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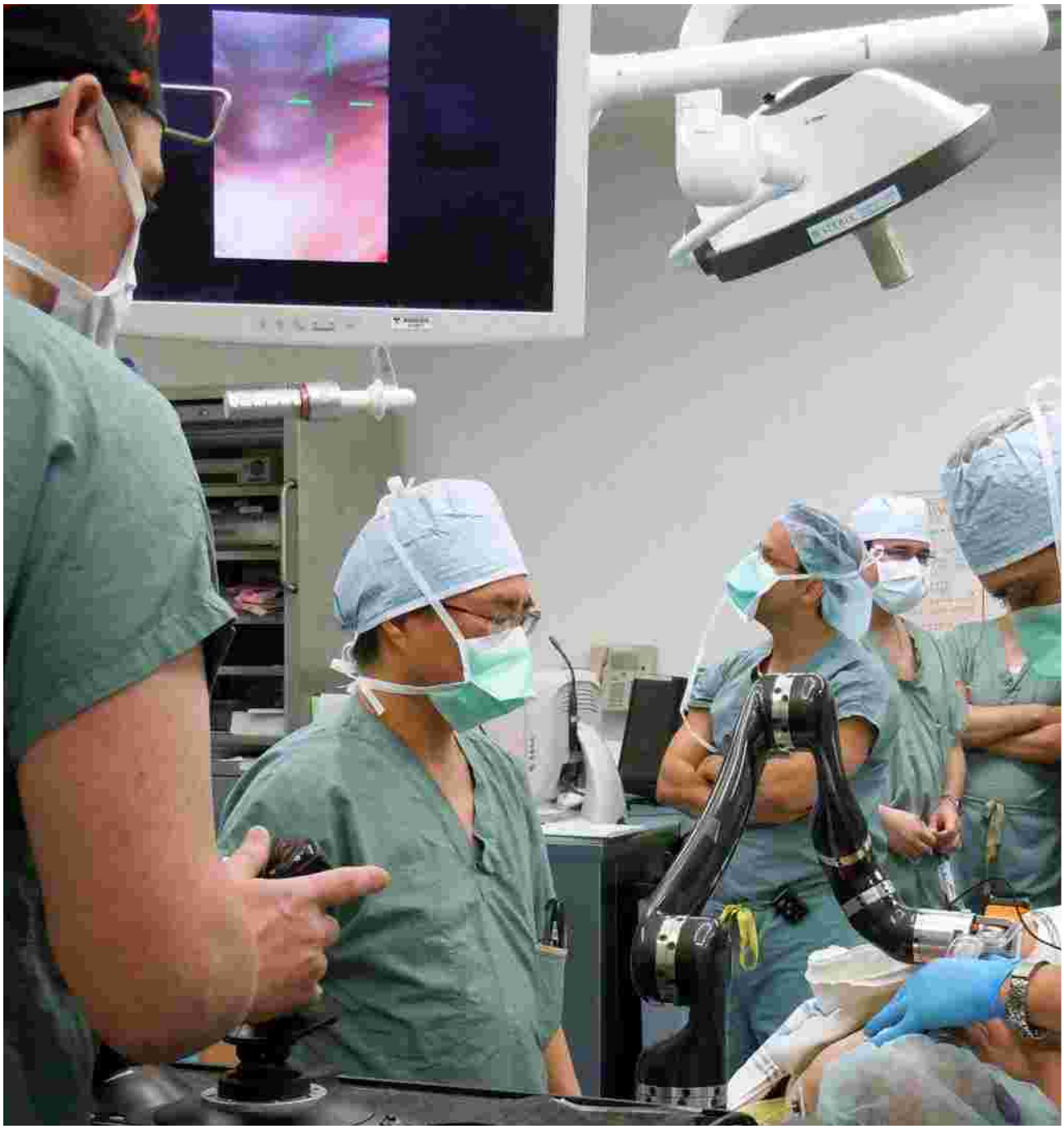

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EDITORIAL VIEW

Low sodium; a high risk in perioperative pediatric patients

Zulfiqar Ahmed, M.B.,B.S. F.A.A.P.

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Perioperative fluid therapy is aimed at providing maintenance fluid requirements, at correcting fluid deficit and at providing the volume of fluid needed to maintain adequate tissues perfusion. It gets more important in pediatric population as the little shift in the small total volume of intracellular and extracellular compartments in these patients is multiplied many folds in its effects. Perioperative fluid therapy has been suggested to be a medical prescription adapted to the patient status, the type of operation and the expected events in the postoperative period of which both the volume and the composition matter.

The landmark article in which Holliday and Segar[1] proposed the rate and composition of parenteral maintenance fluids for hospitalized children has been the mainstay of much of our practice of fluid administration in the perioperative period even to this day. However, the glucose, electrolyte, and intravascular volume requirements of the pediatric surgical patient may be quite different than the original population described, and consequently, use of traditional hypotonic fluids proposed by Holliday and Segar has been questioned, e.g. hyperglycemia and hyponatremia, in the postoperative surgical patient. There is significant controversy regarding the choice of isotonic versus hypotonic fluids in the postoperative period[2].

Holliday and Segar calculated maintenance electrolytes from the amount delivered by the same volume of human milk. Daily sodium and potassium requirements are 3 mmol/kg and 2 mmol/kg respectively in children. Thus, the combination of maintenance fluid requirements and electrolyte requirements results in a hypotonic electrolyte solution. Since the publication of this paper, the usual intravenous maintenance fluid given to children by pediatricians for decades has been one fourth-to one half-strength saline and usually 5% dextrose[3].

The dextrose is added to prevent assumed hypoglycemia in infants and smaller children. Although, very important in this group of patients, the risk of preoperative hypoglycemia has been demonstrated to be low in normal healthy infants and children (1-2%), despite prolonged fasting periods[4-6] as energy requirements during anesthesia are close to basal metabolic rate. Although neonates have a higher metabolic rate and an increased risk of perioperative hypoglycemia and lipolysis, but during anesthesia, even in neonates, both oxygen consumption and metabolic rate are decreased, and this may lead to reduced intraoperative glucose requirements.

Hyperglycemia, on the other hand, can induce osmotic diuresis and consequently dehydration and electrolyte disturbances. Several animal studies have also demonstrated that hyperglycemia will increase the risk of hypoxic-ischemic brain or spinal cord damage. Conversely, administering glucose containing solutions (to prevent hypoglycemia) has predisposed the pediatric patients to dangerously low levels of sodium. The fact is that dextrose containing solutions with low sodium is still administered as a perioperative fluid of choice in many parts of the world. This practice has already led to many cases of hyponatremia and brain injury or death[7]. For practical purposes, in the peri-operative environment, D5 0.45% solution is hypotonic. The sodium in such glucose containing solutions needs to be low to maintain isotonicity. These solutions become effectively hypotonic once the fluid enters the blood stream and the glucose becomes metabolized. This may occur when these solutions are utilized in the intraoperative or post-operative time period. Recent studies have focused attention on the incidence of postoperative hyponatremia and associated morbidity and mortality rates, generating debate on the advisability of perioperative fluid therapy and calling into question both the effectiveness of this strategy and the quantities used[8].

Improper fluid therapy has just compounded the problem of hyponatremia, that may have other causes as well,

including pituitary or adrenal insufficiency, brain injuries or brain tumors associated with salt losses, and inappropriate secretion of ADH. Plasma ADH is often increased in postoperative period as a result of hypovolemia, stress, pain, or traction of dura mater. The combination of ADH secretion and infusion of hypotonic fluids will produce dilutional hyponatremia. Normally, the kidneys are able to excrete in excess of 20l/d of electrolyte-free water. In water intoxication, dilutional and hypotonic hyponatremia ensues from a rapid intake of a large volume of parenteral electrolyte-free fluid in excess of renal excretion over a short period of time. As free water is retained, hyponatremia develops. The resultant hyponatremia causes osmotic movement of free water across cell membrane from extracellular to intra-celllular compartment and the brain is the most seriously damaged organ[9]. Some of the risk factors are postmenarchal female gender, and prepubescent children. In post menarchal women, estrogen seems to impair the ability of brain to adapt to hyponatremia. Children are more susceptible to brain edema then adults because of the ratio of brain size and intracranial capacity. By the age of six years, the brain size of a child is the same size as adult while the skull continues to grow until the age 16 to adult size. Hence the capacity of CSF to buffer the brain expansion is relatively less in children then adults.

In older infants the occurrence of iatrogenic hyponatremia in this way has led to a critical reappraisal of the validity of the Holliday-Segar method for not only calculating maintenance fluid requirements, but also the choice of solution, in the postoperative period. The emphasis needs to be laid, now, on prevention of hyponatremia, which is the most common electrolyte disorder in hospitalized patients, with an incidence of approximately 1%-4%[10-13]. In fact, excess total body water in the presence of a small serum sodium concentration can result in an increase of extracellular water, cerebral edema, and potential brain herniation. Cerebral edema can manifest as nausea, headache, confusion, lethargy, convulsions, seizures, or coma. Radiological diagnosis of cerebral edema is difficult, if not impossible. Other signs and symptoms may include hemiparesis, ataxia, nystagmus, tremor, rigidity, aphasia, muscle cramps, and fasciculations[12,13]. Severe hyponatremia is also associated with cardiopulmonary dysfunction, including arrhythmias, hypotension, hypoxemia, and pulmonary edema[12]. In the perioperative period, these signs may easily be confused with adverse effects of the anesthetic drugs and agents being used, thus delaying the proper and adequate treatment of the actual cause. Often the respiratory arrest is the first manifestation of such electrolyte imbalance because the hyponatremia progress unnoticed till it is too late. The mortality rate of hyponatremia in hospitalized patients is reported to be 7- to 60-fold more frequent compared with normonatremic controls[14].

Anesthesiologists should maintain an index of suspicion for hyponatremia from water intoxication in patients with neurologic symptoms during the perioperative period. Routine preoperative instructions regarding maximum perioperative water intake and inquiry into any concurrent alternative medical therapies may help to avoid this preventable complication. A careful intraoperative monitoring and adaptation of the infusion rate as needed is crucial because the glucose and fluid requirements may vary widely between subjects. Conceptionally, the distinction between maintenance requirements, deficits and ongoing loss is helpful. Although the pathophysiological basis for parenteral fluid therapy was clarified in the first half of the 20th century, some aspects still remain controversial.

Dextrose containing solutions are an inappropriate choice for perioperative fluid losses such as blood loss and insensible loss and urine output, and by all means, in infants and young children, 5% dextrose solutions should be avoided; 1% or 2% dextrose in lactated Ringer may be more appropriate[15]. Only children who are risk for hypoglycemia should receive dextrose containing solution. These children include neonates in the first few days of life, patients on total parenteral solutions, children with low body weight (less then 3rd percentile) or born to diabetic mothers among others.

It may be reasonable to choose a solution for fluid replacement which has a composition comparable to the composition of the fluid which must be replaced. In any case, only isotonic solutions should be used in clinical situations which are known to be associated with increases in antidiuretic hormone (ADH) secretion. In this context, it is important to realize that in contrast to lactated Ringer's solution, the use of normal saline can lead to hyperchloremic acidosis in a dose-dependent fashion[16].

In summary, administration of dextrose containing fluids in pediatric patients in the peri-operati ve environment should be strongly discouraged and should be reserved in patients at real risk of hypoglycemia. If in doubt blood glucose should be monitored and patient should be followed closely in the post operative period. The fluid therapy in pediatric patients, especially during the perioperative period, must be tailored to the indi vidual patient and careful monitored. Prevention of iatrogenic hyponatremia is an easy to implement practice with a high dividend. "First of all, do no harm".

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APICARE UPGRADED

We proudly announce that Anaesthesia, Pain & Intensive Care has been upgraded by Higher Education Commission of Pakistan to 'Y' category. It is indeed a great tribute to continuous and dedicated hard work by the members of Editorial Board, our respected reviewers, contributors, researchers as well as our sp onsors. Congratulations!

EDITORIAL VIEW

Sepsis in my view

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Sepsis is a disease process that exists on a spectrum that increases in severity from sepsis to severe sepsis to septic shock. The common thread between these elements is a disseminated inflammatory response to infection characterized by clinical and laboratory findings. Severe sepsis is complicated by organ dysfunction. It is the number one cause of death in the noncoronary intensive care unit. More than 750,000 Americans develop severe sepsis each year in the USA, while the worldwide toll is unknown. Cases of severe sepsis are expected to rise in the future with the increase in the awareness and sensitivity for the diagnosis, number of immunocompromised patients, use of invasive procedures, number of resistant microorganisms, and the growth of the elderly populations[1]. Septic shock is sepsis with refractory hypotension. Over the last decade several strategies to manage septic patients have emerged and have been summarized in international guidelines supported by international medical specialty organizations. Despite extensive research indicating the benefits of these therapies in the management of sepsis, the debate is continuing and research is gearing up[2].

In the past three decades, enormous investment has been made in enhancing critical care resources, yet, mortality from severe sepsis ranges from 28% to 50% or greater. A 2001 study reported that the treatment of severe sepsis resulted in an average cost of $2200 per case, with a nationwide annual total cost of over $16.7 billion. [2,3]

Any type of bacteria, and fungi and (rarely) viruses may produce this condition. Toxins released by the bacteria or fungi may cause tissue damage, and may lead to low blood pressure and poor organ function. Some researchers think that blood clots in small arteries are responsible for low blood flow and poor organ function.

Septic shock occurs most often in the very old and the very young. It also occurs in people who have other illnesses; and has a crude mortality rate of 45% and claims the lives of 90,000 people each year in the USA alone.[3] An epidemiological survey in France of over 100,000 intensive care unit (ICU) admissions, indicates the incidence of septic shock before or following admission to ICU is rising and now affects almost 10% of this patient population.[4] Given the scale and associated costs of this problem,[3,5] it is not surprising that developing solutions has been a focus of researchers, clinicians, and the pharmaceutical industry. The intensive care specialists took the challenge to overcome the current situation and to reduce sepsis mortality significantly by implementing evidence based clinical standards for the diagnosis and treatment of sepsis worldwide. New strategies, including tight glycemic control, early hemodynamic goal-directed therapy, infusion of activated protein C, and use of corticosteroids (still for debate), have shown some promise in prevention and/or treatment of sepsis and septic shock..

Risk factors for septic shock include; diabetes, diseases of the genitourinary system or intestinal system, AIDS, indwelling catheters (those that remain in place for extended periods, especially intravenous lines and urinary catheters and plastic and metal stents used for drainage), leukemia, long-term use of antibiotics, recent use of steroid medications and many more.

Sepsis is defined as the presence of infection in association with SIRS. The presence of SIRS is, of course, not limited to sepsis, but in the presence of infection, an increase in the number of SIRS criteria observed should alert the clinician to the possibility of endothelial dysfunction, developing organ dysfunction, and the need for aggressive therapy. Certain biomarkers have been associated with the endothelial dysfunction of sepsis; however, the use of sepsis-specific biomarkers has not yet translated to establishing a clinical diagnosis of sepsis in the emergency department (ED). There is a promise of procalcitonin use as a marker in early identification of such septic patients.

With sepsis, at least one of the following manifestations of inadequate organ function/perfusion is typically seen:

- Alteration in mental state
- Hypoxemia; PaO_2 < 72 mmHg at F_iO_2 of 0.21; overt pulmonary disease not the direct cause of hypoxemia
- Elevated plasma lactate level
- Oliguria (urine output < 30 ml or 0.5 ml/kg for at least 1 h)

Severe sepsis is defined as sepsis complicated by end-organ dysfunction, as signaled by altered mental status, an episode of hypotension, elevated creatinine concentration, or evidence of disseminated intravascular coagulopathy (DIC).

Septic shock is defined as a state of acute circulatory failure characterized by persistent arterial hypotension despite adequate fluid resuscitation or by tissue hypoperfusion (manifested by a lactate concentration greater than 4 mg/dl) unexplained by other causes. Patients receiving inotropic or vasopressor agents may not be hypotensive by the time that they manifest hypoperfusion abnormalities or organ dysfunction.

We all agree that treatment strategies of sepsis should start in the emergency room and we should start the antibiotics within the hour after blood work is drawn. The success of treatment depends upon early detection of high-risk patients, appropriate antimicrobials, source control, hemodynamic optimization (clarity in fluid therapy and vasopressor selection), and the results of large-scale efforts to implement bundles of care. Recently, the sepsis surviving campaign has issued the latest recommendations for treatment of septic shock, but the debate about the use of steroids is still going on. In my opinion, it has a definitive role and should be used in refractory hypotension.

In 2001, a landmark paper, "Early goal-directed therapy in the treatment of severe sepsis and septic shock", altered the clinical landscape of sepsis management. Two hundred and sixty-three patients with severe sepsis, defined as two SIRS criteria, a source of infection, and a serum lactate>4 mmol/l, and systolic blood pressure <90 mmHg after adequate fluid challenge, were randomized to receive either standard therapy or early goal-directed therapy (EGDT). During the first six hours of care, patients in the EGDT arm received statistically significantly more intravenous fluids, inotropes, and blood transfusions. By moving an aggressive, algorithmic resuscitation strategy to the proximal phase of critical infection and inflammation, Rivers and colleagues demonstrated a 16% absolute reduction in in-hospital mortality. This reduction in mortality was accompanied by a decreased use of vasopressors and mechanical ventilation over the first 72 hours of hospitalization. These results spurred a renewed interest in improving sepsis management in the ED and led to numerous implementation studies and quality improvement initiatives, showing improved in-hospital, 28 day, and up-to-one-year mortality with implementing EGDT [5].

We recognized more than a decade ago that the widespread and perhaps indiscriminate use of an extremely expensive and marginally effective therapy for septic shock could have serious economic implications for many hospitals. One of these is Drotrecogin Alpha Activated protein C[6].

Many times in humans, sepsis is caused by fungi or gram-positive bacteria. Drugs that are effective against endotoxin or gram-negative bacteria may not have the same effect on other pathogens. The report continues: In sepsis there are multiple clinical, microbiologic, and host derived indicators of prognosis that are difficult to control, such as severity of underlying disease, co-morbidities, degree of organ dysfunction, and adequacy of antibiotic therapy. Remarkably, Bernard and his colleagues, in a landmark New England Journal of Medicine article describing the so-called PROWESS trial, demonstrated that drotrecogin alfa or recombinant human activated protein C has anti-thrombotic, anti-inflammatory and pro-fibrinolytic properties. Treatment with this human activated protein C (marketed by Eli Lilly as Xigris®), significantly reduces mortality in patients with severe sepsis. The treatment was effective regardless of age, severity of illness, the number of dysfunctional organs or systems, the site of the infection and the type of infecting organism.[5,6]

At the integrated hospital system level, I believe drotrecogin alfa requires widespread coordination of pharmacy department efforts to appropriately utilize this new entity. Intrasystem coordination is essential in the sharing of data about the number of sepsis cases, their clinical characteristics, and outcomes with and without the use of drotrecogin alfa[7]. Integrated systems should have a systemwide approach to drotrecogin alfa use, emphasizing a judicious and circumspect prescribing behavior on the part of all clinicians.

A retrospective analysis using electronic database for patients who received drotrecogin alfa from June 2008 until April 2011 was conducted at our 20-bed intensive care unit (ICU) at a governmental hospital in Al Ain, United

Arab Emirates. Among the 41 patients who recei ved drotrecogin alfa, the indication w as appropriate for 32 (78%). We conclude that strictly following the institutional protocols can have a big impact in minimizing wastage by better selection of candidates for drotrecogin alfa.

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NOT-TO-BE-USED ABBREVIATIONS

In 2001, The Joint Commission issued a Sentinel Event Alert on the subject of medical abbreviations, and just one year later, its Board of Commissioners approved a National Patient Safety Goal requiring accredited organizations to develop and implement a list of abbreviations not to use. In 2004, The Joint Commission created its "do not use" list of abbreviations as part of the requirements for meeting that goal.

On the list used by the European Association of Science Editors (www.ease.org.uk), Tom Lang has posted a link to a list of abbreviations that one organization has recommended should not be used, apparently because they have been associated with confusion leading to serious adverse events (http://www.jointcommission.org/facts_about_the_official_/).

Some of these abbreviations are very common in health research. Experience with manuscripts from different parts of the world shows that some of them -particularly the ones that use Greek letters and other symbols not available on the keyboard- - may cause character conversion errors, and that these errors are not always detected at proof stage. If dosages of radiation or drugs are involved, the potential for accidents may be worth considering.

ORIGINAL ARTICLE

A comparison of APACHE II and APACHE IV scoring systems in predicting outcome in patients admitted with stroke to an intensive care unit

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ABSTRACT

Introduction: Stroke is the second major cause of death worldwide. APACHE IV is a successful scoring system assessing severity of illness and prognosis of ICU patients. The objective of this study was to compare APACHE IV scoring system for patients admitted with stroke with APACHE II scoring system Methodology: We included all patients with the diagnosis of stroke, who were admitted to intensive care unit of our hospital for tracheal intubation and mechanical ventilation, between 1 January 2008 and 1 February 2009 from prospectively collected ICU database. Observed mortality rates were compared with predicted mortality rates for both the APACHE IV and APACHE II scoring systems, SMR, sensitivity and specificity were determined. The mortality percentages were predicted using the APACHE IV system and were compared with the observed data. The statistical analysis was carried out using SPSS for Windows version 15.0. The qualitative variables were compared to a _2 (chi-squared) test.

Results: Fifty five patients were included in the study, with an average age of 76.5±11.5 years for male patients and 72±5 years for females. The overall mortality observed was 34.54% in all the patients (19/55 patients). Apache IV predicted mortality rate sensititivity and specificity were 94.7% and 94.4% respectively, SMR of 0.95 and diagnostics value was 94.5%. Apache II predicted mortality rate sensitivity and specificity 100% and 86.1%, SMR of 0.79 and diagnostics value was 90.9%.

Conclusion: Predicting outcome in stroke patients is difficult due to the variability in etiology, presentation and underlying patho-physiology. We conclude that APACHE IV scoring system is equally better as the APACHE II system in predicting mortality rate in ICU stroke patients. APACHE IV (score of >84) gives probably a more reliable prediction of high risk of death in patients with stroke than APACHE II (score >24).

Key Words: Intensive care unit; mortality prediction; APACHE IV; APACHE II; stroke

Citation: Ayazoglu TA. Validation of the APACHE IV scoring system in patients with stroke: A comparison with the APACHE II system. Anaesth Pain & Intensive Care 2011;15(1):7-12.

INTRODUCTION

Stroke is a major health problem and the second major cause of death worldwide. As the population ages, its significance will grow[1,2]. The Oxford Vacular Study reported that the incidence of cerebrovascular events was 1.2-fold higher than coroner events[3]. There are about 5.5 million deaths yearly and an estimated loss of 49 million disability adjusted life years worldwide[4,5]. Stroke can occur at any age, but half of all strokes occur in people aged over 70 years. About 80% of all acute strokes are ischaemic, usually resulting from thrombotic or embolic occlusion of a cerebral artery[6].

The survival, recovery and final outcome in stroke patients depends on various variables such as neurological damage,

age, hypertension, diabetes, smoking, atrial fibrillation (AF)[7,8] and social factors. Intensive care units (ICUs) have played a vital role in the practice of stroke patients. The ICU provides advanced and resource-intensive treatment for the sickest hospitalized patients. Critically ill patients frequently require mechanical ventilation, circulatory support, and other assist devices; but it is still not clear whether intensive care treatment does provide any help to patients with stroke, since most of them have a very poor prognosis despite intensive care treatment.[9-13]

The use of scoring systems to predict risk of mortality and evaluating outcome in critically ill patients is important in modern evidence-based medicine. Clinicians can predict the outcome for patients, who are severely ill and for those who have a good prognosis. Measuring the severity of disease and prognosis in patients in the ICU is very important, because it effects the quality of patient care across ICUs, but this cannot be done without some objective index of disease severity. Predictive scoring systems can provide a stable fundamental principle and help clinical decision making. The other objective is to identify ICUs requiring longer or shorter length of stay (LOS). Accurate prediction of LOS of stroke patients in ICUs is critical to ICU outcome assessment, its resource management and floor management.

APACHE (Acute Physiology and Chronic Health Evaluation) scoring system[11] takes into consideration various parameters like physiological variables, vital signs, urine output, neurological score, along with age related parameters and comorbid conditions, which may have a significant impact on the outcome of these critically ill patients.

APACHE II has been used worldwide for measuring ICU performance[14,15]. The system, outlined by Knaus[16] et al. in 1985, has been validated in many clinical trials, and is a commonly used ICU severity of illness estimation. APACHE II estimates risk, based on data available within the first 24 h of ICU stay.

APACHE III was developed in 199117 and this system was designed to predict an individual's risk of dying in a hospital. Disease-specific scoring systems have been developed for several important subgroups treated in the ICU. APACHE IV is the newest standardized scoring system to assess the severity of illness and prognosis in the ICU and new variables added to APACHE III like mechanical ventilation, thrombolysis, impact of sedation on Glasgow Coma Scale, rescaled Glasgow Coma Scale, PaO_2: F_iO_2 and disease-specific subgroups.[18-20]

We compared the performance of the APACHE IV system with APACHE II in ICU stroke patients.

METHODOLOGY

This study was carried out at an 11 bedded ICU. Fifty five patients, ³65 yrs of age, who had been admitted with stroke into the ICU, were included in the study. These patients were either admitted from emergency room or transfered from another hospital; evaluated clinically and CT scans were performed to confirm the diagnosis. The necessity of tracheal intubation and mechanical ventilation was the leading cause of admission to ICU. We included all ICU patients with the diagnosis of stroke between 1 January 2008 and 1 February 2009 from a prospectively collected ICU database.

The patients aged under 65 years old or readmitted during the study period and those transferred from other ICUs or with a stay of less than 24 h were excluded.

The day after ICU admission the worst values on APACHE IV and APACHE II variables(worst measurement observed during 24 h following ICU admission) were abstracted from clinical and laboratory records and APACHE scores were calculated using an online APACHE score calculator. Observed mortality rates were compared with predicted mortality rates for both the scoring systems and standardized mortality ratios (SMR) and sensitivity, and specificity were determined. APACHE -IV predicted ICU-LOS of stroke patients were compared with observed ICU-LOS and days on mechanical ventilation.

Statistical analysis was carried out using a software package (SPSS for Windows; version 15.0) and p values less than 0.05 were considered significant. All data were tested for normal distribution with the Kolmogorov-Smirnov test before further statistical analysis. Differences between study groups were assessed using the Mann Whitney U test. The Wilcoxon signed rank test was used for paired comparisons of abnormal distribution variables into the groups. The qualitative variables was compared to a _2 (chi-squared) test.

Receiver operating characteristic (ROC)[21] curve, is a graphical plot of the sensitivity, or true positive rate vs false positive rate (1_specificity or 1-true negative rate), for a binary classifier system as its discrimination threshold is varied. The ROC can also be represented equivalently

by plotting the fraction of true positives out of the positives (TPR = true positive rate) vs. the fraction of false positives out of the negatives (FPR = false positive rate). The area under the ROC curve was measured to test discrimination.

The SMR with 95% confidence intervals were calculated and the differences between observed and predicted numbers of ICUs deaths were analyzed.

RESULTS

In this study the average age of male patients was 76.5±11.5 and of female patients was 72±5 years. There was no difference between gender (p>0,05); but the age was the most significant factor for stroke associated mortality in both sexes (p=0,000) (Table 1)

Table 1: Demographic variables

Gender	Non-survivors		Survivors		p
	N	%	N	%	
Female	9	47,4	10	27,8	0,146
Male	10	52,6	26	72,2	
Total	19	100	36	100	
	Mean±SD	Range	Mean±SD	Range	
Age (years)	77,1±6,5	65-88	69,1±4,3	65-79	0,000

Twenty three patients had hemorrhagic infarction (41.8%) and thirty two had ischemic infarction (58.1%). Twelve patients out of 23 of the hemorrhagic group (52.17%) and seven out of 32(21.8%) in the ischemic infarction group died. The overall mortality observed was 34.54% in all the patients (19/55 patients) (Table 2).

Table 2. Stroke subtypes

Subtypes	N	Non-survivors	Survivors
Ischemic	32	7/32 (21.8%)	24 /32(78.2%)
Hemorrhagic	23	12/23 (52.17%)**	11/23 (47.83%)
Total	55	19/55	36/55

**p < 0.01

Mean observed ICU-LOS (19±8 days) for non-survivors, and (16±6) for survivors was significantly greater than APACHE -IV predicted ICU-LOS. Length of ventilation period was18±8 days in ICU for non-survivors, and 13±7 days for survivors (p<0.05)(Table 3).

Table 3. APACHE-IV LOS ICU and ventilation period: Comparison of non-survivors and survivors

	Non-survivors			Survivors			P
	N	Mean±SD	Range	N	Mean±SD	Range	
LOS ICU day	19	19±8	7-39	36	16±6	9-45	0.037
LOS Vent.D	19	18±8	7-39	36	13±7	6-45	0.012
Predicted ICU LOS	19	5.5±0.8	3.9-7.5	36	6±0.8	4.7-8	0.021

LOS: lenght of stay Vent.D: Ventilated Day

Predicted ICU lenght of stay was significantly short both in non-survivors and survivors group (p<0.05).

APACHE IV, APS and APACHE II scores were significantly elevated non-survivors groups (p=0.000)(Table4).

Table 4. Comparison of non-survivors and survivors scoring systems

	Non-survivors			Survivors			P
	N	Mean±SD	Range	N	Mean±SD	Range	
APS score	19	89.6±13.7	74.0-115.0	36	68.1±10.6	45.0-91.0	0.000
AP II score	19	28.9±3.7	25.0-40.0	36	21.4±3.1	14.0-27.0	0.000
AP II Pred							
M.Rate	19	0.66±0.10	0.53-0.91	36.00	0.41±0.10	0.19-0.61	0.000
AP IV score	19	105.4±14.9	84.0-139.0	36	79.9±11.6	50.0-103.0	0.000
AP IV Pred							
M.Rate	19	0.65±0.11	0.50-0.89	36.00	0.38±0.09	0.17-0.52	0.000

APACHE-IV, APS and APACHE-II scores were significantly elevated in non-survivors groups (p=0,000).
APS = Acute Physiology Score *APS is the acute physiology score derived from APACHE IV
AP II = Acute Physiology and Chronic Health Evaluation-II
AP IV= Acute Physiology and Chronic Health Evaluation-IV
Pred. M.Rate = Predicted mortality rate

Tables 4, 5 and 6 provide patient data in relation to APACHE IV and II scores, observed deaths and predicted mortality rates.

Table 5: Apache-IV predicted mortality rate * situation crosstabulation

		Situation		Total	
		Non survivors	Survivors		
Predict Apache IV	deaths	18	2	20	%36.3
	discharged	1	34	35	
Observed		19	36	55	%34.5

Sensitivity = 18/19 = 94.7% Specificity = 34/36 = 94.4% Diagnostics value (18+34) + 55= 94.5%
SMR 19/20=0.95

The mean APACHE IV score was 88.7 (±17.6), sensitivity was 94.7%, specifity was 94.4%, diagnostics value was 94.5% and was SMR of 0.95. Mean APACHE II score was 24 (±4.9) and sensitivity was 100%, specifity was 86.1, diagnostics value was 90.9% and was SMR of 0.79.

APACHE IV predicted deaths were 36.36% and APACHE II were 43.63%. Observed mortality rate was 34.54% (Table 5 and 6).

Table 6: APACHE-II predicted mortality rate * Situation Crosstabulation

		Situation		Total	
		Non survivors	Survivors		
Predict Apache II	deaths	19	5	24	%43,6
	discharged	0	31	31	
Observed		19	36	55	%34,5

The sensitivity = 19/19 = 100% Specificity = 31/36 = 86,1% Diagnostics value (19+31)/55= 90,9%
SMR=19/24=0.79

The area under ROC curve was 93% for APACHE IV and 98% for APACHE II (Fig 2,3), (Table 7). The predictability of APACHE II was more sensitive than APACHE IV but APACHE IV predictions was more selector and more reliable than APACHE II.

Table 7: Area Under the Curve; Test Result Variable(s)

	Area	Std. Error(a)	Asymptotic Sig.(b)	Asymptotic 95% Confidence Interval	
APACHE IV Score	.935	.033	.000	.871	.999
APACHE II Score	0.981	0.014	0.000	0.95	1.00

The square under the curve 93% (confidence interval 0,87 - 0,99; p<.001) was found APACHE IV. The distinction of non-survivors situation was 93%. The square under the curve 98% (confidence interval 0,95 - 1,00; p<.001) was found APACHE II. The distinction of non-survivors situation was 98%

Acute Physiology Score (APS) was derived from APACHE IV. Mean APS score was 75.5 (±15.5). APACHE IV, APS and Apache II scores were significantly different betweeen survivors and non-survivors groups (p=0.000). All scores were significantly higher in non-survivors. It was also observed that the likelihood of mortality increased as the score increased

DISCUSSION

In the ICU, risk adjustment and mortality prediction has usually been performed using severity score taxonomies such as the APACHE score, the Simplified Acute Physiology Score (SAPS) or the Mortality Prediction Model (MPM) and their updated derivatives[22]. Apache IV model is the most recent version and it used the same variables as APACHE III[21] but new variables added and disease-specific subgroups.

The results from our study demonstrate that the APACHE IV prognostic scoring system better predicts mortality rate than APACHE II scoring system.

Stroke severity at onset and patient age are the most important factors for predicting prognosis[1]. Burtin et al. emphasized that age was the most significant independent

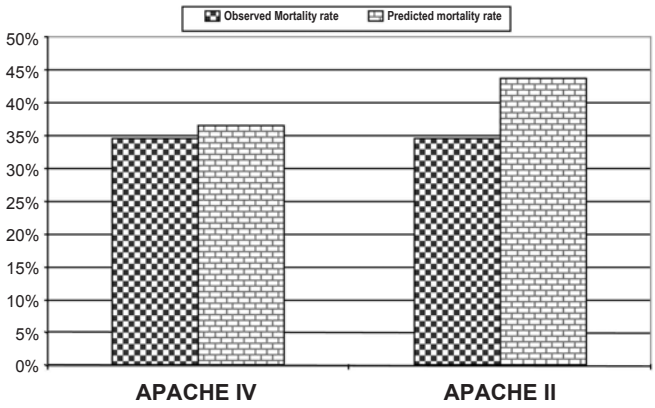

Figure.1: Comparison of observed vs predicted mortality rates

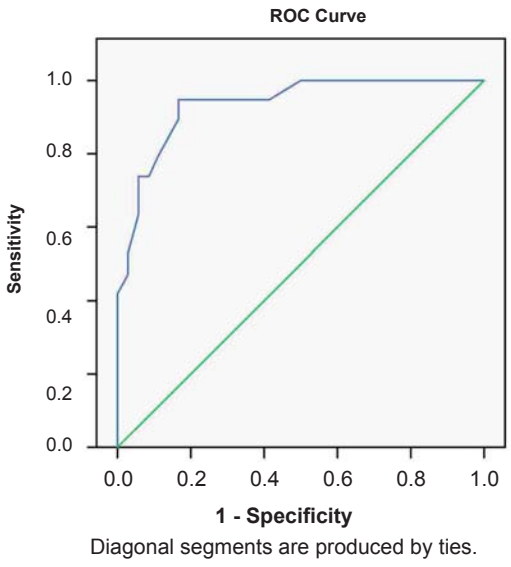

Figure 2: APACHE IV score ROC curve

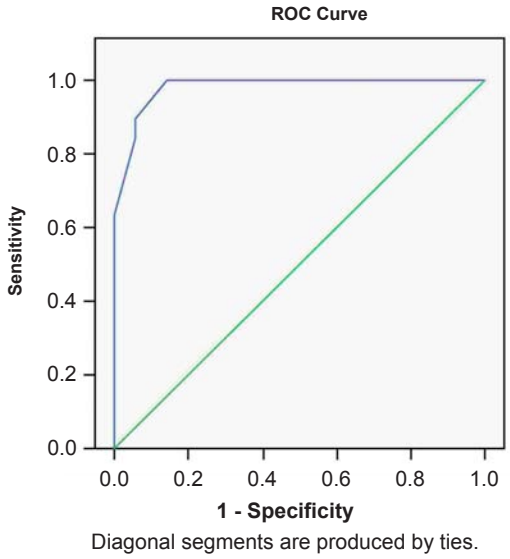

Figure 3. APACHE II score ROC curve

risk factor for stroke-associated mortality in both sexes.[11] In this study there w as no difference betw een gender (p>0.05) but the age of non-survivors was seen to be more than the survivors (p=0.000) (Table 1).

The total mortality observed was 34.54%. The patients with hemorrhagic infaction group had a higher mortality (52.17% vs 21.8%) than those with isc hemic infarction (Table 2). Per Thorvaldsen et al reported that the case-fatality rates for stroke at 28 days varied from 15% to 49% among men and from 18% to 57% among w omen18. Bhalla A. et al. re ported an overall mortality, due to all causes, of 34% in all strok e patients[23]. In our study mortality rate is similar to other studies.

The APACHE system is the only v alidated ICU risk-adjustment model that provides performance information about two separate outcomes of care, e.g. mortality and ICU length-of-stay (LOS).

Prediction of duration of a patient's sta y in the ICU, however, is difficult and less studied than the prediction of mortality[24]. Prolonged stay in the ICU not only increases the overall costs and consumes more resources, but also limits the number of beds available for use.

Kakar et al experienced that the predictive ICU length of stay and mortality percentage did not correlate in severe acute pancreatitis[25]. We found that APACHE IV predicted ICU lenght of stay was not correlated and significantly short for both non-survivors and survivors groups p<0.05 (Table 3).

APACHE IV, APS and APACHE II scores were elevated in non-survivors groups. It was observed that the likelihood of mortality increased as the score increased (T able 4).

Daley at al point outed that APACHE II has been widely used for measuring ICU perfor mance but this scoring system was not disease spesific[26]. Bhattacharyya et al found it to overestimate ICU perfor mance and suggested that APACHE IV might be more relev ant to estimate ICU performance[27].

The SMR of 0.95 and predicted mortality rate sensitivity was 94.7% and the specificity was 94.4% for APACHE IV. SMR of 0.79 and predicted mortality rate sensitivity was 100% and the specificity was 86.1% for APACHE II. The correctness was 94.5% for APACHE IV and 90.9% for APACHE II .

We found that AP ACHE IV w as more sensiti ve than APACHE II in our study (Table 5-7, Figure 2,3)

APACHE IV scoring system better predicts mortality rate than APACHE II scoring system in our study, which may be the result of having disease-specific subg roups and including a specific reason for ICU admission in its risk prediction. Thus, this may be a better alter native and a good, effective predictor of short term outcome in elderly stroke patients in ICU.

CONCLUSION

Predicting outcome in stroke patients is difficult due to the variability in etiolog y, presentation and underlying patho-physiology. In this study, APACHE IV (score of >84.5) is probably a more reliable prediction of high risk of death in patients with stroke than APACHE II (score >25.5). APACHE IV score is a valid mode of predicting outcome in stroke patient. Further comprehensive studies are needed to supplement our finding.

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ORIGINAL ARTICLE

A comparative study of supraclavicular versus infraclavicular approach for central venous catheterization

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ABSTRACT

Objective: Supraclavicular approach to subclavian vein catheterization is still being employed less often than traditional infraclavicular approach. The purpose of this study was to compare the two techniques regarding number of attempts, success rate of catheterization and complications associated with the procedure .

Place of study: Surgical Intensive Care Unit (SICU) of Rehman Medical Institute, Peshawar (Pakistan).

Duration of study: 1st June 2010 to 30th December 2010

Method: We included 144 adult patients of either sex undergoing central venous catheterization for various indications, selected by nonrandom sampling, in the study. They were divided into the supraclavicular and infraclavicular groups (72 in each group). Right subclavian vein of the patient was chosen in all patients for catheterization. Variables for comparison included number of attempts, success or failure of catheterization and complications associated with the procedure in each group. Statistical analysis was done by applying Chi-square test and Student's Independent Samples T-test.

Results: The overall success rate was 95.83% for right supraclavicular and 87.50% for right infraclavicular approach ($p>0.05$). The number of successful attempts for supraclavicular and infraclavicular approaches were 1.13 ± 0.42 and 1.35 ± 0.69 respectively ($P=0.029$). The complication rate was higher in the supraclavicular group, but the difference was not statistically significant.

Conclusion: The supraclavicular approach to subclavian vein cannulation was found to be a more successful method for adult central venous catheterization with complications comparable to the more commonly used infraclavicular approach.

Key Words: Central venous catheterization; infraclavicular approach; supraclavicular approach

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INTRODUCTION

Central venous catheter (CVC) placement is a routine procedure in the management of critically ill patients in Intensive Care Units (ICU) and Operating Rooms (OR). Central venous access is indicated when peripheral veins are inaccessible, for volume resuscitation, administration of potent vasoactive drugs, frequent blood sampling, total parenteral nutritional support, hemodialysis, hemodynamic monitoring, transvenous cardiac pacing, and administration of long term chemotherapy.[1-3]

The subclavian vein access has been the standard recommended approach for central venous catheterization both for short and long term use. The advantages are attributed to its large size, patient comfort and lowest rate of catheter related infections.[4,5] It also carries a lower risk of thrombosis when compared to femoral or internal jugular vein cannulation.[6,7]

Since the first report of percutaneous catheterization of the subclavian vein, the infraclavicular approach has been widely used.[8,9] Unfortunately this approach is associated with a few well known complications like subclavian arterial puncture, pneumo- and hemothorax, which may be due to vague anatomical landmarks such as controversial skin entry points and ambiguous targets located far from the insertion site.[10] Sometimes these complications are life-threatening.[11-13] Moreover, the approach is influenced by changes in patient's position and shoulder retraction. [14]

As an alternative, the supraclavicular approach for subclavian vein was suggested by Yoffa.[15] This route to the subclavian vein has some distinct advantages over the infraclavicular approach. However, it is less often taught and utilized for reasons that are not clear[14]. Perhaps most of the practitioners have not been trained and taught this technique. Secondly, there may be a fear of directly entering into the pleural cavity and damage to vital structures, and there may be initial difficulty in identifying the landmarks, the angle and proper direction of the needle, resulting in failures.

We compared the two techniques regarding number of attempts, success rate of catheterization and complications associated with the procedure.

METHODOLOGY

This prospective, randomized, comparative study was conducted in the SICU of Rehman Medical Institute, Hayatabad, Peshawar (Pakistan) from 1st June 2010 to 30th December 2010. Permission was obtained from hospital ethical committee and informed consent was obtained either from the patient or from next of kins to carry out the procedure. A total of 72 patients, requiring subclavian vein catheterization for various indications, were included in each of the two groups by nonrandom selection. Right sided supraclavicular and infraclavicular approaches were used in Group A and Group B patients respectively. Both groups were studied with respect to number of attempts, success or failure of procedure and any complications associated with the procedures. Size 16 or 18 G Arrow™ (Teleflex International Ireland) central venous catheters (Saldinger technique) were used in the study. Size of the catheter and single or triple lumen were selected according to need of the individual patients. Size 18 (No-33) and size 16 (No-39) catheters were used in Group A and size 18 (No-42) and size 16 (No-30) catheters were used in Group B patients. Each skin puncture was defined as an attempt and maximum 3 attempts were allowed in either approach and in case of failure, alternate approach (internal jugular) was used for catheterization. All successful cannulations were confirmed by post-procedure chest radiography.

Data were analyzed by SPSS version 15.0 for calculation of descriptive and inferential statistics. The Chi square test was used for comparing qualitative variables, while the Student's Independent Samples T-test was used to compare means. A $p \leq 0.05$ denoted significance.

PROCEDURE

Patients to be catheterized were placed in supine position with head turned to the left side. No roll towel was kept between interscapular region, nor a head down position was used in the study, as it was impracticable on ICU beds. Anterior region of neck and upper chest was cleaned with povidone-iodine solution. All aseptic precautions were used by the operator. Procedure site was draped with sterile towels. Lignocaine plain 1% solution (3-4 ml) was injected to anaesthetize the puncture site and subcutaneous tissue. The claviculosternomastoid angle was identified either by asking the patient to raise his/her head or by palpation. Correct identification of this angle is critical to the success of supraclavicular approach. The needle with attached syringe was inserted at the claviculosternomastoid angle, bisecting it in a direction, 10 degrees from the sagittal plane and 35 degrees posteriorly from the coronal plane. Needle was advanced behind the clavicle and directed towards the contralateral nipple. This approach allows for the shortest distance to the target vessel (2-3 cm) and for the first rib to act as a physical barrier to reduce the risk of pneumothorax. Bevel of the needle was directed medially (9 o'clock position) to facilitate threading of the guide wire in the direction of superior vena cava (Fig. 1). Right sided approach was used because of the lower location of pleural dome, more direct route to superior vena cava, being away from subclavian artery and absence of thoracic duct on this side.

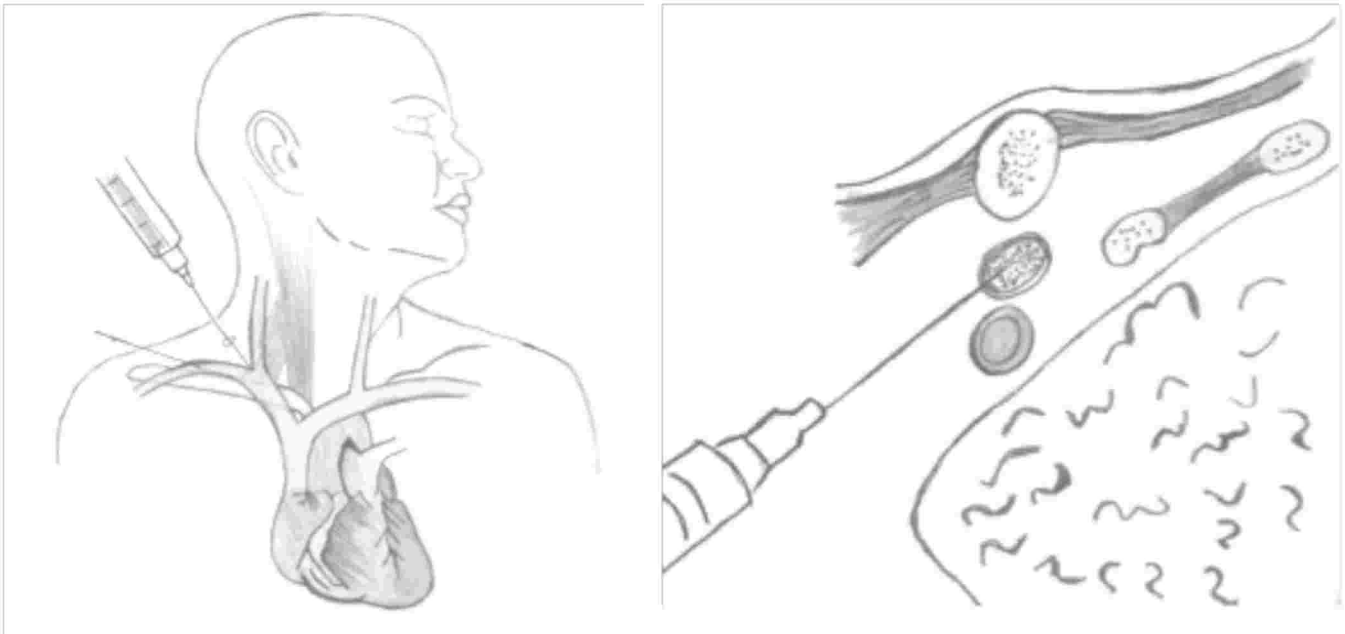

Figure 1(a&b): Supraclavicular approach

Standard approach was used for the infraclavicular approach by selecting point of needle entry 1 cm below the clavicle at the junction of middle and medial third of the clavicle and directing the needle towards the suprasternal notch.

RESULTS

There were 54 males and 18 females in Group A, and 47 males and 25 females in group B; the differences were not statistically significant. The mean age of the patients in group A was 38.26±8.72 years and in group B it was 40.42±9.52 years (p=N.S.)

Results of the successful attempts and the frequency distribution of successful catheterizations are given in Table 1.

Table 1: Frequency distribution of No. of attempts

Attempts	Approaches n(%)		Total n(%) n=144	P value
	Supraclavicular n=72	Infraclavicular n=72		
1	62(86.11)	49(68.05)	111(77.08)	0.042
2	05(6.94)	06(8.33)	11(7.64)	
3	02(2.77)	08(11.11)	10(6.94)	
Unsuccessful	03(4.16)	09(12.50)	12(8.33)	

Overall success rate was 95.8% (69/72) for right supraclavicular approach and 87.5% (63/72) for right infraclavicular approach. Catheterization failed in 3 patients (4.16%) in Group A and in 9 patients (12.50%) in Group B. Comparison of successful attempts is given in Table 2.

Table 2: Comparison of successful attempts of CVC (n=132)

Attempts	Supraclavicular (n=69)	Infraclavicular (n=63)	Total (n=132)	P value
Mean±SD	1.13 ± 0.42	1.35 ± 0.69	1.23 ± 0.58	0.029

Malpositioning of catheter (threaded in contralateral subclavian) was noted in 2 patients in Group A and ipsilateral internal jugular vein in 1 patient in Group B, whereas pneumothorax and subclavian arterial puncture was encountered in 1 and 3 patients respectively in Group A; only 1 arterial puncture was seen in Group B as shown in Table 3. The complication rate was not significant within or inbetween the two groups.

Table 3: Comparison of complications in two Groups (n=72 each)

Complication	Group A n(%)	Group B n(%)	Total n(%)	P value
Malposition	2(2.80)	1(1.40)	3(2.08)	N.S.
Pneumothorax	1(1.40)	0	1(0.07)	
Arterial puncture	3(4.20)	1(1.40)	4(3.47)	
Total	6(8.33)	2(2.80)	8(5.55)	

DISCUSSION

Numerous modifications of Yoffa's original supraclavicular technique[15] have been suggested and tested in cadaver studies and prospective case series. Garcia et al evaluated 83 attempts at subclavian vein catheterization using a modified supraclavicular approach.[17] Successful catheterization was achieved in 98.6% of the attempts with 2 pneumothoraces and 3 subclavian artery punctures.

These findings are in agreement with our present study, where the right supraclavicular approach (as per Yoffa technique) showed success in 95.83% of cases, as compared to a success rate of 87.50% for the right infraclavicular approach. Moreover, the complication rates of the present study are also similar with 1.4% pneumothorax and 4.2% arterial punctures recorded, and total complications of 8.33% compared well to Yoffa's 6.02%.

Identification of landmarks was critical to the success of supraclavicular approach. We found that supraclavicular approach was comparatively easy in thin medium build patients but was difficult in obese patients with short necks. Further, difficulty was faced in unconscious patients who could not lift their head for identification of claviculosternomastoid angle. In such cases manual palpation of the angle was used which usually led to success.

The literature demonstrates the effectiveness of the supraclavicular approach using Yoffa's original technique as well as modifications to landmarks, angles and patient position. No central venous access is without potential complications and no one technique is ideal for every patient.

Large scale, multicentre studies may help in better comparison between the two techniques. A thorough knowledge of anatomy and familiarity with multiple approaches is the route to successful CVC.

CONCLUSION

We conclude that the supraclavicular approach was the more successful method of central venous catheterization compared to the infraclavicular approach.

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ORIGINAL ARTICLE

Oral gabapentin reduces hemodynamic response to direct laryngoscopy and tracheal intubation

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ABSTRACT

Background: Laryngoscopy and tracheal intubation increase blood pressure (BP) and heart rate (HR). We studied the effect of gabapentin 800 mg given orally one hour before surgery on hemodynamic responses to laryngoscopy and tracheal intubation.

Methods: Sixty patients were randomly allocated to one of the two groups. Group I received 800 mg of gabapentin and Group II received placebo with sip of water one hour before the induction of anaesthesia. After standard induction technique, study variables, pulse and noninvasive BP (systolic, diastolic and mean) and HR were noted every minute for first five minutes then at 10 and 15 minutes. Relevant demographic data and study variables were recorded.

Results: Mean systolic BP with Gabapentin was lower compared to placebo but it was significant at 1min (136±22vs149±23), 2min (120±21vs136±24), 10min (107±12vs118±16) and 15 min (106±13vs116±13) after intubation (P<0.05). Mean diastolic BP with gabapentin was significantly lower at 3min (69±15vs74±17) after intubation with P<0.05. Mean BP with gabapentin was significantly lower at 2min (91±18vs103±18), 10min (79±12vs88±13) and 15 min (79±14vs86±12) after intubation at P<0.05. Decrease in HR with gabapentin was significant at 10min (92±15vs101±18) and 15 min (87±14vs99±16) after intubation (p<0.05).

Conclusion: Oral gabapentin decreases the response to laryngoscopy and intubation on systolic BP at 2 min and 15 min; mean arterial pressure at 2, 10 and 15 min and HR at 10 and 15 min following laryngoscopy.

Key Words: Gabapentin; pressor response; laryngoscopy; tracheal intubation

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INTRODUCTION

Endotracheal intubation is required for maintenance of the airway and protection against aspiration of the gastric contents[1]. Direct laryngoscopy and intubation result in an increase in BP and HR[2,3], the so called 'pressor response'. Tachycardia and hypertension cause an imbalance in myocardial oxygen demand and supply, predisposing it to ischemia, infarction and heart failure. Patients with preexisting coronary artery disease and underlying cardiac dysfunction are particularly vulnerable to these changes[4]. Patients with uncontrolled hypertension also show exaggerated response to laryngoscopy and intubation. Different pharmacological agents have been used to obtund this response.

Ultra short acting opioids increase the depth of anaesthesia for a short period[5]. The beta blocker esmolol is used

because of its cardioselective adrenergic receptor blocking properties and ultra short duration of action[6,7]. Several studies have assessed the effectiveness of esmolol in blunting the hemodynamic response to laryngoscopy and tracheal intubation.

Recently, gabapentin has been recommended to decrease the cardiovascular response to laryngoscopy and intubation[8]. It was approved in 1994 by FDA for the control of partial seizures with the combination of other antiseizure drugs[9]. In 2002 it was shown to be effective for postherpetic neuralgia[10] and other painful neuropathies [11], and nerve related pains. Originally developed as an anticonvulsant, it is effective in controlling neuropathic pain, to treat acute postoperative pain and reduce postoperative opioid requirements in clinical trials. We planned to evaluate gabapentin for attenuation of response in BP and HR on direct laryngoscopy and tracheal intubation in normotensive patients undergoing elective surgery.

METHODOLOGY

The study was conducted at Department of Anaesthesia, Hameed Latif Hospital Lahore, from May 2007 to July 2008. After obtaining approval from hospital ethical committee, 60 American Society of Anaesthesiologists class I and II. adult patients, planned for elective surgery were randomly allocated either to gabapentin group or control group. Pregnant patients, known hypertensive and ischemic heart disease patients were excluded from the study. The patients in extremes of age were also excluded.

Patient's demographic data e.g. age, sex, weight, diagnosis and the surgical procedures were noted. Group I patients received 800 mg oral gabapentin, while Group II patients received placebo capsules one hour prior to surgery in the pre operative area. All patients received inj. nalbuphine 0.1 mg/kg approximately 5 minutes before intubation. Induction of general anaesthesia was done with inj. thiopentone sodium 5 mg/kg and inj. rocuronium 0.6mg/kg. Patients were ventilated with facemask and bag for 3 minutes and then intubated after direct laryngoscopy by a trained anaesthetist. HR, systolic, diastolic and mean arterial BPs were recorded just before intubation as a baseline and then 1, 2, 3, 4, 5, 10 and 15 minutes after intubation. Data was collected on a specified proforma and analyzed by computer with software SPSS version 11. Independent variables were gabapentin and placebo while dependent variables were HR, systolic, diastolic and mean arterial BP.

Descriptive statistics were calculated. The ratio between genders was described in percentages while age was described as mean and standard deviation. Mean HR, systolic, diastolic and mean BPs were compared by using paired 't' test. $P < 0.05$ was considered as significant.

RESULTS

The demographic data was comparable between the groups. There was no statistical difference in gender distribution or mean age between two groups (Table 1&2)

Table 1: Gender distribution of the subjects under study [N(%)]

Gender	Study groups		Total
	Gabapentin	Placebo	
Male	17(57.7)	19(63.3)	36(60)
Female	13(43.33)	11(36.67)	24(40)
Total	30(100)	30(100)	60(100)

Table 2: Comparison of mean age of the subjects (in years)

Study groups	N	Mean±SD
Gabapentin	30	37±12
Placebo	30	36±14

Statistical Analysis: t =0.246 P = 0.8 (P>0.05)
There was no statistically significant difference of mean age between two study groups

The patients in gabapentin group as compared to placebo group, showed lower Mean HR but it was statistically significant only at 10 and 15 min after intubation as p value was <0.05 only at these time intervals (Fig 1). Mean systolic BP with gabapentin was lower compared to placebo but it was significant at 1,2,10 and 15 minute after intubation ($P<0.05$). Mean diastolic BP in gabapentin group was significantly lower at 3-minute after intubation with $P=0.05$. Mean arterial BP with gabapentin was significantly lower at 2, 10 and 15 minute after intubation ($P=0.05$)(Fig 2).

DISCUSSION

The results of our study suggest that there was a generalized trend towards less haemodynamic response in the gabapentin group as compared to the placebo group but it gained statistical significance only at some specific points

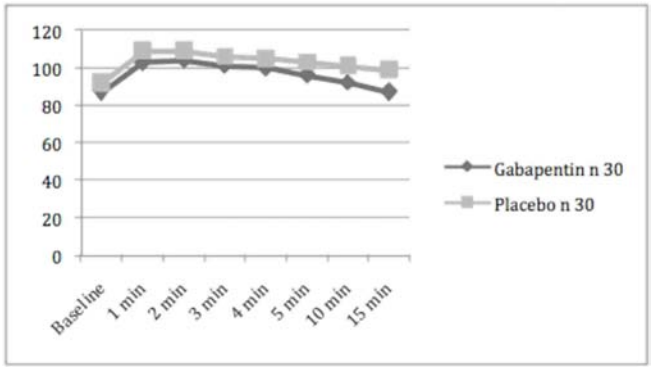

Fig 1: Comparison of HRs before and after laryngoscopy and intubation in two groups

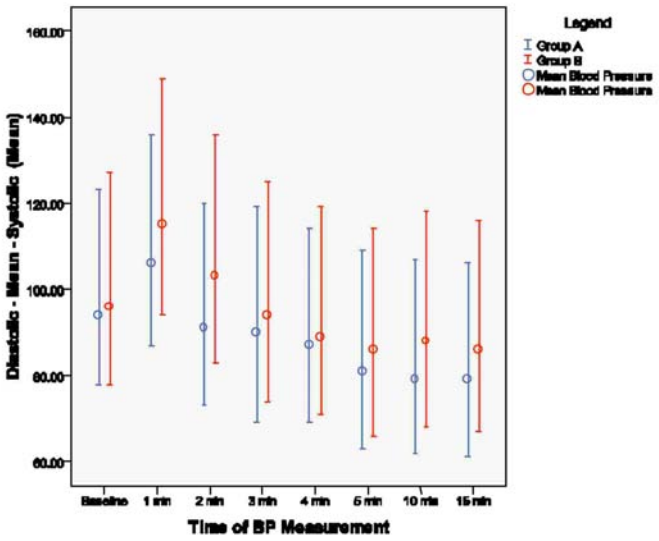

Fig 2: Comparison of systolic, diastolic and mean BPs in two groups

Originally gabapentin was introduced as an anti-epileptic drug. It has also been used as a useful adjunct in the treatment of chronic pain syndromes[12,13]. These studies observed an analgesic effect of gabapentin but they did not realize its hemodynamic effects. The data on this subject is, therefore, limited. Fassoulaki and his colleagues studied the effect of gabapentin on pressor response to direct laryngoscopy and tracheal intubation.[14] They used 1600 mg of gabapentin to one group and placebo capsule to the other group, starting the day before surgery at 6 hours intervals and showed that gabapentin group had less cardiovascular response at all the observed intervals as compared to the placebo group. While in our study, systolic BP was noted to be significantly low at 1, 2, 10 and 15min, but not at 3, 4 and 5 min. The difference in results could be explained by different dosing regimes. Shashi Kiran and Deepak Verma conducted a similar study[15]. Their patients received gabapentin or placebo the night before and on the morning of surgery. Mean systolic BP was significantly lower in the gabapentin group as compared to the control group at 0, 1, 3, 5 and 10 min after intubation; whereas , lower diastolic and mean BPs were noted at 0, 1, 3, and 5 min after intubation. HR was lower in the gabapentin group 0, 1 and 3 min after intubation. The results of our study were similar to this study, as they had used the same strength of gabapentin as we used i.e. 800 mg.

D. Memis et al compared the effects of gabapentin on arterial pressure and HR at induction of anaesthesia and tracheal intubation[16]. Patients receiving placebo (Group I) and 400 mg gabapentin (Group II) showed a significant increase in BP and HR associated with tracheal intubation compared to baseline levels and Group III (patients receiving 800mg gabapentin). The results of our study were same as the group receiving 800 mg gabapentin. Moreover this study also showed that 400 mg dose of gabapentin was not sufficient to blunt the cardio vascular response to tracheal intubation.

There is yet an undocumented but strong observation that the population in our part of the world is very sensitive to the sedative effects of gabapentin. A consistent attenuation of hemodynamic response could therefore, be achieved with a higher dose at the cost of excessive sedation. Postoperative sedation caused by gabapentin was not measured, which is one of the limitations of this study. We used only a single dose pre-operatively in all patients. This would result in lower plasma levels in our patients at the time of laryngoscopy and intubation as compared to other studies employing dosing spread over two days. Gabapentin in combination with dexamethasone has been found to provide much stable hemodynamic profile than gabapentin used alone[17]; this combination could be studied for the sedative effects with low doses of gabapentin.

CONCLUSION

In conclusion, gabapentin attenuates the presser response to laryngoscopy and intubation but this effect is statistically significant only at some specific time intervals. Further studies are needed to find out the optimum dose with or without an adjunct.

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ORIGINAL ARTICLE

Comparison of prophylactic ephedrine vs prn ephedrine during spinal anesthesia for caesarian sections

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ABSTRACT

Objective: The objective of this study was to compare the hemodynamic effects of use of prophylactic intravenous ephedrine with ephedrine use on as needed basis in patients receiving spinal anesthesia for caesarean sections.

Study design: A double blind, randomized, comparative trial

Setting: Department of Anaesthesiology, Critical Care, and Pain Management, Shifa International Hospital Islamabad.

Duration: October 2007 to March 2008

Methodology: Seventy patients were recruited who were scheduled to receive spinal anaesthesia for C-section. The patients were randomized into two groups (A and B). In patients of Group A (control group) ephedrine was used to treat h ypotension when indicated, while in Group B (inter vention group), patients receiv ed prophylactic ephedrine soon after the subarachnoid block. Hemodynamic changes were recorded and the data was analysed.

Results: In Group A, the blood pressure dropped in a higher number of patients [23 (65.7%)], as compared to Group B [6(17.1%)]. This difference was statistically significant ($p<0.001$).

Conclusion: Prophylactic ephedrine is better than ephedrine prn in prevention of hypotension in patients receiving spinal analgesia for C-Section.

Key Words: Subarachnoid block; hypotension; caesarean section; ephedrine.

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INTRODUCTION

Hypotension in patients who receive subarachnoid block (SAB) is a potentially serious issue, which is known to lead to significant morbidity if not manag ed effectively and urgently. In obstetric applications, profound hypotension can potentially lead to serious hypoxia and hypovolemia in the mother and the fetus. As placental blood flow is directly proportional to the maternal blood pressure, the hypotension can lead to to placental hypoperfusion and fetal asphyxia.[1] The current incidence of hypotension following SAB is up to 8o% of patients without prophylactic therapy.1 To prevent this problem, various methods have been considered appropriate. Expansion of intravascular volume can be achieved with preload with crystalloids or colloids. Though this is a common practice for electi ve cases, it does not offer full protection against hypotension.[2] Other options include, but are not limited to, left uterine displacement (LUD) and occasional use of ionotropic suppor t.

Ephedrine has been the vasopressor of choice to control spinal hypotension for many years, but the controversies still exist about the best regimen of its use; whether to use it in intermittent boluses or in infusion, whether to use it prophylactically or just to use it prn to control hypotension

once it does occur. We conducted this study to compare the hemodynamic control by ephedrine when used prophylactically with its prn use after the occurrence of hypotension.

METHODOLOGY

A double blind, randomized, comparative trial was conducted at Department of Anesthesiology, Critical Care, and Pain Management, Shifa International Hospital, Islamabad, after getting approval from Hospital Ethics Committee and informed consent of the parturients, from October 2005 to March 2006. Seventy obstetric patients scheduled for elective caesarean section with American Society of Anesthesiologist's physical status (ASA-PS) I or II were randomly divided into two groups A and B with 35 patients in each group. Patients on antihypertensives, diabetics, and pregnancy induced hypertensive patients were excluded. Patients with pre-eclampsia and eclampsia were also excluded from the study. Patients with fixed cardiac output (mitral stenosis or aortic stenosis), coagulopathy (platelet count less than 80,000), abruptio placentae, placenta previa, severe fetal distress and cord prolapse were also excluded from the study as SAB is contraindicated in these cases.

After appropriate preoperative preparation, patients were transferred from the ward to the obstetric operating room. Baseline BP and HR were measured. An intravenous line with 18G IV cannula was established. Lactated Ringer's solution 15ml/kg was infused to all patients 30 minutes before the SAB as a standard protocol. Patients were then divided into two groups A and B in random order.

Spinal hypotension was defined as a $\geq$ 30% drop of systolic BP from the baseline reading.

SAB was instituted in left lateral position with hyperbaric bupivacaine bupivacaine 0.75% with dextrose 8.25% (Abocaine Spinal™ -Abbott Laboratories (Pakistan) Ltd®) 1.6 ml injected in the subarachnoid space over 15 sec at L3-4 through 25G pencil point needle (Unises Corporation Tokyo-Japan) after infiltrating 1% lignocaine 1 ml locally. Patients in Group B received prophylactic ephedrine 15mg intravenously, simultaneously with the administration of hyperbaric bupivacaine. Then patients were placed in a supine position with the table in left lateral tilt. Oxygen with facemask was initiated at 3 litres/min to all patients. BP and HR were measured every two minutes initially, till delivery of the baby and then every five minutes till the end of the operation. Lactated Ringer's solution 5 ml/kg/hr was infused as a maintenance fluid. Synthetic oxytocin (Syntocinon™) 5 IU was injected IV after delivery of the baby in all patients. In both groups, hypotension if occurred was treated by a second dose of ephedrine 10mg IV in order to maintain the systolic BP within ±10% of the baseline. The patients were shifted to post anaesthesia care unit (PACU) and vital signs monitored.

The data collected included systolic, diastolic and mean arterial pressures and heart rates. Statistical analysis was performed through SPSS version 12. Descriptive statistics were presented as tables. Chi-square test was applied to compare the mean values of systolic blood pressure. P value $\leq$ 0.05 was considered statistically significant.

RESULTS

The demographic data of the patients and the indications of the surgery are given in Table 1. No statistical difference was found between two groups regarding mean age, body weight and indications of c-section.

Table 1: Comparison of demographic data of mothers in two groups

	Group A n=35	Group B n=35
Age (yrs) (Mean±SD)	31±4	27±4
Body wt. (Kg) (Mean±SD)	63±4	64±5
		Indications for c-section [N(%)]
Breech	13(37.1)	11(31.4)
Feto-pelvic disproportion	12(34.2)	17(48.6)
Previous c-sections	10(28.5)	7(20)

The baseline hemodynamic parameters in two groups were comparable, with no statistical difference (Table 2).

Table 2: Comparison of hemodynamic parameters in two groups (Mean±SD)

Parameter	Group A (Control Group) n=35	Group B (Intervention Group) n=35
Systolic	116±7	118±10
Diastolic	66±13	68±10
Mean	82±12	87±11
Baseline HR	102±12	95±15

The total blood loss in two groups was comparable, with no statistical difference (Table 3). Total quantity of ephedrine used in Group B was more, 12.2±4mg vs. 16.7±4mg, but the difference was statistically not significant (Table 3). A higher proportion of patients in the control group suffered from nausea than in the inter ventional group, 5 (14.2%) vs. 2 (5.7%). It was relieved promptly with administration of additional ephedrine.

Table 3: Comparison of clinical parameters of mothers in two groups

Parameter	Group A (Control Group) n=35	Group B (Intervention Group) n=35
Preload (ml) Mean±SD	945±60	960±75
Total ephedrine (mg)	12.2±4	16.7±4
Patients requiring extra ephedrine (N)	8	6
Blood loss (ml)	180±60	150±60
Nausea (N)	5(14.2%)	2(5.7%)

In Group B , only 17.1% of the patients recei ved supplemental 10mg ephedrine when their systolic blood pressure dropped below the cut off mark. In Group A, ephedrine was administered when hypotension occurred, and 23 (65.7%) patients recei ved rescue dose of 10mg ephedrine when they developed hypotension ($p<0.001$). A small proportion of patients developed tachycardia after administration of ephedrine. (Table 4).

Table 4: Comparison of development of hypotension in the groups

Parameter	Group A (Control Group) n=35	Group B (Intervention Group) n=35	Chi-square	P value
Frequency of Hypotension	23(65.7%)	6(17.1%)	17	<0.001

DISCUSSION

Hypotension is the most common complication of SAB for caesarean sections and is a potential threat to both the mother and fetus . In obstetric applications , profound hypotension can potentially lead to serious hypoxia and hypovolemia in the mother and the fetus. As placental blood flow is directly proportional to the maternal blood pressure, the hypotension can lead to to placental hypoperfusion and fetal asphyxia.1 The current incidence of hypotension following SAB is up to 8o% of patients without prophylactic therapy.[1]

To prevent this complication various methods are in practice. Preload with crystalloids or colloids, is a common practice for elective cases, but it does not prev ent hypotension reliably[2]. Left uterine displacement and vasopressors are the other measures in use. Incorporation of measures that reliably prevent maternal hypotension may improve maternal and fetal outcome.

Phenylephrine and ephedrine are helpful vasopressor to counteract the hypotension. Phenylephrine is purely alpha stimulant and it is effective in increasing blood pressure due to vasoconstriction. On the other hand it may lead to placental hypoperfusion and reflex maternal bradycardia. Ephedrine is an alpha and beta stimulant, which increases both mater nal blood pressure and hear t rate . T he predominant beta effect of ephedrine increases ar terial pressure by increasing cardiac output. [3] Kang YG et al. recommended prophylactic intravenous ephedrine infusion during spinal anaesthesia for caesarean section.[4] Simmon L et al. proved that a single bolus of intravenous ephedrine with doses of 15 mg or 20 mg decreased significantly the incidence of maternal hypotension as compared to a single bolus of ephedrine.[5] In later years , Loughery JP et al. proved in their study that 12 mg proph ylactic ephedrine could better counteract spinal h ypotension.[6] In 2005, Berends N et al. proved that prophylactic use of ephedrine is effective and safe to prevent and treat spinal hypotension[7]. Lionel Simon et al. observed that the incidence of maternal hypotension associated with spinal anaesthesia for caesarean section was unacceptably high in women receiving only a 10mg prophylactic bolus of ephedrine. Increasing the dose of the prophylactic bolus of ephedrine to 15mg significantly reduced the incidence of hypotension without increasing the incidence of undesirable tac hycardia and/or hypertension. There are some dra wbacks to the use of ephedrine. Ephedrine can induce a dose-related, undesirable maternal tac hycardia and its use for the treatment of hypotension does not completely restore preanesthetic levels of uterine blood flow even when it restores maternal blood pressure to baseline measurements.[8] It has been shown to cross the placenta and does affects fetal and neonatal heart rate.[9] A greater proportion of low umbilical artery pH has been obser ved in patients treated with ephedrine than in patients treated with either phenylephrine[10] or angiotension-II. [11-12] Chan et al. [13]

compared ephedrine infusion and fluid preload for the prevention of spinal hypotension during caesarean section. The best prophylaxis of maternal hypotension during caesarean section is still controversial. McGrathe et al.[14] showed that ephedrine was superior to phenylephrine in restoring uterine blood flow and fetal oxygenation during ritodrine infusion and epidural anaesthesia induced hypotension in gravid ewes. Hall et al.[15] compared infusions of ephedrine and phenylephrine during spinal anaesthesia, Some authors proposed using angiotension-II instead of ephedrine to avoid maternal tachycardia and fetal academia, but it is not readily available. Thus, ephedrine remains the vasopressor of choice in obstetrics.

We used prophylactic ephedrine in a dose of 15 mg with intermittent boluses of ephedrine prn, and found that the former was better in controlling maternal hypotension ($p<0.001$).

CONCLUSION

We conclude that prophylactic use of ephedrine is more efficient for maintenance of blood pressure during spinal anaesthesia for caesarean section as compared to its prn use.

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ORIGINAL ARTICLE

Endotracheal reintubation in post-operative cardiac surgical patients

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ABSTRACT

Background: The reported incidence of reintubation in patients who were weaned from mechanical ventilation after cardiac surgery is 6.6%4 in a retrospective study, but little work has been done prospectively to find out the incidence and causes for reintubation in a cardiac surgical ICU. We conducted this study to find out incidence and the causes of endotracheal reintubation in patients who were electively ventilated after open heart surgery and were extubated after fulfilling preset criteria for extubation.

Methodology: A total of 1229 consecutive patients were included in the study. On arrival to ICU after cardiac surgery, all patients were electively ventilated with standardized ventilatory parameters. Routine monitoring of all patients was done and patients were extubated once they met the criteria for extubation. The patients, who met the reintubation criteria, were reintubated and the reason(s) noted. Once they stabilized and fulfilled the extubation criteria, they were extubated.

Results: A total of 47(3.82%) patients required reintubation after weaning from the ventilation during the study period, and in 5(10.63%) patients out of these, reintubation was needed more than once. We found a higher incidence of reintubation, 11.84 % and 10.63%, in patients after single and double valve replacement surgery respectively. The incidence was much lower (2.14%) among coronary artery bypass grafting (CABG) patients.

Conclusion: The patients undergoing valve replacement surgery are more prone to reintubation in postoperative period as compared to CABG patients. Impending respiratory failure, cardiovascular (hemodynamic) instability and impaired conscious level are the common indications for reintubation.

Key Words: Extubation failure; coronary artery bypass grafting; reintubation; cardiac surgery intensive care unit; open heart surgery; valve replacement.

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INTRODUCTION

Endotracheal reintubation is not uncommon among critically ill patients after open heart surgery[1]. The overall incidence for reintubation in a general surgical intensive care unit is generally considered 4%, but varies dramatically between 1-13%, depending on the underlying disease process [2]. Similarly a 10% incidence has been re ported in 745 consecutive admissions in medical ICU patients that were mechanically ventilated for a minimum of 6 hours[3]. The reported incidence of reintubation in patients who were weaned from mechanical ventilation after cardiac surgery

is 6.6%[4] in a retrospective study but little work has been done to find out the incidence and causes for reintubation in a cardiac surgical ICU prospectively.

Reintubation is not only associated with increased duration of mechanical ventilation but also the ICU and hospital length of stay[5]. Reintubation is known to be an independent cause, which adds to the mortality; patients who required reintubation have poor prognosis with a mortality rate exceeding 30-40%[6], irrespective of the cause for reintubation. The major causes of reintubation are usually related to respiratory or cardiovascular system but could be multi-factorial6 and may possibly be prevented, to some extent, by improving the care[7].

We studied the incidence and the causes of endotracheal reintubation in patients who were electively ventilated after open heart surgery and were extubated after fulfilling the preset criteria for extubation.

METHODOLOGY

After approval by the institutional review board of our hospital, all adult patients, who underwent open heart surgery and were electively ventilated after the surgery in the post-cardiac surgery intensive care unit (CICU), were included in the study. It was a descriptive study. The data was prospectively collected for a period of seven months, from January to July 2008. A total of 1229 patients, admitted during this period, were enrolled in the study.

Routine monitoring of all patients was done including ECG, arterial oxygen saturation (SaO2), end tidal carbon dioxide (EtCO2), central venous pressure and invasive arterial blood pressure. Pulmonary artery pressure, pulmonary capillary wedge pressure or left atrial pressure were monitored where indicated (Table 3).

Arterial blood gases were checked hourly for the first four hours and were subsequently repeated after every change in the ventilatory parameters. Urine output and surgical bleed through the chest drains was measured on an hourly basis. Hematocrit was aimed to be kept at 30 % or above and appropriate transfusion was given when indicated.

All patients, on arrival to ICU, were put on standardized ventilatory parameters unless indicated otherwise. They were initially put on volume controlled or pressure controlled mode (Table 3). A positive end expiratory pressure (PEEP) of 5 cmH2O or more was added where indicated. An inspired oxygen fraction (FiO2) of ³50% and a tidal volume of 10ml/kg body weight was set to all patients. The ventilatory parameters were adjusted according to the results of arterial blood gases (ABG's).

An early extubation was aimed in all patients but no time schedule was fixed like a fast track. All patients were extubated without any delay, when they met the preset criteria for extubation (Table 1).

Table 1: Pre-set Criteria for extubation

Respiratory:
- *Minimal respiratory support (1-2 h):* SIMV rate ² 6 breaths/min; Pressure support ²10cmH2O; PEEP ² 5cmH2O; FiO2 ² 50%.
- *Arterial blood gas:* SaO2 ³ 90% on Fio2 ² 50%, PaO2 ³ 80mmHg on Fio2 ² 50%, PaCo2 30-45mmHg
- *No frequent airway suctioning needed*

Cardiovascular:
- Mean arterial pressure 70-110mmHg.
- Stable (sinus) rhythm or a rhythm other than sinus not adversely affecting the BP.
- Heart rate 60-110/min.

Conscious level:
- Mentally alert, Obeying verbal commands, protecting airway, intact cough and gag reflex.

Vasoactive drugs:
Dopamine²10 µg/Kg/min; Dobutamine ² 10 µg/kg/min; Epinephrine ² 0.05µg/min; Norepinephrine ² 0.2 µg/kg/min; Glyceral Trinitrate (GTN) ² 5 µg/kg/min; Milrinone ² 0.5 µg/kg/min and Sodium nitroprusside (Nepride) ² 2 µg/kg/min

Miscellaneous:
- Chest drainage ³ 100 ml/hr
- Muscle power ³ grade-3

A consideration was also given to the frequency of requirement and dosage of inotropic, chronotropic, vasodilator and/or vasoconstrictor drugs used. Extubation was delayed if a patient was on more than three drugs at that same time. Diaphoresis, confusion, stroke, renal failure or compromised renal functions and anxiety were also considered as causes for extubation delay. Patients were re-intubated when indicated according to preset criteria for reintubation (Table 2).

Table 2: Pre-set criteria for re-intubation

Respiratory:
- Impending respiratory failure:
- ↑in PaCO2 ³ 10 mmHg/hr, _in the pH ³ 0.10/hr, PaO2 ² 60 mmHg or SaO2 ² 90% on FiO2 ³ 50%
- ↑work of breathing
- Upper respiratory obstruction
- Excessive pulmonary secretions

- Pulmonary edema
- Tension pneumothorax
- Severe bronchospasm

Cardiovascular:

- ↓Mean arterial pressure ² 60mmHg (for ³ 1hr)
- Cardiac temponade
- Dysrythmias with hemodynamic instability
- Cardiopulmonary arrest

Impaired conscious level:

Miscellaneous:

- Chest drainage ³ 100ml/hr
- Accidental extubation

The data for the indications for reintubation were collected under the categories of respiratory, cardiac, central nervous system and multisystem involvement. All other causes were grouped under miscellaneous , including accidental extubation and surgical bleeding.

RESULTS

Demographic data showed a mean age of 62±5.5 years. The number of male patients was almost three times more than females. Patients, who underwent a CABG, were 933(75.91%), including 5(0.4%) patients who had had a redo procedure. Nine patients (0.73%) had sev ere renal impairment and underwent off pump bypass.

A total of 47(3.82%) patients required reintubation after weaning off ventilation. Fourteen (29.78%) patients were reintubated within 5-10 hours after extubation, but 18(38.29%) patients tolerated the extubation trial well for the first 24 hours and needed reintubation afterw ards (Table-4).

Table 3: Reintubation data*

Variable		Total No. of patients	Reintubation N(%)
Patients		1229	47(3.82)
Sex	Male	864(70.30)	32(3.70)
	Female	365(29.69)	15(4.10)
Single valve replacement		152(12.36)	18(11.84)
Double valve replacement		65(5.28)	5(10.63)
CABG		933(75.91)	20(2.14)
Coronary + valve replacement		79(6.42)	4(5.06)
Special Monitoring			
Pulmonary artery pressure		43(3.49)	11(25.58)
PCWP**		35(2.84)	5(14.82)
Left atrial pressure		17(1.38)	7(41.17)
			Initial mode of ver
Volume control		971(79.00)	41(87.23)
Pressure control		258(20.99)	6(12.76)

*Data presented as number and percentage
**Pulmonary capillary wedge pressure

Table 4: Time to reintubation

Time of Reintubation	N(%)
Within 24 hours	26(55.31)
2nd day	7(14.89)
3rd day	4(8.51)
4th day	7(14.89)
5th day	1(2.12)
>5 days	2(4.25)
	0
Time since last extubation (hrs)	**N(%)**
0-1	8(17.02)
2-4	5(10.63)
5-10	14(29.78)
11-24	2(4.25)
>24	18(38.29)

Twenty six (55.31%) patients were reintubated because of impending respiratory failure due to various reasons but respiratory muscles weakness and hypoventilation were the most impor tant cause (T able 5). Only 6 (12.76%) patients had cardiovascular reason for reintubation, where hemodynamic instability and h ypotension w ere the important responsible factors. Five patients (10.6%) were re-intubated because of impaired conscious lev el that deteriorated after extubation. Only 2 (4.25%) patients were extubated accidently and w ere reintubated immediately.

Surgical Procedure

The decision to reintubate was made on overall condition of the patient and the cause for reintubation was assigned to the physiological system that was predominantly involved in the failure. Only 4(8.5%) patients had a significant involvement of more than one body system and the cause was assigned to m ulti-organ failure categ ory. The most

common combination of multi-organ involvement was impending respiratory failure together with impaired conscious level.

Table 5: Causes of reintubation

Causes	N(%)
Impending respiratory failure:	
Due to Pneumonia / excessive secretions, non cardiac pulmonary edema, lung collapse, aspiration, bronchospasm, respiratory muscle weakness, upper airway obstruction, hypoventilation syndrome and kinked / blocked tube.	26(55.31)
Cardiovascular: Severe myocardial ischemia or acute Infarction, severe arrhythmia with Hemodynamic instability, severe hypotension (low output syndrome), congestive heart failure and cardiac arrest.	6(12.76)
Impaired conscious level	5(10.6)
Accidental extubation	2(4.25)
Surgical bleeding	2(4.25)
Multi organ involvement	4(8.5)
Miscellaneous	2(4.25)
Total	47(100)

Eighteen patients (38.29 %) that were reintubated once or more than once eventually died. None of them had a tracheostomy because they all died for various reasons within two weeks of reintubation. The cause of death determination was beyond the scope of this study; hence, has been ignored.

Five (10.63%) patients, needed reintubation more than once (Table 3). The incidence of reintubation was not different between male and female patients and corresponded closely to their ratio. We found a higher incidence of reintubation, 18/152 (11.84 %) and 5/65 (10.63%), in single and double valve replacement surgery respectively. The incidence was much lower [20/933 (2.14%)] among CABG patients.

DISCUSSION

We admitted 1229 consecutive patients after cardiac surgery in our ICU over a period of 7 months and studied them prospectively. A total of 47(3.82%) patients failed the extubation trial. Patients undergone a single or double valve surgery had a higher incidence of reintubation in comparison to CABG surgery. The incidence of reintubation was 4/79(5.06%) in patients who had CABG together with a valve replacement.

The higher incidence of reintubation among the valve replacement surgery indicates some correlation between the extubation failure and valve surgery. The exact cause is unclear but it is known that pulmonary functions might deteriorate in the immediate postoperative period and might take time to return to the preoperative values8. The possible mechanism could be the poor compliance of the lungs to accommodate the corrected cardiac output after valve surgery. The reported incidence of persistent pleural effusion for weeks after valve replacement surgery is 45%[9] and that could have been contributed to pulmonary malfunction and subsequent need for reintubation in our valve replacement patients.

Our overall incidence (3.82%) of reintubation was almost half of the reported incidence (6.6%) after cardiac surgery[4]. The reasons of this difference may be related either to the difference in the type of surgery or to a difference in the policy of fast track protocol at some centers, in an attempt to reduce the ICU stay and cost[10].

The most common (55.31%) cause for reintubation in our study was impending respiratory failure that manifested with increased work of breathing, accessory muscle use, hypoxia and/or hypercapnea, hypoventilation and respiratory acidosis, especially for those who were reintubated within the first 24 hours. Half of our reintubated patients developed pneumonia. In a case control study, the incidence of pneumonia was significantly higher (47%vs10%) in patients needing reintubation[11]. Dries and colleagues also found an increased incidence of nosocomial pneumonia in patients who failed extubation trial[12], which confirms our findings.

Pulmonary edema and upper airway obstruction were among the important respiratory causes for reintubation, especially for those who were reintubated after the second day of extubation. Interestingly, causes related to airway patency and secretions manifested only after extubation.

The incidence of asymptomatic myocardial ischemia has been reported to be 52% after CABG[13]. In our study 6/47 (12.76%) of the patients had a cardiac reason for reintubation, where myocardial ischemia or acute infarction were the common reasons, that led to low output syndrome and heart failure among CABG patients, while pulmonary hypertension was the important reason in the valve

replacement surgical patients.

It is well known that patients, who undergo myocardial revascularization procedures, are particularly prone to stroke, encephalopathy and other neurologic dysfunction, because they are relatively old and have atherosclerotic disease. They are also subject to cerebral embolization and cerebral hyperthermia after the discontinuation of cardiopulmonary bypass[14,15]. We found impaired conscious level (10.6%) to be the third important reason for reintubation in our study. Two of those patients ultimately developed stoke and died later on.

CONCLUSION

Endotracheal reintubation is not uncommon among critically ill patients after open heart surgeries. The incidence was higher in patients undergone valve replacement surgery in comparison to CABG surgery. Impending respiratory failure, cardiovascular (hemodynamic) instability and impaired conscious level were the most important indications for reintubation.

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ORIGINAL ARTICLE

Influence of working conditions on job satisfaction in Indian anesthesiologists: a cross sectional survey

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ABSTRACT

Background: Studies related to job satisfaction in Indian anesthesiologists are very limited which prompted us to design this study to quantify the level of job satisfaction among Indian anesthesiologists and to identify the factors responsible for satisfaction/dissatisfaction.

Study Type and Design: Cross-sectional study based upon a confidential survey.

Location: Pravara Institute of Medical Sciences, Loni (India).

Duration: One year.

Methods: A set of questions was handed over personally to the anesthesiologists at National and state level anesthesiology conferences and CMEs, and filled proformas were collected. Confidentiality and anonymity of the participants was maintained. Main outcome measures were demographics, anesthesia practice, overall job satisfaction, anaesthetic assistance , surgeons' perceived attitude, attitude towards other colleague anesthesiologists, and patients' perceived attitude towards them.

Results: Response rate was 96%. Seventy eighty percent respondents reported full satisfaction. Female anesthesiologists and male anesthesiologists working in teaching hospitals were more satisfied. ($P < 0.01$). Forty nine percent respondents were satisfied with the assistance in operating rooms; 51% felt they were duly respected by the surgeons; and 50% expressed satisfaction with recognition of their services by patients. Two main factors for the dissatisfaction were lack of resources/equipment and low recognition of anesthesia services by the patients.

Conclusions: Although job satisfaction level in Indian anesthesiologists is quite high, still there is a need to set the standards related to number of working hours, number of night call duties per week, enforcing proper assistance, raising the profile of anesthesiologists among general public, improving funding and resources for OT, which would help reduce occupational stress and further improve efficiency and job satisfaction among anesthesiologists.

Keywords: Indian anesthesiologists; job satisfaction; working conditions.

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INTRODUCTION

The scope of work of anesthesiologists in hospital practice has expanded in the past few decades. Anesthesiologists work as specialists in emergency care, in intensive care medicine and in the management of acute and chronic pain. Some anesthesiologists have taken up research, teaching or administrative responsibilities in addition. Yet these accomplishments have not necessarily resulted in an improved recognition of their important role in healthcare system[1-3]. Low recognition is perhaps not only limited to the general public and the media, but surgical and nursing colleagues have also been involved. Previous studies have shown that recognition of the anesthesiologist as a medical doctor by the patient varies from 65 to 82%[1-3] but very few know of their precise role in the hospital. Anesthesiologists are overworked due to a huge gap between demand and supply[4]. Conflicting demand is regarded as a risk factor for overwork[5]. Government of India has indicated a shortage of nearly 6000 anesthesiologists and has reported that only 30% of the population has satisfactory access to proper anesthesia services of which 80% are urban beneficiaries[4]. It is essential to know whether those who are already practicing the specialty are fully satisfied with the job and if not, then why so? Job satisfaction is one of the central variables in work and organizational psychology and is seen as an important indicator of working life quality[6,7]. Satisfied employees tend to be more productive and creative. Studies have shown a direct correlation between physician satisfaction and patient satisfaction.[8]

Several studies have been conducted to find out job satisfaction and quantify effects of stressors among anesthesiologists from different regions of different countries[9-13]. Studies related to job satisfaction in Indian anesthesiologists are very limited, which prompted us to design this study to quantify the level of job satisfaction and to identify the factors responsible for satisfaction/dissatisfaction.

METHODOLOGY

Approval from the institutional ethics committee was obtained and a questionnaire was distributed to the anesthesiologists at national and state level anesthesiology conferences and CMEs to be filled in. The confidentiality and anonymity was maintained. Questionnaire used by Jenkins K et al 11 for a survey of professional satisfaction among Canadian anesthesiologists was used with few modifications. National conferences are attended by residents and senior anesthesiologists from teaching as well as community hospitals from all over India. State level conference and CMEs were also selected because many anesthesiologists from private sector, nonteaching hospitals attend it. Thus, we assume that our sample is representative of all groups of anesthesiologists from India.

We distributed 200 proformas based on previous similar studies[12,13].

Main Outcome Measures: Demographics, type of and standing in anesthesia practice, overall job satisfaction, nature of anesthesia assistance available, surgeons' attitude, attitude of colleague anesthesiologists, and patients' perceived attitude.

Anesthesiologists having more than 8 years of practice were grouped as seniors and those having less than 8 years of practice as juniors. Professors and associate professors were included in the senior group where as residents, and lecturers were included in the junior group.

Overall job satisfaction and satisfaction with available OR assistance was recorded on a five-point Likert scale. Anesthesiologists were asked to indicate the factors which contributed to job satisfaction and dissatisfaction from the list handed over to them. The breadth of clinical responsibilities was examined looking at service commitments in OR, in intensive care unit (ICU), in acute and chronic pain management, in consultation clinic and in offsite work like in private clinics, in radiology or in other areas. Involvement in research, teaching and administration was also noted. Assistance available in the OR was looked at in areas, e.g. transfer of patients, application of monitors, insertion of venous and arterial catheters, induction and emergence, and obtaining drugs and equipment. Response was sought regarding perception of the surgeons' attitudes towards anesthesiologists, and the public's attitude toward anesthesia, as perceived by the anesthesiologist. Anesthesiologists were asked if they explained their intraoperative role to the patients preoperatively, whether patients knew that they were medical doctors and whether they talked to the lay public about the role of anesthesia during an operative procedure. A five-point scale was used for questions of satisfaction, dissatisfaction and perceived attitudes. All five-point scales were also recategorized into binary variables where 1, 2, 3 represented one group and 4, 5 the other.

The statistical analysis was performed by Stata 10 software. Comparison of categoric variables among and between groups and subgroups were performed using Chi squared analyses. A p-value of <0.05 was considered statistically significant.

RESULTS

Out of 200 questionnaires distributed, 192 were received back (96% response rate).This high response rate was due to the fact that questionnaires were distributed and then collected personally. All figures of percentage are expressed in whole numbers ignoring fractions for simplicity in the discussion to follow. Out of 192 respondents, 104(54%) were males and 88(46%) were females. Total number of juniors was 146(76%) in which male to female ratio was 79:67. Total number of seniors was 46(24%) which had a male to female ratio of 25:21. A majority of respondents (70%) were in the age group between 25 to 34 years . 124(65%) respondents worked in teaching hospitals and 68(35%) in nonteaching hospitals (Table 1). 38% of anesthesiologists worked for less than 50 hours per week.

Table 1: Demographic data

Age wise distribution	Age in years	No. of respondents
Age wise distribution	25 to 34	135(70%)
	35 to 44	36(19%)
	45 to 54	15(8%)
	55 to 64	4(2%)
	> 65	2(1%)
Gender wise distribution	Males	104(54%)
	Females	88(46%)
Number of years in practice	0 to 4	117(61%)
	5 to 8	29(15%)
	9 to 12	18(9%)
	>12	28(15%)
Type of hospital	Teaching hospital	124(65%)
	Community hospital	68 (35%)
Number of working hours per week	<50	74(38%)
	51 to 60	57(30%)
	61 to 70	36(19%)
	71 to 80	23(12%)
	>80	2 (1%)
Number of ORs in respondents' hospitals	1 to 4	75(39%)
	5 to 9	60(31%)
	10 to 14	23(12%)
	> 15	34(18%)

Regarding clinical responsibilities shared by anesthesiologists, all 192(100%) respondents worked in operating rooms; 154(80%) had also worked in ICU including looking after patients on mechanical ventilation ; 132 (69%) respondents were members of acute pain control team , 63(33%) in chronic pain service; 69(36%) conduct consultations in consult clinic, 75(39%) have participation in research, 96(50%) were involved in teaching , 75(39%) had a role in administrative work while 67(35%) did offsite services (including private clinics 35%, Radiology 28% and others 37%).

The assistance available to anesthesiologists in their routine jobs is given in Table 2.

Table 2: The assistance available to anesthesiologists

Type of assistance	Assistants			No assistance
	Anesthesia assistants	Nurses	Both	
Overall assistance in OR's	84	80	12	16
help in bringing patients from holding area into operating rooms	95	81		16
applying standard monitors	78	85		29
assistance with intravenous lines	79	86		27
assistance with arterial line/ Central Venous line	65	80		47
assistance with induction / emergence	81	90		21
obtaining drugs/equipment	83	90		19

Regarding satisfaction with the assistance available, 18(9%) respondents were highly dissatisfied, 31(16%) were dissatisfied, 50(26%) were satisfied, 38(20%) were much satisfied and 55(29%) were highly satisfied with the assistance provided to them in the operating rooms . Help from qualified nurses was available to less than 50% respondents in all procedures.

Table 3 describes surgeons' attitudes and public perception about the role of anesthesiologists. A total of 90(47%) respondents stated that they received a word of thanks from surgical colleagues at the end of each case. Only 67(35%) respondents got recognition from their patients as anesthesiologists. Nine% of them never explained their intraoperative role to patients during preoperative visits.

Table 3: Surgeons' attitudes and public perception

Questions	Response and number of respondents N(%)				
	1	2	3	4	5
How would you rate the surgeons' attitude towards anesthesiologists? #.	4 (2)	15(8)	75(39)	48(25)	50(26)
Do surgical colleagues consult you for medical problems*	6(3)	15(8)	77(40)	54(28)	40(21)
Do surgical colleagues readily accept your decision in cancellation of cases*	6(3)	33(17)	42(22)	52(27)	59(31)
Do surgical colleagues readily accept your choice of anaesthetic technique*	4(2)	2(1)	15(8)	75(39)	96(50)
Do surgical colleagues pressurize you for time taken for assessment/ induction*	54(28)	57(30)	44(23)	10(5)	27(14)
Do surgical colleagues ask if they may start the case*	13(7)	17(9)	8(4)	33(17)	121(63)
Do surgical colleagues thank you at the end of the case*	6(3)	4(2)	42(22)	50(26)	90(47)
Do you explain your intraoperative role to the patients during preoperative visits*	6(3)	12(6)	48(25)	36(19)	90(47)
Do your patients know you are an anaesthesiologist*	19(10)	29(15)	48(25)	29(15)	67(35)

\# Grading: 1-'No respect at all'; 2-Some respect; 3- Indifferent; 4-Moderate degree of respect ; 5-'Consider equal in status'
* Grading: 1-Never; 2-Rarely; 3-Sometimes; 4-Frequently; 5-Always

Role of an anesthesiologist in the healthcare system was described as a 'Perioperative physician' by 105 (55%) respondents, as 'part of a multidisciplinary surgical team' by 77(40%) and as 'providing a service to the surgeon' by 10(5%). No respondent chose the option of 'mainly as a technician' or 'just a job'.

Overall job satisfaction was rated as 1 (totally dissatisfied) by 4(2%) respondents, 2 by 2(1%), 3 by 37(19%), 4 by 111(58%) and 5 (totally satisfied) by 38(20%) respondents.

The commonest reasons given for job satisfaction were;

1. Good quality of patient care; 44(23%)
2. Intellectual stimulation; 25(13%)
3. Interaction with anesthesia colleagues; 25(13%)
4. The magic about anesthesia; 25(13%)

Figure I depicts the aspects of practice bringing the most dissatisfaction. Lack of recognition by patients (49%) and Lack of resources/equipment (46%) are the two most common reasons given by the respondents for dissatisfaction.

Comparison of job satisfaction on the basis of gender, seniority and place of work is shown in Table 4

Females were more fully satisfied than males (79:70) ($p < 0.01$).

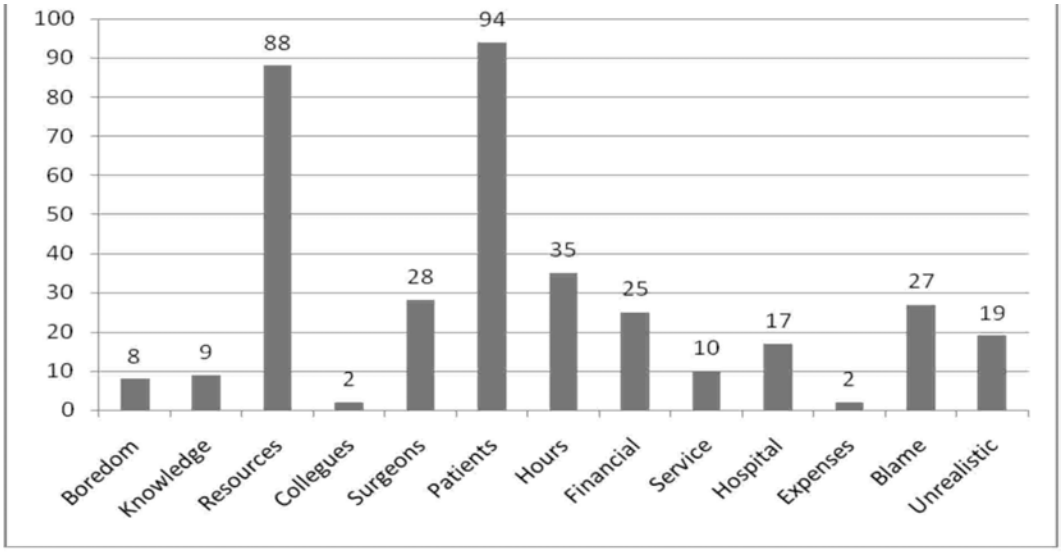

Figure I: Aspects of practice bringing the most dissatisfaction.

Table 4: Comparison of job satisfaction on the basis of gender, seniority and place of work. [N(%)]

Comparison in relation to gender	Males N=104	Females N=88	P-value
Job satisfaction, fully satisfied	70(67.3)	79(89.8)	p<0.01
Consider lack of resources as a reason for dissatisfaction.	37(35.6)	51(57.9)	p<0.01
Consider inability to keep up-to-date with recent advances as a reason for dissatisfaction.	7(6.7)	2(2.3)	p<0.05
Do not get due recognition from patients.	63(60.6)	31(35.2)	p<0.01
Comparison in relation to seniority	**Juniors N=146**	**Seniors N-46**	**P-value**
Job satisfaction, fully satisfied	111(76)	38(82.6)	p<0.05
Do not get due recognition from patients	67(45.9)	27(58.7)	p<0.05
Get respect from surgeons	72(49.3)	26(56.5)	p<0.05
Comparison in relation to place of work	**Teaching hospitals N=124**	**Community hospitals N=68**	**P-value**
Job satisfaction, fully satisfied	102(82.3)	47(69.1)	p<0.05
Job satisfaction, fully satisfied male respondents	51(41.1)	19(27.9)	p<0.01
Consider lack of resources as a reason for dissatisfaction.	61(49.2)	27(39.7)	p<0.05
Female respondents who consider lack of resources as a reason for dissatisfaction	40(32.3)	11(16.2)	p<0.01
Fully satisfied from OR assistance	74(59.7)	19(27.9)	p<0.01

More females (51:37) consider lack of resources as a reason for dissatisfaction. (p<0.01) and out of them more are from teaching hospitals than community hospitals.(40:11) (p<0.01). Male anesthesiologists are less recognized than female anesthesiologists by patients (63:31) (p<0.01). More number of fully satisfied male respondents are from teaching hospitals than from community hospitals.(51:19) (p<0.01). More number of fully satisfied respondents from OR assistance are from teaching hospitals than from community hospitals (74:19) (p<0.01). High job satisfaction was expressed by teachers as compared to non-teachers (102:47) (p<0.05).

DISCUSSION

The specialty of anesthesiology is full of stress and chances of getting burnout are great for anesthesiologists. Job satisfaction can act as protective factor against burnout.[10] Ramirez AJ et al.[14] showed that, although surgeons had the highest level of stress, they also demonstrated a high level of job satisfaction, thus possibly protecting them from burnout. Enhancing job satisfaction is essential to protect anesthesiologists from burnout.

Overall satisfaction:

Overall job satisfaction was found to be high in Indian Anesthesiologists; 78% of the respondents reported full satisfaction (grades 4 and 5). The female anesthesiologists outnumbered their male colleagues (P<0.01) in this respect. Hawton et al[15] noted that there was a higher rate of suicide in female doctors than males and that, anesthesiologists along with psychiatrists, general practitioners and community health doctors, had higher suicide rates than other hospital specialties. There was no difference regarding job satisfaction when junior anesthesiologists were compared to their senior colleagues (P>0.05). Anesthesiologists working in community hospitals have greater number of working hours and in addition have to perform their duties with minimal OR assistance. Most of them are attached to more than one hospitals and have to work in different working atmospheres. Anesthesiologists working in teaching hospitals have better working atmospheres and have more O.R. assistance. They work in a better academic environment, which is reflected in their overall better job satisfaction (P<0.05). This difference was specially observed in males (P<0.01). In conformity with our findings of overall job satisfaction, greater than 75% anesthesiologists in Canadian[11] and Belgium[9] studies have reported high job satisfaction. But J F Kinzl et al[13] found only 50% Austrian and Swiss anaesthetists fully satisfied with their jobs.

Satisfaction with OR assistance:

The Australian Anaesthetic Incident Monitoring Study (AIMS) has shown that quality of anaesthetic assistance is associated with both the development and resolution of critical incidents[16]. From 5837 reports, inadequate assistance contributed in 187 cases whilst skilled assistance in 808 cases minimized the incident. Adequately trained anesthesia assistants are considered essential for the safe conduct of anesthesia in Australia. Only 49% respondents in our study were satisfied with the assistance available. In a Canadian study[11] those working in smaller community hospitals reported greater satisfaction. Where as in our study, significantly greater number of anesthesiologists working in teaching hospitals have reported greater satisfaction with OR assistance than their counterparts working in community hospitals (P<0.01). This may be due to the fact that less importance is given in small private hospitals in India towards appointment of qualified assistants due to financial reasons. Less or even unqualified assistants are appointed

on lower pay scales. Most of the teaching hospitals run nursing schools, which conduct nursing courses as well as paramedical certificate courses like OR assistants course; thus nursing students are available to work in ORs. More number of fully satisfied anesthesiologists working in teaching hospitals than their counterparts in community hospitals where OR assistance is inadequate, points out that there is a close association between quality and type of OR assistance available and better job satisfaction.

Perceived public attitude:

One of the aspects of practice bringing the most dissatisfaction is lack of recognition by patients. It is expected that recognition of an individual doctor increases with the seniority in practice, which is more or less true with doctors from other clinical specialties; but in case of anesthesiologists, seniority makes minimal difference as they always play their role behind the curtain. Results from our study are comparable with other studies in this aspect. No significant difference was found between senior and junior anesthesiologists when compared, in respect of recognition from patients ($P>0.05$). Male anesthesiologists are less recognized by their patients than female anesthesiologists ($P<0.01$). To a certain extent anesthesiologists are themselves responsible for poor recognition by patients as they maintain a low profile. Only 28% anesthesiologists give talks to the lay public about anesthesia; and 9% of them do not even explain their intraoperative role to patients on the preoperative visits. It is possible to raise awareness among patients by laying more emphasis on pre-anesthetic meetings and also by providing an information sheet preoperatively to outpatients. This may help in improving patients understanding of the role of the anesthesiologists. This was also reflected in Presidential address delivered at ISACON-2006, Mysore, (Karnataka) on 27 December 2006 [5] in which it was mentioned that--- "public awareness of anesthesia services and anesthesiologists is far from satisfactory even now. This is basically due to our fault in marketing ourselves. We have to constantly try to make the public aware of the importance of our work by establishing pre anesthesia clinics, patient counseling, pain clinics, trauma and critical care areas as well as promote paramedical courses to train anesthesia technicians or assistants. These steps will enhance our public image and create favorable public opinion. Moreover, we have to utilize the services of 'information and technology science' in publishing about anesthesia, anesthesia related problems and in giving instruction in the management of disasters."

Perceived surgeons' attitudes:

A good relationship with the surgeon is of fundamental importance in anesthesiologist's practice [17]. Poor interpersonal relationships may lead to considerable stress. Anesthesiologists may feel unable to change or control situations in an environment, where the surgeon is commonly perceived to be in charge.[11] Younger physicians tend to find interpersonal relationships more stressful than their older colleagues do. Jenkins K et al[11] found that the senior Canadian respondents got higher regard from the surgeons in comparison to the younger respondents. However, we did not observe such difference ($P>0.05$); in our study, 51% respondents felt highly regarded by the surgeons (graded 4 or 5 on the Likert scale). In a study of Californian anesthesiologists18, 96% indicated they often or always had a good working relationship with the surgeons but slightly over half did not believe that surgeons understood the risks of anesthesia. Surgeons pressurize anesthesiologists to proceed with cases instead of postpone the cases in spite of high risks and to hasten anaesthetic procedures[18]. This conflict of interests is a source of disharmony in OR. Forty-nine percent of our respondents said that they were usually consulted for difficult medical problems. Though most surgeons accepted the anesthesiologists' choice of anesthetic technique (89%) only 58% respected their decision to postpone cases. Nineteen percent of the anesthesiologists felt frequently pressurized for time in assessing patients and inducing anesthesia. All these factors definitely affect job satisfaction.

Factors affecting job satisfaction/dissatisfaction:

The environment in which individuals work has a tremendous effect on the level of 'pride' in themselves and the work they do. A job that is interesting and that permits one to contribute one's skills and ideas is very important in respect of anesthesiologists. As long as sufficient resources are at their disposal, anesthesiologists are able to manage their high demanding tasks and task-related stressors very efficiently[13]. An interesting job as the sole factor would not suffice for adequate job satisfaction. Improving working conditions and providing adequate resources would definitely help in enhancing job satisfaction[13]. Two main factors causing dissatisfaction are lack of resources/equipment and lack of recognition by patients. It is felt that hospital administrators are reluctant in sanctioning and releasing funds for purchasing equipments and drugs related to anesthesiology. Equipment necessary for safe monitoring and improving quality of anesthesia

service will not be purchased unless statutory bodies lay down minimum standards of monitoring care. Budgetary constraints are faced by anesthesiologists in teaching as well as in community hospitals, which is reflected in resources being equally limited to both of them (P>0.05). More female anesthesiologists, especially those working in teaching hospitals, considered lack of resources as a reason for dissatisfaction (P<0.05). Other factors indicated for bringing dissatisfaction were long/unpredictable working hours, being unduly blamed for complications, lack of recognition by surgeons, inadequate financial compensation, unrealistic expectations of the clientele, hospital politics, and not being able to remain abreast with the latest knowledge/ technical applications. At present it is the responsibility of each individual anesthesiologist to keep him/her informed of newer developments, but unless there is statutatory compulsion e.g. compulsory CME activity, this fact will not be viewed seriously.

Overall, 78% anesthesiologists were satisfied by their professional work. Yet, it is felt that this number may be increased by improving on factors identified in the present study. Increasing intellectual stimulation, allowing better quality of care, improving interaction with patients and providing adequate OR assistance should be seriously considered. Departmental funding should be increased so as to meet the requirements of newer drugs, monitors, and equipment to perform newer techniques. Statutory bodies like University Grants Commission, Medical Council of India, Indian Society of Anesthesiologists etc. must lay down regulations requiring local administrations and authorities to follow minimum monitoring standards and provide anesthesia equipments like modern anesthesia work stations to improve standard of care as well improve job satisfaction. Better communication and team work by the entire surgical team would enhance professional satisfaction of anesthesiologists. Raising the profile of anesthesiologist, both in the eyes of the public and fellow health professionals should be taken on a priority basis. Patient education is an important method to raise the anesthesiologists' image amongst the public.

LIMITATIONS

Our sample size is relatively small and may not be representative of all anesthesiologists from India, as it does not include a large number of practicing anesthesiologists, who never attend any conference or CME or workshop; it is not yet mandatory in India to earn CME points for renewal of registration and license to practice.

CONCLUSION

Although job satisfaction level in Indian anesthesiologists is quite high, still there is a need to set the, which would help reduce occupational stress and further improve efficiency and job satisfaction among anesthesiologists. Authorities, e.g. Indian Society of Anesthesiologists may urge large scale multicentre studies to lay down standards related to number of working hours per day and per week, number of night call duties per week, making proper assistance mandatory, preparing standard protocols and guidelines for anaesthetic management of different clinical cases, providing medicolegal protection etc..

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ORIGINAL ARTICLE

An audit on ventilator associated pneumonia in the Intensive Care Unit at Teaching Hospital Karapitiya, Galle, Sri Lanka

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ABSTRACT

Background: Critical care is one of the most expensive services provided by a hospital. The aim of this audit was to ascer tain the incidence of v entilator associated pneumonia in the intensi ve care unit.

Type of study: A descriptive study

Place of study: Teaching Hospital Karapitiya, Galle (Sri Lanka)

Duration of study: 1st June 2010 to 30th August 2010

Methodology: All patients, who were admitted to ICU and who stayed there for more than 48hrs during a period of three months were studied. Infections were identified on clinical parameters such as fever and on laboratory investigations such as full count, CRP and cultures.

Results: Out of 82 patients, 48(58.5%) were subsequently discharged to the ward and 30(36.6%) succumbed to their illness. 68(82.9%) were ventilated and 26 of them had an underlying pathology related to an infection. A total of 20(29.4%) patients of this ventilated group subsequently developed a lower respiratory tract infection. The main nosocomial infection was ventilator associated pneumonia and had an incidence of 21.9%. The most prevalent organisms were mixed gram negative bacilli and Acinetobacter spp.

Conclusion: Nosocomial infections are a cause of increased mortality and morbidity in the intensive care unit. Awareness of the risk factors together with simple preventive measures and surveillance will help to reduce its occurrence.

Key words: Nosocomial infection; ventilator associated pneumonia

Citation: Gunaratne A, Vidanagama D. An audit on ventilator associated pneumonia in the Intensive Care Unit at Teaching Hospital Karapitiya, Galle, Sri Lanka. Anaesth Pain & Intensive Care 2011;15(1):38-41.

INTRODUCTION

Ventilator associated pneumonia (V AP) is a for m of nosocomial infection that occurs in patients recei ving mechanical ventilation for longer than 48hrs[1]. The incidence of VAP is around 22.8%[2], and patients receiving ventilatory support account for 86% of the cases of nosocomial pneumonia[3]. The mortality rate attributable to V AP is around 27%[4], and the costs of treatment of these infections contribute to a significant por tion of the expenditure incurred in maintaining an intensi ve care unit. Teaching Hospital Karapitiya, Galle, Sri Lanka is one of the main tertiary care centers in the country. All the general medical and surgical patients requiring intensive care are admitted to the main intensi ve care unit where the audit w as conducted. The main objective of this study was to ascertain the incidence of ventilator associated pneumonia in the intensive care unit.

METHODOLOGY

Permission to conduct this prospective audit was obtained from the director Teaching Hospital Karapitiya. The audit was conducted for three months from 1st June 2010 to 30th August 2010. We studied all the patients admitted to the main ICU and who stayed there for more than 48hrs, regardless of whether they were ventilated or not during this period. Reports of cultures from tracheal secretions were obtained from the department of microbiology. However, we not able to perform bronchoscopically collected samples for quantitative cultures due to lack of facilities.

RESULTS

Total number of patients admitted to main ICU for more than 48hrs was 82; out of which 48(58.5%) were subsequently discharged to the ward and 30(36.6%) succumbed to their illness. Of the 82 patients studied 68(82.9%) were ventilated and only 26 of them had an underlying pathology related to an infection (Table 2). A total of 20(29.4%) patients of this ventilated group subsequently developed a lower respiratory tract infection (Table 2). The majority of them [14(70%)] were in categories that had no infection in any part of the body at the time of admission to the ICU or at the time of commencing ventilation (Table 2). We used the following criteria to diagnose lower respiratory tract infection (LRTI).

1. New shadow developing in the chest X- ray
2. Temperature > 99º F
3. Course crepitations on chest auscultation
4. White cell count > 11,000

We used the following criteria to diagnose VAP.

1. New shadow developing in the chest X-ray
2. Temperature < 96.8 or > 990 F
3. Ventilated for more than 48 hrs
4. White cell count > 11,000 or < 4,000
5. Cultures positive from endotracheal secretions

All 20 patients, who developed an LRTI, had their tracheal secretions cultured and 2 of them failed to grow any organisms in the endotracheal secretions. However, if we had the facilities to perform bronchoscopic sampling for quantitative cultures, all of them may have been positive for bacterial invasion. The organisms cultured are shown in Table1.

Table 1: The organisms cultured

Organism	Frequency	%
Acinetobacter spp	5	25
Pseudomonas spp	3	66.6
Coliform spp	2	10
Mixed gram negative bacilli	6	33.3
Staphylococcus aureus	2	10
No growth	2	10
Total	20	100

VAP was diagnosed in 18 (21.9%) patients on these criteria.

Table 2: Patient categories developing LRTI following ventilation

Patient category	No.	Ventilated	LRTI
Head Injury	14	14	4
Trauma other than head injury	6	6	1
Poisoning	5	5	3
Post-op elective Ventilation	9	9	4
Medial reasons without infection	11	8	2
Infections from Medical wards	7	4	0
Infections from other wards	30	22	6
Total	82	68	20

DISCUSSION

The patients needing intensive care usually have low host defense immunity. Immunosupression primarily due to the release of interleukins and other anti inflammatory agents creates a state sometimes termed as immunoparalysis[5]. Endotracheal intubation compromises local defense mechanisms such as coughing, sneezing and mucocilliary clearance. Upper airway and oral secretions can pool above the cuff of an endotracheal tube and line the tube, forming a biofilm, starting as early as 12 hrs after intubation. The biofilm contains large amounts of bacteria that can be disseminated into the lungs by the ventilator induced inspiration[6-8]. The presence of the endotracheal tube also provides a direct route for colonized bacteria to enter the lower respiratory tract. Exogenous colonization arises from cross transmission from the hands of health care workers or visitors[9].

Cook and colleagues noted that the administration of paralytic agents was an independent predictor of nosocomial pneumonia in their study of 1,014 mechanically ventilated patients[10]. Sedative drugs and stress ulcer prophylaxis have all been implicated as risk factors.

In a report from the National Nosocomial Infection Surveillance (NNIS) system involving data from 498,998 patients, 83% of episodes of nosocomial pneumonia was associated with mechanical ventilation[11]. Langer and colleagues showed an increased incidence from 5% in patients who received 1 day of mechanical ventilation to 69% in those who received 30 days of venilation[12]. One of the largest databases related to nosocomial infection in intensive care is the EPIC study [13]. In this 1-day point prevalence study, information was obtained on all patients who occupied a bed in an intensive care unit over 24hrs. 10,038 patients were recruited from 1,407 western European intensive care units. 2,064 of them (21%) had an intensive care unit acquired infection. The incidence of nosocomial pneumonia in the EPIC study was 47% and 31% in the NNIS study.

For many years VAP has been diagnosed by the clinical criteria published by Johanson et el in 1972, which include the appearance of a new pulmonary infiltrate, fever, leukocytosis and purulent tracheobroncheal secretions[14]. However these criteria are non specific . VAP is most accurately diagnosed by quantitative cultures and microscopic examination of lower respiratory tract secretions which are best obtained by bronchoscopically directed techniques, such as the protected specimen brush and bronchoalveolar lavage. These techniques have acceptable repeatability and interpretation of results is unaffected by antibiotics administered concurrently for infections in extra pulmonary sites as long as the antimicrobial therapy has not been changed for <72 hrs before bronchoscopy[15,16]. The accuracy of quantitative cultures and microscopic examination of lower respiratory tract secretions for the diagnosis of VAP was validated by Chastre et al[17,18]. However, other published studies have concluded that bronchoscopically directed techniques were not more accurate for diagnosis of VAP than clinical X-ray criteria combined with cultures of tracheal aspirates[19-22].

Prevention has a key part to play in limiting VAP. Several studies have reported high rates of contamination with potentially pathogenic organisms by the hands of healthcare workers[23,24]. Hand disinfection with the use of alcohol based antiseptic hand rub solutions have been shown to be effective in reducing hand contamination[25]. Chlorhexidine oral rinse twice daily has been used by some workers to reduce oral colonization[26]. However, no evidence based protocols for oral care have been tested to decrease the incidence of VAP in patients receiving mechanical ventilation. According to the studies done so far , stress ulcer prophylaxis does not play a significant role in the development of VAP. Saline lavage of endotracheal tubes before suctioning can dislodge bacteria from the endotracheal tubes in to the lower airways increasing the risk of VAP[27]. Positioning the patient in a semi recumbent position prevents reflux and aspiration. Maintaining an adequate cuff pressure decreases the likelihood of secretions leaking around the cuff . Use of tubes with ports for continuous subglottic suctioning can decrease the incidence of VAP by 50%[28,29] and therefore the oropharynx should be thoroughly suctioned. Daily interruption of continuous sedation and paralysis can shorten the duration of mechanical ventilation. Infection surveillance can reduce nosocomial infection rates when incorporated with infection prevention prgrammes[30].

CONCLUSION

VAP, although often preventable, is a cause of increased mortality and morbidity; it is also responsible for excessive resource expenditure in the intensive care unit. Awareness of the risk factors and attention to simple preventive measures such as hand hygiene can reduce the incidence of these infections . Surveillance together with a multidisciplinary approach of prevention is the other important aspect of its limitation.

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CASE REPORT

Development of negative pressure pulmonary oedema secondary to postextubation laryngospasm

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ABSTRACT

Negative Pressure Pulmonary Oedema (NPPE) immediately after general anaesthesia is a rare but life threatening complication, caused by an increased fluid in the interstitial spaces and alveoli due to forced inspiratory efforts against tightly closed glottis. Once developed, it impairs gas exchange and causes hypoxemia and if not treated promptly may lead to respiratory failure. Management involves maintaining airway, diuretics and positive pressure ventilation. Affected cases recover completely with appropriate treatment but death may occur if treatment is delayed. We present here three cases that developed post-extubation NPPE after short spells of laryngospasm. All of the three cases recovered completely after management with diuretics and venitlatory support with added PEEP.

Key Words: Negative pressure pulmonary oedema; extubation; postoperative complication

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INTRODUCTION

NPPE, also called Post-obstruction Pulmonary Edema (POPE), is a complication that can develop in the immediate postoperative period. The first case reports of NPPE were published by Oswalt et al. in 1977[1]. We encountered three cases of NPPE over a period of eighteen years, (incidence 0.06% of all general anesthetics) which is almost similar to other workers[2,3]. It is a rare condition, but it may result in a fatal outcome if diagnosis and treatment are delayed.

CASE 1:

A 22 years old, young soldier, ASA-I, underwent planned haemorrhoidectomy under thiopentone - O_2/N_2O - isoflurane - relaxant anaesthsia. The patient was intubated and inj. pethidine 50mg was given IV. At the end of the procedure, the effects of relaxant were reversed and extubation was done with the patient fully recovered from anaesthesia. A few seconds later the patient had a brief spell of laryngospasm after which his SpO_2 started falling. Positive pressure was applied with mask and 100% O_2 but SpO_2 kept on falling. Chest auscultation showed bilateral fine crepts, so it was decided to re-intubate the patient. On laryngoscopy frank blood tinged froth was noticed coming out of the glottis. A diagnosis of NPPE due to post-extubation laryngospasm was made, the patient was given relaxants, IPPV continued and shifted to ICU for ventilatory support. Portable X-ray chest showed bilateral opacities of acute pulmonary oedema. ECG trace and cardiac enzymes were ordered and found to be within normal limits. After about 4 hours of ventilatory support chest auscultation confirmed his complete recovery from pulmonary oedema so the relaxant was reversed, he was weaned off the ventilator and extubated. He recovered completely without any sequelae.

CASE 2:

A 4 years old female child, ASA-1, weighing 15 kg, was scheduled for repair of a tongue laceration under general anaesthesia in emergency. Child had been NPO for 6 hours

before the procedure. She was induced with thiopentone 60mg and intubated orally after relaxation with inj. Succinyl choline 20mg. A throat pack was placed in pharynx. Anaesthesia was maintained with O_2/N_2O, isoflurane and inj. Tracrium™. At the end of procedure, the throat pack was removed and extubation was done after thorough suction. The patient went into severe laryngospasm after extubation. Airway was maintained and 100% O_2 was given with face mask but her SpO_2 dropped rapidly and she developed bradycardia with a hear rate of 50/min. Classic signs of NPPE were present e.g. bilateral fine crepts and bilateral diffuse opacities on chest X-ray. Inj. atropine 0.2 mg IV was repeated twice and the patient was re-intubated. Laryngoscopy revealed frank blood tinged froth from the larynx. IPPV with100% O_2 improved the SpO_2. She was sedated and relaxed and later on shifted to pediatric ICU for ventilatory support with a PEEP of 4 cm of H_2O. After 4 hours of ventilatory support lungs became dry and she was weaned off and extubated after reversal of the relaxants.

CASE 3:

A 25 years old male, ASA-1, a moderate smoker for the last eight years, was planned for a testicular biopsy for infertility, under GA. The course of anaesthesia with intubation and IPPV remained uneventful. At the end of the procedure, the relaxant was reversed and extubation was done. The patient developed severe laryngospasm soon after extubation and his SpO_2 started falling. Ventoline™ nebulisation was done. Laryngospasm did not respond to any medication or maneuver. Administration of 100% O_2 by mask failed to raise SpO_2 to normal levels, so he was re-intubated to enable us positive pressure ventilation with PEEP. During intubation typical pink froth was noticed to fill the mouth cavity. Auscultation of the chest revealed bilateral rales. IPPV was continued and he was shifted to ICU for ventilatory support. He was given inj. Dexamethasone 4mg IV, inj. Furusamide 40mg IV and ventilatory support with 8cmH_2O of PEEP. Eight hours of ventilation dried his lungs, so he was weaned off the ventilator. His postoperative investigations revealed no cardiac, pulmonary or neurological deficit.

DISCUSSION

NPPE, also called POPE, results from transudation of fluid, first from pulmonary capillaries into interstitial spaces and then into the alveoli. It occurs after complete obstruction of the airway usually due to a brief but severe laryngospasm. Young healthy muscular patients, undergoing head and neck surgeries and/or painful procedures are more prone to this condition. NPPE is a potentially dangerous condition with a multifactorial pathogenesis. The central mechanism is a large inspiratory force generated against an obstructed or closed upper airway. The resultant decreased intrathoracic pressure leads to increased venous return to the right side of the heart and increased hydrostatic pulmonary capillary pressure. Elevation of pulmonary capillary pressure results in decreased left ventricular compliance that may result from the right ventricular distention and shift of the cardiac septum to the left. The negative intrathoracic pressure also results in an increased afterload imposed on the left ventricle, causing a further decrease in left ventricular stroke volume.[4,5] The autoPEEP during obstruction does not allow fluid to transudate, but as soon as airway opens, this autoPEEP is lost and under the effects of increased interstitial pressure, fluid pours first into interstitium and then into the alveoli. Fortunately, because of the lung's unique ultrastructure and its capacity to increase lymph flow, the pulmonary interstitium usually accommodates large increases in capillary transudation before interstitial partial pressure becomes positive. When this reserve capacity is exceeded, pulmonary edema develops[4,5].

Pulmonary edema is often divided into four stages:

Stage I: Only interstitial pulmonary edema is present.

Stage II: Fluid fills the interstitium and begins to fill the alveoli.

Stage III: Alveolar flooding occurs; many alveoli are completely flooded with no air.

Stage IV: Marked alveolar flooding spills over into the airways as froth.

All of our cases of NPPE involved post-extubation laryngospasm. Other mechanical causes of upper airway obstruction resulting in NPPE reported in literature include hanging, laryngeal growths, strangulation, sleep apnea, and biting down on or kinking of the endotracheal tube while intubated.[6-8] Croup and epiglottitis are common causes of upper airway obstruction leading to NPPE in children.[9] Warner et al [10] reported NPPE developing after administration of muscle relaxants at the beginning of an inhalation induction of anesthesia in healthy infants. Other causes of airway obstruction in unconscious patient may be tongue fall against the posterior pharynx, glottic edema, secretions, vomitus or blood in the airway, foreign body

like forgotten throat pack or external pressure on the trachea most commonly from a neck hematoma.

Signs and symptoms of NPPE include tachypnea, shortness of breath, pulmonary rales, frothy sputum production, decreased oxygen saturation, and evidence of upper airway obstruction. Chest radiographs may show signs of pulmonary edema.

None of the patients on whom we have reported had any history of cardiac disease and each had a negative preoperative physical exam [6]. After establishing a noncardiogenic etiology with relative certainty, the differential diagnosis should include an aspiration of gastric contents, adult respiratory distress syndrome (ARDS), volume overload, anaphylaxis, and airway obstruction. Perhaps the hardest to differentiate from the diagnosis of post obstructive pulmonary edema is that of aspiration of gastrointestinal contents. This is due to the fact that the onset of both processes may closely resemble each other (struggling patient, difficult intubation) and the clinical presentation (wheezing, dyspnea, hypoxia) is very often identical, but this condition is difficult to treat and its mortality is very high[9,10].

Airway obstruction should be managed by giving supplemental oxygen and opening the airway. If these maneuvers fail then refractory laryngospasm should be treated aggressively with a small dose of succinyl choline(10-20 mg) and temporary positive pressure ventilation with 100% oxygen. Some anaesthesiologists routinely use IV lignocaine 10-20 mg at the time of extubation to prevent severe coughing and laryngospasm[11]. Endotracheal intubation may occasionally be necessary to reestablish ventilation. If pulmonary edema develops it is similar to cardiogenic pulmonary edema and is managed in a similar way but reintubation and positive pressure ventilatory support with PEEP are extremely useful and full recovery from pulmonary edema occurs without any residual pulmonary or cardiac damage in most of the cases.

CONCLUSION

Postextubation laryngospasm in the immediate postoperative period is an important complication and it may lead to significant morbidity or mortality like pulmonary edema, cardiac arrest, brain damage or death. Prompt establishment of airway, use of short acting muscle relaxant to relieve severe laryngospasm and IPPV with PEEP may be life saving in these situations.

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CASE REPORT

Perioperative anaphylactic shock in a patient with unruptured hepatic hydatid cyst: a case report

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ABSTRACT

Hydatid cyst disease is an infection most frequently caused by the larval form of a parasite named Echinococcus granulosus. Spillage of hydatid fluid during open surgery has been shown to result in serious anaphylactic reaction. We report a case of 46 years old male with hydatid cyst of liver, who had a sudden onset of intra-operative hypotension, tachycardia, flushing, edema and bronchospasm. He was managed with adrenaline, antihistaminics, steroids, supplementary fluids and vasopressors, and after successful resuscitation, was shifted to ICU for further management. Four days later, he was weaned off from vasopressors and ventilatory support and shifted to the surgical ward. Early diagnosis and intervention are crucial for successful management of the anaphylactic reactions.

Key words: Hydatid cyst; anaphylactic shock; liver

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INTRODUCTION

Hydatid cyst disease is an infection most frequently caused by the larval form of a parasite named Echinococcus granulosus[1,2]. Hydatid cysts of the liver have been treated surgically for many years by several surgical techniques including marsupialization, evacuation, and filling the cyst with saline after evacuation of the endocyst[2-4]. Surgery for hydatid cysts of the liver has been associated with spillage of the antigenic hydatid fluid into the peritoneal cavity or direct contact with the bloodstream resulting in serious IgE-mediated anaphylactic reaction[3-7]. Most anaphylactic reactions encountered in open surgery for hepatic hydatid cysts occur when the cysts are deeply seated into the liver, and thus require a hepatotomy[4,6]. We present a case report of such a reaction during an open surgery of hydatid cyst of the liver.

CASE REPORT

A 46-year-old male complained of abdominal and flank pain and fever for many months. Ultrasonography and computed tomography of the abdomen showed a cyst of the liver. Preoperative examination of the cardiovascular and respiratory systems was normal and he had no history of allergy. The patient was premedicated with 0.07 mg/kg midazolam IM. The anesthesia was induced with 0.05 μg/kg fentanyl, 0.1 mg/kg vecuronium and 7 mg/kg thiopentone sodium IV. Endotracheal intubation was done using a 8.5mm endotrac heal tube. The patient was continuously monitored by electrocardiography (ECG), noninvasive blood pressure monitor, pulse oximetry and end-tidal capnography. Anaesthesia was maintained with 50% O_2:50% N_2O and isoflurane. The patient was hemodynamically stable at the onset of the operation with

blood pressure (BP) at 120/80 mmHg and heart rate (HR) 90/min. Until approaching the cyst, hemodynamic signs continued to remain stable. Just before touching the cyst 20 mg diphenhydramine and 4 mg dexamethasone sodium were injected IV. After the starting of cyst excision procedure there was a sudden increase of HR to 140 bpm and a decrease of BP to 80/40 mmHg. 10 mg ephedrine was administered and infusion rate of fluids was increased. Instantly, a radial arterial catheter was passed to measure blood pressure invasively. Suddenly, the patient desaturated from 99% to 85% and his BP dropped to 60/30 mmHg. He was with 100% O_2 and isoflurane was switched off. Prednisolone 2 mg/kg, ephedrine 20 mg, adrenaline 0.1 mg and ranitidine 40 mg were administered IV. Due to persistent hypotension, infusion of dopamine at a rate of 20 μg/kg/h and an infusion of adrenaline at a rate of 0.2 mg/h were started. Arterial blood gas (ABG) analysis showed hypoxemia (PaO_2: 52 mmHg, $PaCO_2$: 60 mmHg, pH: 7.1, serum bicarbonate: 22 mmol/l and SpO_2: 88% on FiO_2 of 1). His BP was 30/10 mmHg now. The patient had diffuse erythema of whole of the body, edema of head and neck and bronchospasm. A central venous catheterization was administered and central venous pressure (CVP) was measured to be 6 mmHg. After the BP rose to 70/40 mmHg, the operation was allowed to proceed. The cyst was excised in toto. After a few moments BP increased to 90/50 mmHg, and remained stable till the end of the operation at 90/60 mmHg. HR was then 130 bpm and ABG's now showed improvement (PaO_2: 69 mmHg, $PaCO_2$: 47 mmHg, pH: 7.2, serum bicarbonate: 22 mmol/l and SpO_2: 90%). The patient was admitted to ICU and electively ventilated for 21 hours. He was extubated after full normalisation of ABG's and hemodynamic status at the 21st hour and discharged from ICU to surgical ward at the 4th day.

DISCUSSION

Anaphylaxis is a severe, life-threatening, hypersensitivity reaction[7]. In recent years anaphylactic reactions during anesthesia are becoming a common problem[8]. However, the incidence of intraoperative anaphylaxis due to hydatid cyst has been reported to be low at 0.2-3.3% and is usually associated with spillage of its highly antigenic contents into the body cavities or systemic circulation [9]. It may present with signs like flushing, edema, bronchospasm, hypotension and tachycardia[10-12]. The present report describes a typical anaphylactic reaction as manifested by severe hypotension, tachycardia, flushing, and edema.

The allergic reaction can be in a range from a mild hypersensitivity reaction to a fatal anaphylactic shock. In this case, the cystic walls were intact, and we believe that high intracystic pressure coupled with blunt dissection must have been the cause of leakage of cystic fluid into the bloodstream. In our case, there was an anaphylactic reaction secondary to the diffusion of the highly antigenic hydatid fluid directly into the bloodstream, as there was no macroscopic rupture of the cyst. In the literature few anaphylactic reactions have been reported without macroscopic ruptures of the hydatid cysts [13,14].

In an operation for a hydatid cyst removal, the possibility of an anaphylactic or anaphylactoid reaction should always be considered when there is unexpected, sudden, severe hypotension and tachycardia. Bronchospasm, skin and mucosal erythema may be late or obscured signs. Early aggressive therapy with intravenous adrenaline is crucial and the drug of choice in the management of such cases15. In addition, inhalation anesthetics should be stopped just after the diagnosis of anaphylaxis, 100% oxygen administered and the intravascular volume replaced with colloid or crystalloid fluids. Histamine receptor antagonists may be administered. The use of vasopressors should be considered.

CONCLUSION

In conclusion, in hydatid cyst surgery of the liver, anesthetists must remain vigilant for an anaphylactic reaction. An intubated patient with anaphylactic reaction provides easy control of airway and early diagnosis and intervention are crucial for a successful outcome in a patient with anaphylactic shock.

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CASE REPORT

Removal of a large hydatid cyst in spleen

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ABSTRACT

Hydatid disease is caused by the infestation of larvae of Taenia Echinococcus (TE). Humans are infected through faeco-oral route by the ingestion of food and milk, contaminated by dog faeces containing the ova of parasite or direct contact with dogs. After coming out of eggs in the gut, larvae get into the portal circulation and pass through the liver which acts as the first filter. Most of the larvae settle in the liver and lungs, rarely passing to other organ like brain, spleen and mesentery. We describe an incidental finding of huge hydatid cyst spleen in an old lady who presented with long standing g eneralized vague complaints. The complete removal of cyst was performed with partial splenectomy.

Key words: Hydatid cyst; splenectomy; laparotomy; old age

Citation: Ahmad M, Saqib M, Ahmad M, Raees M. Removal of a large hydatid cyst in spleen. Anaesth Pain & Intensive Care 2011;15(1):48-50.

INTRODUCTION

Hydatidosis is endemic in many Mediterranean countries, the Middle East, South America, Australia, New Zealand, Africa and other parts of the world. It is caused by an infection from echinococcus granulosus larvae which can lead to the development of cysts. The most frequently affected organs are the liver and lungs. Splenic hydatid cysts alone are very rare. Humans are incidental host who contract the disease by ingesting highly infective eggs of adult echinococcus, harbouring in the small intestine of the definitive hosts like dogs and other canine animals. Splenic hydatid cysts, being a rare entity, can occur primarily or in association with hepatic, pulmonary or multi organ hydatidosis[1]. Open splenectomy is the standard procedure for benign disorders and laparoscopic hydatid cystectomy has also been reported. We report a case of incidental finding of this condition in an old hypertensive lady, who presented with unusual complaints.

CASE REPORT

A 79 years old female , weighing 85 kg, presented with complaints of malaise and generalized aches and pains in multiple joints. She was given symptomatic treatment for two weeks but this did not improve her symptoms. She had these complaints for the last 15 years. She was on tab atenolol 50 mg daily for her hypertension for the last 15 years. She reported with these complaints off and on to different outdoors and was always given symptomatic treatment, which continued for 2-3 years with no improvement. Interestingly, she had no abdominal complaints. Her investigations, e.g. blood complete picture, urine RE, blood sugar, blood urea and electrolytes and RA factor were within normal limits.

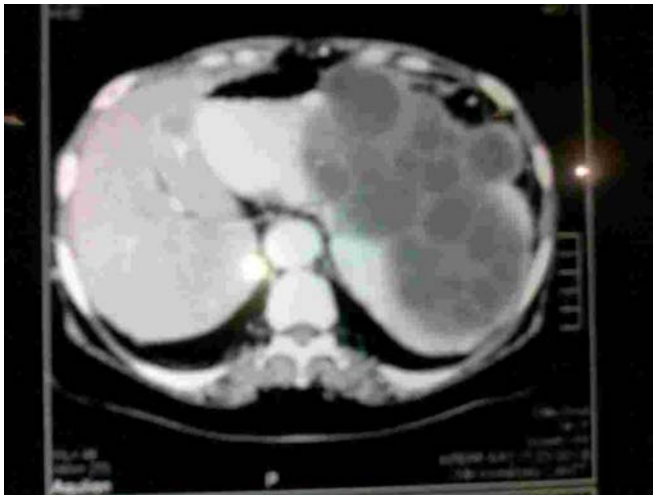

Figure 1: CT scan abdomen showing hydatid cyst in thespleen

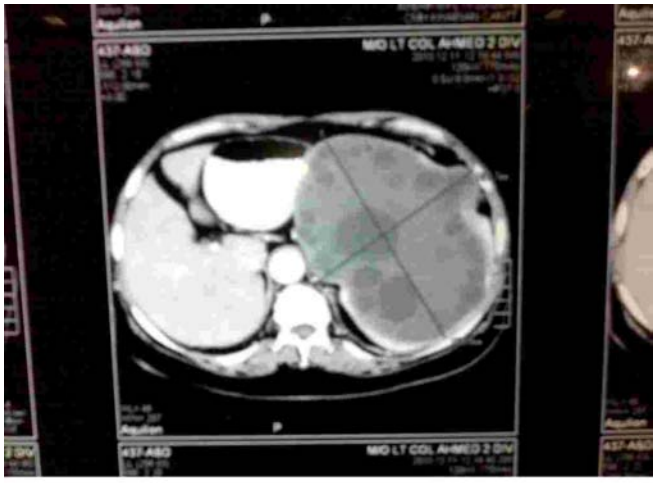

Figure 2: CT scan abdomen showing another view ofhydatid cyst

At her latest visit, she complained of some heaviness in her abdomen along with g eneralized complaints. Her abdominal examination revealed her spleen to be enlarged; and ultrasound abdomen rev ealed a huge cystic mass in spleen measuring 20x20 cm. A CT scan abdomen confirmed the diagnosis of hydatid cyst spleen (Fig 1&2). Her lab reports were normal except her hemoglobin, which was 9.8 gm/dl and ECG which revealed symmetrical T wave inversion in V3-6 leads. She was prepared for splenectomy under general anaesthesia. In the operating room, routine basic monitoring was done. She was induced with propofol 150 mg and morphine 4mg bolus plus 1mg intra-operatively to deepen the anaesthesia. Inj. atracurium 35 mg was used and ETT 7 mm was placed. For maintenance isoflurane 1.2 % was used in oxygen and nitrous oxide. Atropine 0.5 mg was given during the operation when her hear t rate dropped to 48/min. Intra-operatively she was transfused two pints of blood along with 2 liter of Ringers lactate solution. The cyst was punctured, aspirated and hypertonic saline was injected into the cyst re peatedly. Abdominal packs soaked with hypertonic saline were placed around the cyst during dissection. The rupture of cyst was inevitable in spite of careful dissection due to large adherent cystic mass hindering surg ery but there w as no anaph ylaxis reaction. Partial splenectomy with complete remo val of the cyst was performed. The surgery remained uneventful and she w as shifted to ITC after smooth reco very.

DISCUSSION

Hydatid disease is a zoonosis caused by ingesting eggs of the parasite echinococcus granulosus in rural sheep farming regions. After ingestion, the eggs hatch and oncospheres penetrate the intestinal mucosa and enter circulation. The embryos are car ried to the li ver to be ar rested in the sinusoidal capillaries (liver acts as first filter). Some of the embryos may pass through the hepatic capillaries and enter the pulmonary circulation and filter out in the lungs (lungs act as second filter). Wherever the embryo settles, it forms a hydatid cyst. Human ec hinococcosis is caused b y the tapeworm of the genus echinococcus. Of the 4 kno wn species of echinococcus, 3 are of medical importance in humans. These are echinococcus granulosus, causing cystic echinococcosis (CE): echinococcus multilocularis, causing alveolar echinococcosis (AE); and echinococcus vogeli[2]. Liver and lungs are the org ans most commonly affected by this disease as evident by the life cycle of the parasite. Primary infestation of the spleen by the parasite is rare. The infection is usually acquired in childhood and mostly remains asymptomatic. The cyst grows slowly at a rate of 0.3-1 cm per year and sometimes it may take 5-20 years to grow into size to cause symptoms of abdominal discomfort[3]. Berlott (1790) was the first to describe splenic hydatidosis as an autopsy finding[4]. When the cyst attains a considerable size the patient becomes symptomatic and mostly presents with painful left upper abdominal mass. The diagnosis of hydatid cyst spleen in our case w as an incidental finding, and initially she had only g eneralized vague complaints. The differential diagnoses for splenic hydatid cysts include other cystic lesions such as epidermoid cysts, pseudocysts, splenic abscesses, hematomas and cystic neoplasms of the spleen[5,6]. The PAIR approach is often used: puncture-aspirate cyst-inject h ypertonic saline-reaspirate after 25 min. There is always a risk of spontaneous or traumatic r upture and anaph ylaxis. T he standard treatment is total or par tial splenectomy; splenectomy without puncturing the cyst is preferable. We drained the cyst after puncturing it follo wed by partial splenectomy. Hypertonic saline w as used during the procedure and although there was some spillag e of cyst contents into peritoneal cavity, no adverse reaction was observed. Pre-operatively, she was prepared with albendazole, which is the mainsta y of treatment. T he morbidity is usually secondary to r upture of the ec hinococcal cyst (with or without anaphylaxis), infection of the cyst, or dysfunction of affected organs. The examples of dysfunction of affected organs are biliar y obstr uction, cir rhosis, bronc hial obstruction, renal outflow obstruction, increased intracranial pressure secondary to mass, and hydrocephalus secondary to cerebrospinal fluid outflow obstr uction. T he most serious complication during surg ery is IgE mediated anaphylactic reaction. Some reports have cited a 0.2-3.3% incidence of anaphylactic shock following surgical removal of hydatid cyst[7]. All preparatory measures must be at hand to deal with this adverse reaction promptly.

CONCLUSION

Hydatid cyst spleen is a rare but important diagnosis. An early diagnosis and treatment had an almost complete cure from the disease. Surgical excision is the mainstay of the treatment, but all preparatory measures must be undertaken to treat possible anaphylactic reaction.

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CASE REPORT

Dental braces bracing a throat pack to cause difficulty in its removal

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ABSTRACT

We present an unusual case of dental braces entangled into a throat pack, thus making it impossible to remove it from the mouth cavity of a patient. The patient, who was emerging from anesthesia, had to be reanesthetised, to enable removal of the pack.

Key words: Throat pack; anesthesia complication; dental braces

Citation: Aqil M. Dental braces bracing a throat pack to cause difficulty in its removal. Anaesth Pain & Intensive Care 2011;15(1): 51-53.

INTRODUCTION

Throat packs are commonly used in patients undergoing oral, nasal and dental procedures. We encountered difficulty in its removal at the time of extubation of trachea in a patient who was having dental braces fixed to lingual surface of her teeth. We found our throat pack was entangled in a hook of the braces that led to difficulty in its retrieval. The cause of this difficulty in removal of the throat pack is unusual and to our knowledge no such event has been reported in the literature. This case report emphasizes the need of extra care while removing the throat pack to avoid damage to these costly braces that may result in embarrassment to the anaesthetist and/or lead to a compensation claim.

CASE REPORT

A 23 years old female patient presented to our hospital with nasal deformity secondary to road side accident. She was scheduled for elective open septorhinoplasty under general anaesthesia. Her weight was 74Kg and height 157cm. Her airway examination and neck movements were normal. She was wearing lingual dental braces as part of her treatment for dental deformity. All baseline investigations e.g. haemoglobin, haematocrit, platelet count, urea, creatinine, prothrombin and APTT were within normal limits. She was graded as ASA 1 physical status. She was advised to be fasting from midnight and was premedicated with 2mg tab. lorazepam two hours before surgery with a sip of water.

On arrival in the holding area of the operating room, an IV line was established with a 20G cannula on the dorsum of the hand. In the operating room, ECG electrodes, pulse oximeter probe and non invasive blood pressure cuff were applied. She was pre-oxygenated with oxygen 6 l/min for about 3 minutes. Anesthesia was induced with inj. propofol in the dose 2 mg/kg and fentanyl 2 μg/kg For endotracheal intubation, neuromuscular block was attained with cisatracurium in the dose of 10 mg. She was intubated without any difficulty with 7.5 mm internal diameter RAE (Portex®) cuffed endotracheal tube (ETT). After confirmation of proper position of the ETT, it was fixed at 21 cm in the midline and intermittent positive pressure ventilation of the lungs was started with anesthesia machine (Datex Ohmeda AS 5™). To avoid soiling of the airway, the throat of the patient was packed around the ETT with a cotton ribbon gauze pack by one of our trainee doctor and the tail of the pack was left outside the mouth and tied to the ETT. To remind the presence of pack in the throat, a sticker was applied to the ETT connector quoting "Caution! throat pack inside". The placement of the throat pack was notified in the anesthesia record sheet and also endorsed to the circulating nurse. Anesthesia was maintained with sevoflurane in oxygen-air mixture and intermittent

doses of fentanyl. The intraoperative course was uneventful and duration of surgery was 110 minutes.

At the end of the surgery, residual neuromuscular block was reversed. On establishment of adequate breathing we planned to extubate the trachea. The oral cavity was cleared of any blood clot by using a flexible suction catheter size 14F and removal of throat pack was attempted by applying a gentle traction on the tail of the throat pack. We noticed unusual resistance in retrieving the throat pack. We planned to retrieve it under direct vision with the help of a Mc Intosh laryngoscope and Magill's forceps. To get a deeper plane of anaesthesia, inspiratory sevoflurane concentration was increased to get its end tidal concentration 3-4%. On attaining adequate depth of anaesthesia, laryngoscope was placed in the oral cavity and found that the threads of the throat pack were entangled in a hook of the lingual dental braces near the second molar tooth. Throat pack was gently freed from the hook and was removed after some difficulty. Residual blood clots were removed and trachea was extubated. The patient was sent to post anesthesia care unit where she stayed for about 40 minutes and was shifted to the ward with full recovery.

DISCUSSION

Lingual braces are used by orthodontists to straighten the tooth position. They consist of wire brackets that are attached to the lingual side of the teeth. They are usually invisible from outside and very costly. This is an unusual and unexpected cause of difficulty in removal of throat pack and should be considered in the patients with lingual dental braces, undergoing surgery under general anesthesia requiring endotracheal intubation and throat pack.

Throat packs are commonly used under general anesthesia in the surgery in the oral or nasal cavity and procedures on nasolacrimal duct. The common purpose of their use is to absorb blood or debris, body secretions or external fluids and prevent the seepage into respiratory tract.[1-3] Occasionally, they are used to provide seal around the ETT or to stabilise the ETT or supraglottic devices.[4-6] We tried to search the literature to find out the reported complications of throat pack but did not find any report of difficulty in its retrieval due to entanglement in a hook of a dental brace. The reported complications are pain in the throat1, [7-10], injury to lingual and hypoglossal nerve[11], unilateral laryngeal and hypoglossal paralysis[12], soft palate paresis[13], forgotten throat pack leading to airway obstruction[14-24] and unilateral pharyngeal plexus injury.[25]

We recommend that during pre-anesthesia assessment, we must enquire about the presence of dental braces, especially the lingual braces, and have more thorough inspection to find out any uncovered hook. Throat packs, if used, should be gently removed under direct vision, as an undue traction on it out may result in damage to the costly braces. Such incident may be an embarrassment to the anaesthetist and is likely to result in a compensation claim.

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DR PRANAV BANSAL JOINS APICARE

Dr Pranav Bansal has recently joined APICARE as assistant editor. He is currently serving as Associate Professor at Dept. of Anaesthesiology, Teerthanker Mahaveer Medical College, Moradabad, U.P. (India). He is a member of editorial board of the 'Internet Journal of Medical Education' and 'Internet Journal of Anesthesiology'. He is also a peer reviewer for 'Journal of Local and R egional A nesthesia', 'Jour nal of P ain R esearch', Dovepress, NewZealand

As well as 'Kathmandu University Medical Journal' of Nepal. He will be responsible for our permanent chapter, 'Cliniquiz'. This page is based upon a clinical case scenario, a technological development or newer trends in the practice of the relevant fields, followed by MCQ's of one best option type.

We welcome Dr Pranav Bansal to the world of APICARE.

CASE REPORT

Anesthetic management of the parturient with combined protein C and S deficiency

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ABSTRACT

Protein S is a vitamin K de pendent co-factor of protein C. Deficiency of Protein C and S results in a hypercoagulable state, which is treated with anticoagulation. This is the first report of a patient with combined protein C and S deficiency, who underwent a Cesarean section under spinal anesthesia in KRL Hospital Islamabad (Pakistan).

Key words: Protein C and S deficiency; spinal anesthesia; caesarean section

Citation: Batool T, Babur B, Tasneem T. Anesthetic management of the parturient with combined protein C and S deficiency. Anaesth Pain & Intensive Care 2011;15(1):54-56.

INTRODUCTION

Protein C is a 62-KD, Vitamin K dependent glycoprotein synthesized in the liver, and circulates in the blood as an inactive zymogen at a concentration of 4μg/ml. Its activation into activated protein C (aPC), is catalyzed b y thrombin when it is bound to the endothelial proteoglycan thrombomodulin.This activated form exerts its anticoagulant activity primarily through inactivation of factors Va and VIIIa[1],which are required for factor X acti vation and thrombin generation. The catalytic activity of activated protein C is enhanced by protein S. The results of deficiency of these can result in dee p vein thrombosis, pulmonary embolism, thrombophlebitis, neonatal purpura fulminans, liver cir rhosis and w arfarin-induced skin necrosis .[2]

Protein S is also a vitamin K-de pendent plasma protein discovered in 1977. Patients, deficient in either protein S or C, or who express a dysfunctional protein S , are at a risk for repetitive thrombosis.1 Under normal circumstances, pregnancy is associated with a h ypercoagulable state.[2] Venous thromboembolism is among the leading causes of maternal death in developed countries.[3-5] We describe the use of neuraxial anesthesia for cesarean section in a parturient who presented with both protein C and S deficiency.

CASE REPORT

A 34 years old primigravida, with a past medical history of epilepsy controlled on two antiepileptic medications, had developed deep venous thrombosis of left leg at 30 weeks of gestation and w as on anticoagulant therapy i.e . low molecular weight heparin according to her w eight. Her work up for hereditar y thrombophilia was done and she was found to have deficiency of both protein C and S. She had developed bursitis of left knee joint and mumps at 36 weeks of gestation. Her elective C- section was decided at 37 weeks of gestation. A coagulation profile obtained prior to surgery showed her PT 14, APTT 40, INR 1.0 and platelets 205000.

Anticoagulants were stopped 24 hours prior to her delivery. Spinal anesthesia was chosen for the surgery. The patient was preloaded with inj. Ring er's lactate solution in the operating room and placed in the sitting position. A spinal anesthesia was given at the L3-L4 level using a 25 gauge pencil point needle. The patient received 2.0 cc of 0.5% (hyperbaric) bupivacaine to obtain a T4 level of anesthesia. The patient was placed in the left uterine displacement position and had an uneventful Cesarean section. She was monitored in the post anesthesia care unit for two hours. She had by this time recovered motor and sensory functions

bilaterally and was discharged from the recovery room and sent to the high dependency unit. In the immediate post op period she was given two fresh frozen plasmas and one unit of blood. Her repeat coagulation profile was carried out. The results were in normal range. She was restarted on aspirin and heparin on 2nd post operative day and was discharged on day 7 after shifting to oral warfarin as an anticoagulant for further management.

DISCUSSION

Protein S is a vitamin K dependent co-factor of protein C. Protein C acts by neutralizing activated factors V and VIII and by an inhibitory action on plasminogen activator.[6] Deficiency of both protein C and S results in increased incidence of venous thrombosis. Deficiency of these may be hereditary or acquired. Hereditary disease is an autosomal dominant disorder, with homozygotes generally dying in infancy due to massive thrombosis. Heterozygotes generally have their first thrombotic event by their mid-twenties[7]. Acquired disease is usually due to hepatic disease.[7]

The frequency of venous thromboembolism from protein C and S deficiency ranges from 7 to 17%.[6] There is also a risk of spontaneous abortion. Pregnant patients with protein C and S deficiency can be managed with either a combination of aspirin and subcutaneous heparin or low molecular weight heparins (LMWHs).[8] LMWHs do not cross the placenta[8-9] and thus have a fetal safety profile equivalent to that of unfractionated heparin. Patients should not be offered neuraxial anesthesia unless the PTT is within the normal range if they are managed with aspirin and heparin.[10] The effect of low molecular weight heparin cannot be determined by a lab test, so the patient must be off it for at least 24 hours prior to neuraxial anesthesia. Tachycardia, hypotension, and hypothermia increase the likelihood of thrombosis and should also be avoided[10]. The risk of DVT among healthy pregnant women undergoing elective cesarean section is low and general medical thromboprophylaxis is probably not justified.[11]

To the best of our knowledge, this is the first report of a patient with combined protein C and S deficiency, who underwent a Cesarean section under spinal anesthesia. Our search revealed three previous case reports of patients with only protein S deficiency, who presented in labor.[12,13] out of these, two patients delivered by caesarean section done under spinal anesthesia without complication. The third patient had been on heparin, also. She had had a combined spinal/epidural anesthetic vaginal delivery.

Spinal anesthesia has an added benefit of being associated with a lower incidence of DVT. It is also preferred as pregnant patients are at increased risk for aspiration prior to intubation for general anesthesia and there is an increased risk of difficult intubation. A regional anesthetic technique is thus preferred whenever possible, and general anesthesia should be avoided.

CONCLUSION

In summary, neuraxial techniques can be used safely in patients with protein C and S deficiency as long as an appropriate laboratory workup is done and the patient has been off anticoagulants for an adequate period of time.

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CASE REPORT

Tension pneumothorax caused by ventilating rigid bronchoscopy for removal of foreign body

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ABSTRACT

Tension pneumothorax during ventilating bronchoscopy for foreign body removal is a rare but life threatening complication, which if not promptly diagnosed and treated can pro ve fatal. We present a case of tension pneumothorax, due to a laceration in the right main bronchus caused by bronchoscope, in a one year old child, who underwent bronchoscopy for removal of foreign body (bead). The child was successfully treated and managed by immediate insertion of 14 gauge IV cannula in the pleural cavity followed by chest tube insertion. The laceration was subsequently repaired and foreign body removed by thoracotomy.

Key Words: Ventilating bronchoscopy; Tension pneumothorax

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INTRODUCTION

Ventilating rigid bronc hoscopy is commonly used for removing foreign bodies from the tracheo-bronchial tree. Foreign body impaction in the airway is a common cause of death in c hildren[1]. Haemor rhage, post-procedure laryngeal oedema and trac heo-bronchial lacerations can occur during v entilating bronc hoscopy[2]. T ension pneumothorax is the most serious consequence of rigid bronchoscopy[3,4]. T his occurs when a one w ay v alve mechanism dev elops because of trac heo-bronchial instrumentation leading to a rent allowing the air to enter the pleural cavity during positive pressure ventilation but not allowing it to leave during expiratory phase. As the air builds up in the pleural space, ipsilateral lung is compressed followed b y mediastinal shift and compression of contralateral lung and intrathoracic vasculature. This leads to sev ere hypoxemia and cardio vascular compromise. Tension pneumothorax should be suspected in mechanically ventilated patients who suddenly decompensate [5]. Early diagnosis and prompt manag ement are essential for an optimum outcome. Therefore, this complication must be kept in mind and should be ruled out whenever ventilation is impaired and there is sudden cardiovascular compromise during anaesthetic manag ement for v entilating bronchoscopy[6].

CASE REPORT

A one year old female child, weighing 11 kg, was admitted through ER department with a one day history of foreign body inhalation followed by severe bouts of cough and dyspnea. Pre-operative examination sho wed a health y female child with symmetrical chest expansion, reduced air entry on the right side and SpO_2 of 100%. She was not dyspneic and was normothermic at the time of inspection, without any other medical problem. Pre-op c hest x-ray showed a foreign body in the right main bronchus (Fig 1).

Without any premedication, anaesthesia w as induced intravenously with inj. propofol 2mg/kg IV and supplemented by sevoflurane 3-4 MAC with 100% oxygen. Inj. atropine 0.2mg w as given IV and m uscle relaxation was obtained with a small 5-10mg dose of suxamethonium. Rigid bronchoscope was inserted by otolaryngologist and

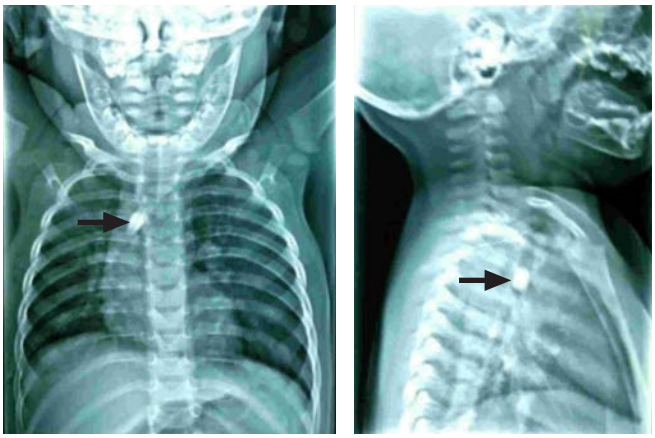

Fig 1: Pre-operative chest x-ray showing a foreign body in the right main bronchus (arrows)

attempts were made to get hold the foreign body with the forceps. 30 minutes after starting the procedure patient's SpO_2 started falling down to 40%, with cyanosis. Heart rate went upto 200 beats/minute. Child's abdomen was distended and on auscultation no breath sounds could be heard over the right hemithorax. The surgeon was asked to stop the procedure and an uncuffed endotracheal tube (size 4.0 ID Endosoft) was put in the trachea under direct laryngoscopy and the patient was manually ventilated with 100% oxygen. High airway resistance was encountered with only a slight improvement in SpO_2, upto 80%. Still no breath sounds were audible on the right side on auscultation. Immediate portable chest x-ray was requested, which showed a massive right sided pneumothorax with depression of right hemidiaphragm and shifting of trachea and mediastinum to the left with compression of the left lung (Fig 2).

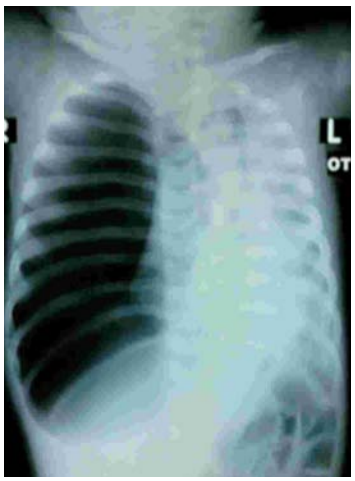

Fig 2: Chest x-ray showing a massive right sided pneumothorax with depression of right hemidiaphragm and shifting of trachea and mediastinum to the left with compression of the left lung

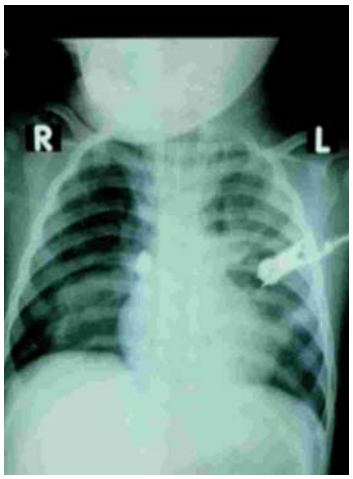

Fig 3: Post-op chest x-ray showing re-expansion of the right lung

A 14 gauge IV cannula was immediately inserted in the 2nd intercostal space in the midclavicular line. A gush of air leaked out through the cannula and ventilation became easier. Within a few minutes SpO_2 rose to 100%. Subsequently, another size-14 cannula was passed in the midaxillary line in the 5th intercostal space and connected by an IV infusion set to a temporary under-water seal after removing the 1st cannula. Repeat chest x-ray showed marked improvement with re-expansion of the right lung and mediastinal shift back to its position. (Fig 3)

A chest tube was placed in the right pleural cavity by the thoracic surgeon followed after a day by right thoracotomy which showed a small 0.7mm rent in the right main bronchus through which foreign body was removed and the rent was sutured. Child showed uneventful recovery and was discharged after a few days.

DISCUSSION

Ventilating rigid bronchoscopy has inherent risks and complications such as bleeding, laryngeal trauma, laryngeal oedema, laryngospasm, bronchospasm, infection, hypoxemia, tracheobronchial lacerations and tears leading to pneumothorax[2], pneumomediastinum and surgical emphysema of the chest wall and neck.

Tension pneumothorax is a rare but life threatening complication[3,4]. Rothmana and Boeckman[7] reported that the probability of developing pneumothorax during rigid bronchoscopy for the removal of foreign body is approximately 1 in 100 cases. It usually results from direct trauma to tracheobroncaheal tree. Therefore, the possibility of pneumothorax should always be kept in mind when

ventilation worsens during ventilating bronchoscopy[8]. An early diagnosis of pneumothorax during anaesthesia, however, is not so easy as the symptoms may be masked by anaesthesia[6]. Full monitoring is essential to alert the anesthesiologist of a worsening situation. Tension pneumothorax during surgery may manifest itself by a fall in oxygen saturation, a rapid increase in airway pressure, hypotension and tachycardia[9]. In our case, bronchial laceration caused by rigid bronchoscope was responsible for tension pneumothorax. Immediate intervention to release the built up pressure in the pleural cavity can be achieved by a large bore IV cannula and is life saving, to be followed by chest tube insertion. Vigilance is the price of safety.

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CASE SERIES

Interventional pain management techniques can be helpful in headache management

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ABSTRACT

In this case series we present three different interventional procedures used to treat headache. The procedures, e.g. occipital nerve block, cervical injection and trigger point injection, are described and the supporting literature is reviewed.

Key Words: Emergency department (ED); migraine; cervical injections; trigeminovascular system; cephalgia; occipital nerve block; trigger point injection.

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INTRODUCTION

The lifetime prevalence of headache is over 90%. The reported prevalence of migraine headaches is 18.2% among females and 6.5% among males. Headache is a common complaint for which patients seek relief in the emergency department (ED). The management of headache in UK EDs includes an armamentarium of medications delivered by the oral, subcutaneous, intramuscular, or intravenous routes. It has been characterized as a "broad pharmacopeia of medications" with opioids commonly administered, especially meperidine. While the most effective treatment for primary headaches is intravenous prochlorperazine (typically administered with diphenhydramine to counteract the common side effect of akathisia)[1-4], there are other therapeutic techniques that involve intramuscular injections of local anesthetics. This technically simple procedure is rapidly accomplished, and results are gratifying in that the relief occurs in five to 10 minutes. The technique is becoming increasingly accepted as a therapeutic modality for treating headache. In this case series, we used three different procedures to treat headache including occipital nerve blocks, cervical injections and trigger point injections. Patients' length of stay in the ED appears to be shortened. Based on the rapid resolution of headache and other trigeminovascular system-related signs and symptoms following these injections, connections to the trigeminal system appear to be involved. Three patients illustrative of the therapeutic response to the lower cervical injection with inj. bupivacaine are presented.

CASE ONE:

(Migraine without Aura: Cervical Injection)

A 31 year old female presented to the ED for pain relief from migraine headache, that started three days earlier. She complained of light sensitivity, nausea and vomiting. Routine abortive medications were attempted but without relief. The headache began on the left hemicranium, but became bilateral and was 10/10 in severity on VAS. The patient denied having any other medical problem. She was treated with 1.5ml of inj. bupivacaine 0.5% at either side of the spinous process of the C-7 vertebra. In less than five minutes she experienced relief of her headache to 1/10. She also described complete relief of her photophobia and nausea. Subsequently, the patient reported that she did

not have her usual postdromal headache that typically affected her during the following 24 hours. Nine days later she returned to the ED with a migraine headache initiated by the 'smell of a strong cologne'. Again, photophobia and nausea accompanied the headache. The patient again received bilateral intramuscular injections of 1.5ml of 0.5% bupivacaine at the level of C-7 spinous process. The time from the local anesthetic injections to complete headache relief was exactly seven minutes. The patient had two subsequent visits to the ED for similar migraine headaches over several months and responded consistently to the cervical injection therapy.

CASE TWO:

(Episodic Tension Headache: Cervical Injection)

A 47-year-old female complained of a constant frontal, unilateral headache for three days prior to arrival in the ED. Similar headaches would occur 'every now and then'. The patient described the headache as a tight band about her head. She denied an aura, numbness, phonophobia, photophobia, nausea, or vomiting. Even though she reported feeling 'congested', there was no clinical evidence of sinusitis. The headache was 6/10 in severity. Bilateral lower cervical injection with 1.5ml of 0.5% bupivacaine resulted in complete resolution (0/10) of the headache in approximately six minutes. During follow-up, the patient confirmed that she remained headache-free after leaving the ED, and that she was able to return immediately to her daily activities.

CASE THREE:

(Acute Post-traumatic Headache: Cervical Injection)

A 25 year old male sustained a head injury and orofacial trauma after collision with a car while driving a motorbike. A brief loss of consciousness occurred. Additionally, there was avulsion and subsequent reimplantation of the right maxillary central incisor as well as extrusive subluxation of the mandibular central incisors. Since the accident the patient had experienced continuous, severe right maxillary dental pain with hypersensitivity to cold water and light touch. He also experienced significant dental and gingival pain in the subluxated but stabilized teeth. His pain was unresponsive to hydrocodone with acetaminophen or oxycodone with acetaminophen. In addition, the patient reported a constant, throbbing, posterior headache rated at 7-10/10 in severity. A C-7 paraspinous intramuscular bupivacaine injection was performed bilaterally. Not only was the patient's headache relieved, his dental pain was reduced to 1/10 in severity. After the injection, the patient was able to bite down, drink water, and run cold water over his previously painful teeth. During the follow-up, the patient reported that his dental pain remained diminished and that the headache did not return.

CASE FOUR:

(Occipital Neuralgia: Occipital Nerve Blocks)

A 41 year old male presented to the ED for evaluation and management of his headache of recent onset. The patient described intermittent shooting pains that seemed to originate from the right occipital area. The clinical presentation was consistent with the diagnosis of occipital neuralgia. The headache had been present for over a week and had not responded to over-the-counter medications. Palpation over the occipital area easily reproduced the pain. He denied any other associated symptoms and denied any other relevant past medical, social or surgical history. In the ED the injection of bupivacaine 0.5% and methylprednisolone sodium succinate 20 mg with a 25-G needle (1.5 cm) into the muscles of the occipital region along the nuchal line, thus blocking superficial occipital nerves, brought immediate relief to the headache.

CASE FIVE:

(Trigger Point Injections)

A 23 year old female presented for evaluation of headache that had been present for three days. Muscle tenderness was detected by palpation bilaterally over the anterior temporal area and several ml of inj. bupivacaine 0.5% were used to inject these areas. The patient had rapid relief of her headache.

DISCUSSION

Occipital Nerve Blocks

With this procedure the greater and lesser occipital nerves are anesthetized. These nerves are commonly involved in cervicogenic headaches[5] and occipital neuralgia[6]. However, evidence exists to support the use of occipital nerve blocks for a much larger spectrum of primary headaches[7]. The greater occipital nerve arises from the C-2 nerve root and after traveling deep in the paraspinal musculature becomes superficial just below the superior nuchal line and lateral to the occipital protuberance. The nerve travels just medial to the occipital artery at these locations. The lesser occipital nerve is the terminal branch of the superficial cervical plexus and becomes superficial over the inferior nuchal

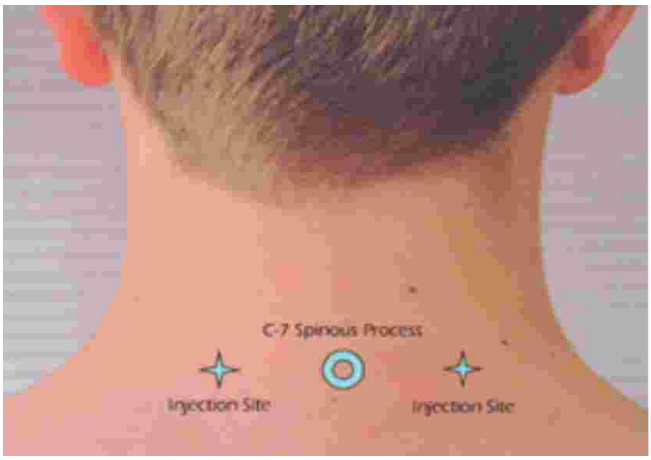

Figure1: The injection site for greater occipital nerve block

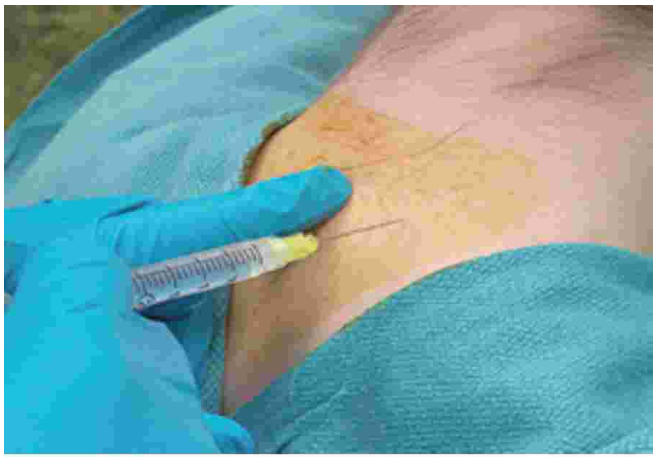

Figure2: The injection for greater occipital nerve block

line. The greater occipital nerve block technique, first involves identifying the nerve at its point of entry to the scalp along the superior nuchal line midway between the mastoid process and occipital protuberance. (Fig. 1) The patient will report pain as the nerve is palpated along this distribution. The point of maximal tenderness should be identified and used as the injection site [8,9]. The nerve typically exits approximately 3 cm below and 1.5 cm lateral to the inion or bony prominence of the occipital skull. (Fig. 2) The scalp should be cleansed with alcohol or another appropriate antiseptic. Local anesthetic agents commonly used include 2% lignocaine or 0.5% bupivacaine. A corticosteroid is often added to the anesthetic being injected. To reduce patient discomfort, the superficial skin can be anesthetized by creating a small wheal using a 27-gauge needle with 1% or 2% lignocaine. Alternatively, a vapocoolant can also be used to reduce discomfort[10,11]. A 25-G needle is directed towards the occiput until bony resistance is felt. A small amount of anesthetic is injected at that location. The needle is then pulled back until it is just under the skin then redirected laterally and medially as the anesthetic is injected. As part of the process the paraspinal muscles near the suboccipital region are infiltrated with the anesthetic. Since the smaller third occipital nerve exits medial to and in close proximity to the greater occipital nerve, it too is anesthetized (Fig. 2). Once the syringe is completely withdrawn, the injected area should be massaged and compressed to allow for better distribution of the anesthetic. An alternative technique consists of anesthetizing the nerve at a more distal site over the occipital ridge. The occipital artery is palpated one-third of the way from the inion to the mastoid process and the injections are made just medial to the occipital artery and then additional injections are made medial and lateral to this point9. Response rates have been reported to be about 85%9. Hypesthesia occurs within 1 to 2 minutes, extending upwards on the scalp to the interaural line. Overall, occipital nerve injections are safe but some adverse side effects such as dizziness, lightheadedness or local tenderness at the site of injection may occur. The use of local steroids has been associated with alopecia and hypopigmentation of the surrounding skin.

Cervical Injections

The bilateral lower cervical injections with bupivacaine is a recently reported technique for managing headache pain[12,13]. Additionally, this procedure also appears to provide some relief to patients with orofacial pain[14]. The mechanism is currently unknown, but based on the therapeutic response the authors suggest that the sensitized trigeminocervical complex is somehow calmed[15-18]. Previous work has established that cervical and trigeminal afferents as well as other structures with profound antinociceptive effects converge on the brainstem and are known to synapse with the trigeminocervical complex[19,20]. Cervical injection is performed at the lower cervical or upper thoracic dorsal spine. The field is cleaned with antiseptic solution such as triclosan 0.25% (Chlorosept), betadine or alcohol swabs. Using a 25-G 1.5-inch needle, 1.5 ml of 0.5% bupivacaine, 1 or 2% lignocaine are the anesthetic options. The needle is inserted 1 to 1.5 inches into the paraspinal muscles, 2-3 cm bilaterally, at C6 or C7 cervical vertebrae[12,21]. The entire amount of anesthetic solution selected (1.5 ml) is deposited in each injection site. Always withdraw the plunger before injecting to ensure that needle is not in a blood vessel. The injected area can be massaged afterwards to facilitate anesthetic absorption and a band-aid can be placed over the injection sites. While the therapeutic response is typically rapid, it can take up to 20 minutes before the

medication effect is noted. If patients do not report any pain relief, other therapeutic techniques should be tried[12,21]. Patients should be warned about injection site soreness which can last anywhere from 24 to 48 hours . Other potential minor complications of this procedure include, pain and irritation at the site of injection, vasovagal syncope, and hematoma formation. Patients should be informed of these potential risks before the procedure is perfor med.

Trigger Point Injections

Myofascial trigger points have been postulated as an etiology for headaches[23-27] and trigger point injections have been described as successful in the manag ement of these headaches[25-27]. Brofeldt and Panacek described the relief of headaches following the injection of anesthetic in the suboccipital and anterior temporal areas in their 1998 article[27]. Their tec hnique is described as a tw o-step procedure that involves identifying the proper injection site and then administrating the injection. To identify the injection site, various sites on the patients head and neck are palpated with the tips of the index and middle fingers using firm circular pressure while paying close attention to the suboccipital and anterior temporal areas. Anterior pressure is applied to the g eneral area where the g reater occipital nerve penetrates the semispinalis capitis muscle located approximately two finger breadths inferior to the superior nuchal line and one to two finger breadths lateral to the occipital protuberance. For the anterior temporal area, pressure is applied to the slight depression just posterior to the lateral orbital rim and superior to the zyg omatic arch. According to the authors , the appropriate site for injection is identified when focal pressure re produces or increases the patient's headache symptoms. The next step is the intramuscular injection for which a 50/50 mixture of 2% lignocaine and 0.25% bupivacaine buffered with a 1/10 volume of 8% sodium bicarbonate is used. A 27-G needle on a 5 ml syring e is inser ted through the area of maximal tenderness until the needle mak es contact with the cranium. To make contact with the inferior portion of the occiput bone, the needle is guided in a 45-60 deg ree angle superiorly. Once the needle is at the periosteum, continuous pressure is applied on the syring e and each focally tender area is 'fanned' with 1-5 ml of anesthetic solution by moving the needle in m ultiple directions, in and out of the tender area. Aspiration to a void injection into a vessel is generally not recommended if the solution is injected sim ultaneously during fanning of the needle. Once the syring e is withdra wn, the area of injection is massaged for at least 30 seconds The injection is considered successful when focal palpation no longer reproduces the headache symptoms[27]. The authors re ported that tw o-thirds of their patients had a therapeutic response. In the report by Young et al. the combination of 8 ml of 0.05% bupivacaine mixed with 2% lignocaine is preferred for the injections9. Their technique involves identifying the injection sites by palpating for areas of tenderness in the paraspinal, suboccipital and trapezius muscles. A total of 0.5-1 ml are injected per site , with the dose di vided betw een three triangularly oriented sites reac hed without removing the needle from under the skin9. When the trapezius muscle is injected near the apex of the lung, the authors pinch the muscle to isolate the muscle and decrease the chance of a pneumothorax. Steroids are often added to the anesthetic when trigger point injections are perfor med[9]. While the occipital injection location described by these authors is very likely an occipital ner ve block and the described paraspinous injections may be similar to the lower cervical injections, the injection of the described trig ger points, including temporal, and trapezius muscles, would appear to have some benefit.

CONCLUSION

In this article we described three different intram uscular anesthetic injections that have reported therapeutic benefit for managing headac he pain. W hile there are m ultiple therapeutic modalities a vai;able to reliev e headac he, intramuscular anesthetic injections other than g reater occipital nerve blocks are cur rently not widely utilized, recognized or researched. The clinical importance of cervical injections and trigger point injections remains to be further clarified. However, this new injection tec hnique appears to be an effective therapeutic option for the entire spectrum of Inter national Headac he Society (IHS) classified headaches, whether it be migraine, tension headache, cluster headache or other trig eminal autonomic ce phalalgias.

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REVIEW ARTICLE

The causes, prevention and management of post spinal backache: an overview

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SUMMARY

Back pain is one of humanity's most frequent complaints, a common reason for physician visits and a major psychological, physical and economical burden. Although the frequency of backache is as high as 46% even after general anaesthesia, it was the major cause for 13.4% patients refusing spinal anaesthesia. Multiple factors are involved in the pathogenesis of postoperative back pain and include type and duration of surgery, duration of immobilization, and the position of the patient during spinal puncture. Diagnosis of back pain is not simple; contributing factors may include needle trauma, surgical positioning, and injection of saline or local anaesthetic into the interspinous ligaments, development of a supraspinous hematoma, excessive stretching of ligaments after relaxation of paraspinal muscles and localized trauma to the intervertebral disc. Its relationship with various types and sizes of spinal needle is yet to be confirmed. Some preventive aspects have been discussed. Acute post spinal backache usually resolves within 7 days without any treatment but the possibility of epidural abscess or epidural hematoma must be ruled out. Counselling, hot and cold massage, mild analgesics like paracetamol or topical NSAIDs ointments may be prescribed.

Key words: Backache; Postoperative back pain; Spinal needle; Transient neurologic symptoms

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INTRODUCTION

Backache is a common public health problem and a major psychological, physical and economical burden for the individual and the society,[1-2] . Back pain is one of humanity's most frequent complaints and a common reason for physician visits. It is estimated that nine out of ten adults experience backache at least once in their lifetime, and five out of ten working adults have back pain every year. No comprehensive data exist for its prevalence in our population but it is almost the same as in the western population if not more.

Back pain after surgery may result from a multitude of causes that include posture during surgery, aggravation of an existing medical condition or needle trauma during central neuraxial blocks,[3-4]. In rare cases this may by the manifestation of a sinister condition like epidural abscess or haematoma following a central neuraxial block.[5]

INCIDENCE

A significant number of patients complain of backache following anaesthesia and surgery. Although the frequency of backache is as high as 46% following general anaesthesia[6], the patients relate this to their anaesthesia if they have undergone a central neuraxial block; the myth of invariable injury to the back associated with needles [7]. Backache following previous spinal anaesthetic was the major cause for 13.4% patients refusing spinal anaesthesia in a series of more than 1000 patients[8].

Symptoms varying from "pricking sensation" at the site of needle insertion, upper or lower back pain or pain radiating to the buttocks and legs are all sometimes reported as backache. 26.6% of more than 100 patients studied by Chan complained of injection site tenderness lasting less than a week, which should be differentiated from classical "backache" that none of them complained[9].

Confounding variables like pre-existing backache; duration of surgery and the patient's posture during surgery compound the issue. The pain could be of a short duration, lasting from 72 hours to a week or persistent, lasting beyond 3 months.

431 out of 918 pregnant patients surveyed by Shaheen and colleagues had at least one episode of backache during their pregnancy; 96 out of these had experienced backache before they became pregnant. This indicates that about half of these patients would have a preexisting backache if they presented for spinal anaesthesia for Caesarean delivery[10].

Controversy exists over the relationship between anaesthetic technique and the true incidence of postoperative back pain. Regardless of anaesthetic technique, back pain was seen in almost 25% of the patients who underwent surgical operations under general or spinal anaesthesia,[11-12]. Randel and colleagues at the University of Michigan compared the recovery characteristics of three anaesthetic techniques for outpatient orthopaedic surgery. One of the parameters they measured was post operative back pain and they found that epidural followed by spinal and then general anaesthesia had highest incidence of back pain on first post operative day but by the third post operative day the difference of back pain in these three techniques was not statistically significant. No patient in this study required any specific treatment for backache[13].

PATHOPHYSIOLOGY

An overview of the anatomical structures involved may help understand the nature of post spinal anaesthesia back pain. The back is a complex structure with an intricate network of bones, joints, muscles, ligaments, with multi level crossovers in nerve supply as well as muscular and ligamentous attachments. The multiple subdivisions of muscle mass, numerous connective tissue planes, and multiple attachments of tendons over small areas of vertebral periosteum help to explain the prevalence of neck and back pain while simultaneously explain the difficulty in precisely localizing the source of that pain. Branches of the posterior ramus provide sensory fibres to fascia, ligaments, periosteum, and facet joints.

Source of traumatic low back pain may be the vertebral column itself, surrounding muscle, tendons, ligaments, and fasciae, or a combination thereof. Taking into account this difficulty in identifying muscle and tendon injury as the source of pain and the fact that there are other generators of low back pain besides muscles (e.g., fasciae, ligaments, facet joint, intervertebral disc), it becomes clear that diagnosis of back pain is not simple. Deyo and colleagues have pointed out that source of acute low back pain cannot be identified in 85% of patients[14] (Table 1).

Multiple factors are involved in the pathogenesis of postoperative back pain and include type and duration of surgery, duration of immobilization, and the position of the patient during spinal puncture[15]. Other contributing factors include needle trauma, surgical positioning, injection of saline or local anaesthetic into the interspinous ligaments and development of a supraspinous hematoma, [16-17]. Excessive stretching of ligaments after relaxation of paraspinal muscles and localized trauma to the intervertebral disc has also been implicated in causing back pain[18].

Persistent Postoperative Back Pain: Schwabe and Hopf studied persistent back pain after spinal anaesthesia in the non-obstetric setting using questionnaires at 3 months and then after 1 year of spinal anaesthesia in 245 patients. Percentage of patients complaining of backache in their study was comparable with the average from 11 studies they referred to (15.4% vs 18%). Pre-existing back pain was the only variable associated with persistent back pain after 3 months of spinal anaesthesia. Most of these patients did not link their post-operative complaints of low back pain to the spinal anaesthetic[19].

Table 1: Pain sensitive tissues in the spine

Pain sensitive tissues in the spine
• Skin, subcutaneous tissue, and adipose tissue
• Capsules of facet and sacroiliac joints
• Ligaments: longitudinal spinal, interspinous (mainly posterior), and sacroiliac
• Periosteum
• Dura mater and epidural fibroadipose tissue
• Vasculature; both arterial and venous
• Paravertebral muscles

Backache and transient neurological symptoms

Postoperative back pain is sometimes confused with transient neurological symptoms. Lignocaine has been implicated as a possible cause of temporary and permanent neurologic complications after spinal anaesthesia in many case reports. Follow up of patients who received uncomplicated spinal anaesthesia revealed that some of them developed pain in the lower extremities after an initial full recovery. This

painful condition that occurs in the immediate postoperative period was named 'transient neurologic symptoms' (TNS).

Frequency of TNS and neurologic complications after spinal anaesthesia with lignocaine compared to other local anaesthetics was studied in a Cochrane review that looked at sixteen trials reporting on 1467 patients, 125 of whom developed TNS. The use of lignocaine for spinal anaesthesia increased the risk of developing TNS. There was no evidence that this painful condition was associated with any neurologic pathology; the symptoms disappeared spontaneously by the fifth postoperative day.

In another study, the relative risk (RR) for developing TNS after spinal anaesthesia with lignocaine as compared to other local anaesthetics (bupivacaine, prilocaine, procaine, levobupivacaine, ropivacaine, and 2-chloroprocaine) was 7.31 (95% confidence interval (CI) 4.16 to 12.86). The authors concluded that the risk of developing TNS after spinal anaesthesia was significantly higher with lidocaine as compared to bupivacaine, prilocaine, or procaine[20]. Risk of TNS with lignocaine does not change when concentration of lignocaine is reduced from 5% to 2%[21].

Anaesthetic factors influencing postoperative backache

The data on post spinal analgesia consists of observational studies looking at the effect of variables like needle size, design and technique on the outcome, which is largely success rate and postdural puncture headache. Postdural puncture backache (PDPB) is largely included as another variable that is not studied closely; a large array of complaints ranging from pain at the site of injection to classical backache or pain radiating to the lower limbs are lumped together as backache. Complete neurological evaluation to determine the cause is largely not documented in these studies[22].

Needle Type and Size: Type and size of spinal needle used for subarachnoid block has been studied extensively. A survey conducted on 274 patients undergoing spinal anaesthesia using 23 or 25 gauge spinal needles found no difference in the incidence of postoperative backache between the groups[23]. Kandg and colleagues compared 26 and 27 gauge needles for spinal anaesthesia in a large population of 730 ambulatory surgery patients. They noted 18-20% incidence of postoperative back pain in the two groups which was not statistically significant[24]. Tarkkila and colleagues compared Sprotte needle with Quincke needle for frequency of postoperative headache and backache in 300 ASA physical status 1 and 2 patients undergoing minor orthopedic or urologic procedures in their randomized, prospective trial. Backache was the most common complication, occurring in 18% patients with no difference between the two groups studied. Sprotte needle did not demonstrate any advantage in reducing the incidence of post dural puncture headache or backache[25]. Atraucan needle was compared with Sprotte and Quincke needles in a study that failed to demonstrate superiority of any one type of spinal needle in reducing the incidence of postoperative back pain[26].

Lowery and Oliver studied the incidence of postdural puncture headache and backache following diagnostic/therapeutic lumbar puncture using a 22G cutting spinal needle, and after introduction of a 25G pencil point spinal needle in 99 pediatric patients. They reported post procedure back pain in 11% of patients in the 22G Quincke needle group while none in the 25G pencil point needle group. These finding, although overwhelming, are not supported by data from adult literature[27].

Rebekah and colleagues compared the back pain and patient satisfaction scores after the administration of a spinal anaesthetic with or without the use of an 18 gauge introducer needle in 84 patients. They failed to demonstrate a difference in back pain or patient satisfaction scores on discharge from post-anaesthesia care unit or 24, 48 and 72, hours postoperatively. Significant increase in the number of redirections between groups was observed in the non-introducer group, which did not affect the results [28].

Technique: Wilder-Smith prospectively followed 697 patients operated under spinal anaesthesia to determine the incidence and contributing factors predisposing to post-spinal anaesthesia backache. Backache was reported by one out of every seven patients (13.1%), which is comparable to frequency of post-spinal headache. They determined that this often neglected additional cause of post-spinal morbidity can be reduced by the use of atraumatic techniques and with small-gauge spinal needles for performing lumbar puncture[29].

Shutt and colleagues compared 22G and 25G Whitacare needles with 26G Quincke needles. It was a controlled study of 150 women undergoing elective Caesarean delivery under spinal anaesthesia in which effect of number of needle insertions on the postoperative complication rate was assessed. The significant difference between groups ($P < .001$) was attributable entirely to the number of patients reporting backache after more than two attempted

needle insertions. The increased incidence of backache following repeated spinal needle insertion was presumed to be due to soft tissue or periosteal trauma. No backache was sufficiently severe to be followed beyond 72 hours after the operation[30].

PREVENTION

Needle size and design do not influence the likelihood of a patient developing postoperative backache. Number of attempts made before a successful block increase the risk of trauma and likelihood of postoperative backache. Avoiding neuraxial blocks while a patient is receiving antiplatelet increases the risk of epidural haematoma with resulting acute back pain and neurological injury. There is little evidence to suggest an association between persistent backache and spinal anaesthesia; almost all of these patients have a history of at least one episode. This history should be sought during preanaesthetic interview and the patients reassured about this lack of association before administering them spinal anaesthesia.

MANAGEMENT

Acute post spinal backache is a self limiting condition that resolves within 7 days without any treatment in most patients but the symptoms overlap with those of serious neurological complications like epidural abscess or epidural hematoma. Conservative management may be instituted after serious causes of back pain have been ruled out. Patient should be counselled about the reversibility of the condition. Hot and cold massage mild analgesics like paracetamol or topically NSAIDs ointments may be prescribed. A follow up would be advisable to rule out persistent backache that requires more extensive workup and management.

CONCLUSION

Incidence of PDPB is almost the same as postdural puncture headache (PDPH). In contrast with PDPH, which is a direct consequence of the technique, there is little data to attribute PDPB to dural puncture; exception being serious conditions like epidural abscess, haematoms and meningitis. PDPB can result from a multitude of causes that include patient's positioning during surgery, length of surgery and pre-existing backache. It is a self-limiting condition that responds to conservative management. There is, however, an established association between intrathecal lidocaine and TNS. We recommend seeking a thorough history for pre-existing backache from all patients receiving spinal anaesthesia; complaints of new onset backache after spinal anaesthesia should be investigated for serious causes like epidural haematoma or abscess before the patients are reassured and symptomatic management ensued. Back pain persisting for more than one week should be referred for further investigations.

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CLINIQUIZ

Radiofrequency Neurotomy

Tariq Hayat Khan

QUESTIONS

Note: Please choose one best answer.

Q1. A radiofrequency neurotomy is a type of injection procedure in which a heat lesion is cr eated on certain nerves thus interrupting the pain pathways.

a. The heat is produced by resistance in the tip of the acti ve electrode to the f lowing cur rent
b. The resistance in the sur rounding tissues is responsible for heat generation, so that the tip of the electrode absorbs heat from the surrounding tissues
c. The electrode tip maintains its temperature regardless of the temperature of the surrounding tissues
d. If the sur rounding tissues ha ve a high conductance, the temperature rise will be tremendous
e. The larger the tip of the electrode, the higher will be the temperature rise

2. If effective, the neurotomy should provide pain relief for a variable period of time that may be;

a. Nine to fourteen months
b. Ten to twelve months
c. Six to eight months
d. Longer than fourteen months
e. Less than six months

3. The neurotomy procedure requires the following:

a. An IV line, sedatives, an x-ray table, local anesthetic solution, RF cann ulas, RF g enerator.
b. An IV line , sedatives, an x-ra y table, general anesthesia, RF cann ulas, RF g enerator.
c. An IV line, sedatives, an x-ray table, local anesthetic solution, RF cann ulas, RF g enerator, imag e intensifier.
d. An IV line, sedatives, an x-ray table, local anesthetic solution, long spinal needles , RF g enerator.
e. An IV line, sedatives, an x-ray table, local anesthetic solution, long insulated spinal needles , RF generator.

4. The duration of the procedure is highly variable and depends upon many factors.

a. The entire procedure usually tak es between 30 and 60 minutes in expert hands
b. The time tak en is shor ter if the height of the patient is less than the a verage height for ag e
c. The duration of the procedure is usually shorter in female patients
d. It is associated with expertise of the operator and the assistants, the number of nerves to be blocked and the cooperation of the patient
e. It may be perfor med quic kly under g eneral anesthesia

5. Regarding RF, it must not be tried if;

a. The pain relief can be achieved with continual use of NSAIDS
b. Infiltration of local analgesic agents gives adequate pain relief
c. A patient is expected to survive less than one year
d. The pain perception is associated with minimal numbness of a foot
e. The patient is a known diabetic

6. Regarding complications of RF it can be said that;

a. There is no evidence of any serious complications except failure to have pain relief
b. There is always full relief of pain even if associated with some vascular or neural injury
c. It is a selecti ve procedure with only cutting of pain pathw ays without producing cutaneous numbness or dysesthesia
d. Local infection is common and is a result of tissue damage by burning

e. Although transient neuritis and dysesthesia have been reported, enhancement of pain occurs only in 5% of the patients

7. The RF is generally a safe procedure, but one must be careful to identify the development of some common side-effects;

a. Hypertension and hyperglycemia

b. Temporary weakness and/or temporary numbness

c. Nausea with or without vomiting

d. Hyperglycemia and nausea

e. Bowel and bladder incontinence

8. Temperature produced depends upon;

a. Current, duration of exposure, tissue resistance and the skin colour

b. Duration of exposure, proximity of the electrode tip to the nerves, tissue resistance and the skin colour

c. Current, duration of exposure, tissue resistance and the diameter of the nerves

d. Impedance, current, duration of exposure and tissue resistance

e. Voltage, duration of exposure, selected frequency and the type of nerves to be blocked

ANSWERS

1. (b) is the generally accepted correct answer.

2. (a): Nine to fourteen months is the generally agreed duration of the pain relief with RF, although some authors have stated a much shorter duration.

3. (c): An IV line, sedatives, an x-ray table, local anesthetic solution, RF cannulas, RF generator and image intensifier are the main requirements of the procedure. A close attention to the availability of the equipment and required drugs will remove many of the later hassles.

4.(d): The time taken to perform RF is associated with expertise of the operator and the assistants, the number of nerves to be blocked and the cooperation of the patient. The height and gender of the patient have no effect on the procedure. It is usually performed by numbing the skin by local anesthetics; and diagnostic blocks and localization of the nerves may become difficult or even impossible under general anesthesia.

5. (a): RF can be used in cancer patients likely to survive more than three months. RF is only used after successful diagnostic block with local anesthetics has been established. These blocks also offer relief from pain caused by RF itself. If patient is benefitted with continual use of NSAID's or other pain medications, he should not be subjected to RF; however, theside effects of these drugs must be controlled by appropriate measures.

6. (e): Although transient neuritis, failure to produce pain relief, and dysesthesia have been reported, enhancement of pain occurs only in 5% of the patients. Some evidence does exist of occasional serious complications e.g. paralysis, dizziness and bowel and bladder incontinence. Infection can be a result of poor adherence to the principles of asepsis.

7. (b): Common side effects include: temporary weakness, temporary numbness, pain at the procedure site, rarely, more-serious side effects occur, including: long-term numbness, paralysis, dizziness and bowel and bladder incontinence.

8. (d): Temperature produced depends upon impedance, current, duration of exposure and tissue resistance. Proximity of large blood vessels may lower the temperature. Color of skin or the type of nerves blocked have no effects.

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LETTERS TO EDITOR

Need to close the 'closed suction in-line catheter' port!

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Infection sources in ICU require utmost vigilance and care. We hereby describe another probable source of infection in patients of ICU where closed suction systems (CSS) are applied for uninterrupted ventilation even during suctioning. Growth of microorganisms increases, whenever these organisms get optimum environment for their multiplication. Closed suction inline catheter systems (CISC) are most often used in patients who are critical and require ventilation for prolonged period. Numerous CSS are mark eted by manufacturers with one advantage or other. Kollef et al suggested that there is colonization of microorganisms in lower respiratory tract when such systems are placed over 24 hours[1]. Recently, numerous studies suggested that the use of CISC for more than 24 hours did not increase the risk of ventilator -associated pneumonia and it might be safe for patients[2]. Some manufacturers claim that this device can safely be attached for 72 hours continuously with low infection risk.

We routinely use these suction systems in patients on high PEEP ventilation. The manufacturer[3] claims some advantages in one CSS with many attachments. This dual lumen CISC (Portex ®Suction ProTM 72) contains various ports .These ports are:

Port 1: Attached to endotrac heal tube connecter
Port 2: Suctioning port that opens manually (Figure 1)
Port 3: For connection in-line with ventilator inspiratory circuit
Port 4: For attachment of supplied connectors (for nebulisation etc.)

This novel device produces great flow, high value and according to manufacturer it can be used for 72 hours. It provides an unobstructed evacuation pathway that helps make it easier to remove secretions, without the risk of cross contamination and the lockable end cap prevents inadvertent suctioning[3].

It aids in disconnection of the catheter from the patient's endotracheal or tracheostomy tubes and a patient label with day-of-the-week stickers are provided to monitor length of use. It is also a time saving solution for respiratory therapists, nurses and medical facilities.

After having used it in various patients in our ICU, it was observed that the suction port provided for attachment of the suction catheter, must have some capping or must have been manufactured in a way so that it does not act as a source of infection in critically ill and immunocompromised patients. It remains uncapped for 72 hours , and it may come into contact with some unsterile things. This might become a continuous source of infection and a place for microorganisms growth. The literature is abundant with reports of infections with respiratory tract secretions or catheter tips as a source, but not from these unusual sites. Further studies are required to samples these sites of CSS devices; the manufacturers may be suggested to take care of these sites either by capping or some coverings that can be removed while suctioning and reapplied afterwards.

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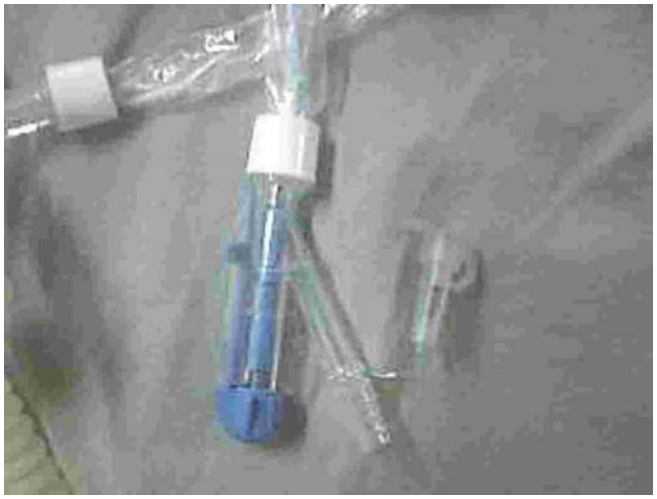


Figure 1: The site (white arrow) where capping is required

Trends & Technology

FDA Recalls Implantable Infusion Pumps and Refill Kits

FDA issued a class I recall of Medtronic's SynchroMed II and SynchroMed EL implantable infusion pumps and refill kits, used for the long-term infusion of pain, cancer treatment and anti-spasm medications. Class I recalls are the most serious type of recall and involve situations in which there is a reasonable probability that use of the recalled product will cause serious adverse health consequences or death. These pumps and refill kits have been recalled because pocket fills - the unintended injection of drugs or fluids into the tissue under the skin at the pump pocket site - have occurred and may result in patient harm, serious injury, and/or death due to drug overdose or underdose. The recalled products were manufactured from June 1998 to January 2003 and distributed from April 1999 to January 2011.

www.fda.gov/medwatch/report.htm

FDA Recalls Central Venous Catheter Trays

Because of leaks in the plunger luer detected during a routine syringe leak test, various types of Cook, Inc, central venous catheter trays are subject to a class I recall, FDA announced. "The potential exists for leakage and possible loss of sterility. This may lead to serious adverse health consequences and/or death," according to an alert from MedWatch, the FDA's safety information and adverse event reporting program. .

http://www.medscape.com/viewarticle/738433?src=mp&spon=46

Latest Johnson & Johnson Recall Involves Sterility-Risk Sutures

Johnson & Johnson, which has been plagued by repeated recalls of its consumer medicines and medical devices over the past year, has recalled 107 batches of surgical sutures in December due to potential sterility problems. The recall came to light on Wednesday after the United Kingdom Medicines and Healthcare products Regulatory Agency (MHRA) described the action on the agency's website. The action stemmed from potentially faulty packaging seals on the individually wrapped sutures that raised a contamination risk, J&J said. The potential problem was caused by modifications of manufacturing equipment and has been corrected, said Barbara Montresor, a spokeswoman for J&J's Ethicon surgical products division.

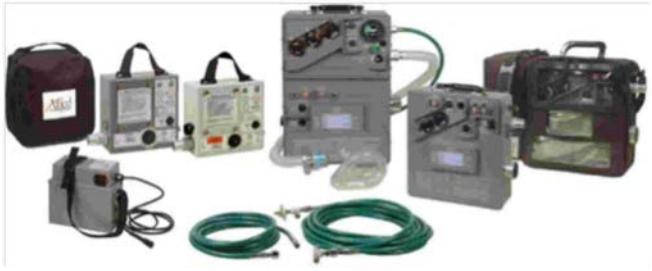
http://www.medscape.com/viewarticle/738340?src=mp&spon=46

Morphine/Naltrexone Combo Temporarily Withdrawn

King Pharmaceuticals Inc, a wholly owned subsidiary of Pfizer, has voluntarily recalled all dosages of a combination morphine sulfate and naltrexone hydrochloride (Embeda Extended Release Capsules CII) from wholesalers and retailers in the United States because "a prespecified stability requirement was not met during routine testing," a message on the product's Website notes. Available data suggest that the issue is unlikely to pose a safety risk to patients using the product as prescribed, the company's message to patients and prescribers notes.

http://www.medscape.com/viewarticle/739008?src=mp&spon=46

Ventilators for Mass Casualty Scenarios



St. Louis-based Allied Healthcare has released a line of ventilators designed for mass casualty situations. During natural or man-made disasters, hospitals may be overwhelmed by the sheer number of patients needing life support, and clinical staff typically not qualified to provide life support may be required to assist. Additionally, electric power may become unavailable. The Allied Mass Casualty Ventilators feature simple operation, long battery life, and are able to operate without external gas connections.

MEDEGRIP

MedeGrip, a simple foam device for working with small or breakable things in the clinic or on the floor, has received the European CE Mark of approval. It was less than a month ago that MedeGrip was successfully registered with the FDA as a Class 1 device and Access Scientific included it as part of the POWERWAND Maximum Barrier Kit. Developed by a PICC line nurse, the device helps take away the pain of handling things like Luer Loks and pin knots, and makes it a bit safer to work with glass ampules.

Masimo E1 Pulse Oximetry Ear Sensors

Masimo has received both US FDA and European CE clearance for its E1 single-patient-use pulse oximetry ear sensor. The ear is often used as an alternative site to measure oxygenation in situations where measurement at the fingertip is impractical, e.g. excessive patient movement or low perfusion states. While traditional fingerclip sensors are often applied to the earlobe, the E1 is attached more securely in the cavum conchae. It promises to give faster detection of oxygen saturation changes during low perfusion, and to avoid cross-contamination risks associated with reusable sensors.

SpectraShield Respirator

The FDA has cleared Nexera Medical's (Richmond, British Columbia) SpectraShield 9500 surgical respirator, a face mask the outside of which has been shown to kill three types of bacteria (Streptococcus pyogenes, Methicillin-resistant Staphylococcus aureus (MRSA), and Haemophilus influenzae). The device is also a certified N95 respirator, blocking at least 95% of dust particles.

BIOTRONIK's Latest Pacemaker Offerings

The FDA approved BIOTRONIK's Estella and Effecta pacemakers, as well as Vp (ventricular pace) Suppression feature in the Evia line. Evia and Estella pacemakers are compatible with BIOTRONIK's Home Monitoring technology for reporting device readings directly to the physician.

The Evia family combines the industry's smallest wireless remote monitoring pacemakers with a decade of longevity. This advancement increases the intervals between necessary device replacement procedures. It reduces unnecessary right ventricular pacing. Ventricular pace suppression, known as Vp Suppression, is a new, highly sophisticated algorithm that can promote innate conduction by enabling the pacemaker to stimulate the heart muscle only when appropriate.

Evia also features BIOTRONIK's proprietary Closed Loop Stimulation (CLS), a unique pacing solution with a proven, physiological rate regulation algorithm that is the most advanced on the market.

spirodoc

Easy to handle touchscreen display with intuitive icons. Rechargeable high capacity lithium battery. Actigraph and step-counter accelerometer to determine patient position during sleep analysis and distance walked estimation for a 6 min. walk test. Massive user-friendly database patient memory with powerful search, visualization and printing functions. Innovative detachable flowmeter ensures a sturdy and durable connection. External connectivity via Bluetooth® or USB cable to PC or printer.

Spirometry features
FVC, VC, IVC, MVV, PRE-POST BD.
Automatically records all trials.
Internal temperature sensor for automatic BTPS conversion.
Advanced spirometry test interpretation.
100% cross contamination free using MIR's patented disposable turbine.5

Pulse Oximetry features
Simple and clear SpO2 and Pulse measurement with pletismographic curve.
Sleep disorder detection with events recording.
Six minute walk test with desaturation area index.
Parameters directly shown on the display (min, max, mean SpO2 and Pulse Rate, _ Index, T90, T89, T88, T5, ODI, NOD, Desaturation Area etc.).

Academic Activities

Symposium on Cardiothoracic Anesthesia: A Symposium was organized on 23rd March 2011 by Pakistan Association of Cardiothoracic Anesthesia (PACTA) at TABBA Heart Institute Karachi.

The Inaugural session started after recitation of holy Quran followed by welcome address by chair organizing committee Dr Hamid Aqil Naqvi consultant TABBA Heart Institute. The oath taking ceremony for new office bearer was conducted by patron PSA Prof. S Tipu Sultan.

The 2 years activities of PACTA was highlighted by outgoing president Prof. Fazal Hameed, who also emphasized to focus on education and teaching in cardiac anesthesia as a second fellowship has already been started by CPSP. It was followed by speeches by incoming president Dr Shahab Naqvi, AFIC, and Prof. S Tipu sultan. They emphasized that establishment of PACTA was a dream which is now a reality and hoped that PACTA would help in promotion of knowledge and improvement in clinical skill and practice in cardiothoracic anesthesia. In the end chief guest CEO TABBA heart institute delivered his speech by appreciating formation of PACTA and extended his offer to cooperate in future also.

A shield was presented for life time achievement in cardiac anesthesia to Prof. Rehana Kamal from AKU. As she was out of country Dr Hamid Aqil Naqvi received the shield on her behalf. Another shield was presented to Prof. Younus Khatri for his contribution in cardiac anesthesia.

The scientific program comprised of two sessions. The program started by a presentation by Dr Zameer Rajput, Shifa Islamabad, who highlighted the challenges of providing safe anesthesia in lung cancer surgery, followed by Dr Khalid Rasheed a Cardiac surgeon from TABBA Heart Institute, who presented his approach and management strategies for dealing with urgent & emergent CABG; Prof Najma Amjad, NICVD, spoke on myocardial protection during off pump surgery; Dr Rana Altaf CPEIC Multan express his views on prevention of organ failure following high risk cardiac surgery. Dr Shahid Sami a cardiac surgeon from South City Hospital Karachi discussed surgical techniques and other relevant issues that affect the decision-making process In dealing with Functional MR; Dr Safdar gave his opinion on quality assurance in cardiothoracic anesthesia.

In post lunch session Arrhythmia During Period of CABG, Prevention vs. Treatment was discussed by Prof Sadqa from DUHS, Dr M Hamid described challenges in Pakistan for open heart pediatric surgery and presented statistics of pediatric surgeries performed all over Pakistan. For the first time a perfusionist Ejaz Haider from AKU and a staff nurse Shenaz Nadeem from TABBA Heart Institute participated in such forum and presented myocardial protection during CPB surgery and fast track cardiac surgery & nursing perspective respectively.

Post-lunch Scientific session included a free paper session in which six papers were presented by anesthetists involved in cardiac anesthesia from all over Pakistan, this generated a lively and exciting discussion for sharing multicentre experiences which was much appreciated by both seniors and juniors. The whole event was a great success and ended with hope of promoting a high standard of scientific presentations in future.

Dr Sadqa Aftab
Prof Anesthesia CHK, DMC, DUHS

Workshop on 'Radiofrequency Neurotomy': A one-day workshop was held at KRL Hospital Islamabad, under the joint arrangements of STSP and Dept of Anesthesiology, Pain Management & Intensive Care of the hospital. Dr. Jamil Sabit was the chief facilitator. Dr. Shahida Tasneem highlighted the importance of pain management and Dr. Tariq Hayat Khan presented an overview of the RF. Dr. Jamil threw light on various aspects of RF use in pain. A hands-on session was the main event, which was much appreciated by the participants from all over the country. The workshop was successful in inoculating an interest in this new pain relief modality in the participants. Certificates were awarded to all of them at the end.

Calendar

Intensive course of regional anesthesia in Dubai UAE
Rashid hospital Trauma centre - DUBAI - UAE (10/07/2011 - 14/07/2011)

Peripheral nerve blocks and catheters under ultrasound combined to NS guidance. 5 consecutive days of training with lectures, hands on phantom, models, live case in the Ors, clinical cases, catheters management in the wards. Requirements to set up a unit of regional anesthesia and analgesia. Educational material Book of 100 pages, forms and policies in soft copies. 8 participants/session

2011 Ultrasound Guided - Regional Anesthesia And Vascular Access Workshop
August 17, 2011 -Hershey, Pennsylvania, United States

Fellowship in regional anesthesia and analgesia in DUBAI
Rashid hospital Trauma Centre - DUBAI - UAE (01/09/2011 - 01/09/2012)

Education and research program in regional anaesthesia and analgesia in a trauma centre

30th Annual ESRA Congress 2011
Dresden, Germany (07/09/2011 - 10/09/2011)

Building Knowledge and Science in Regional Anaesthesia
Come learn and network with over 1,500 anaesthesiologists, physicians and scientists who specialize in regional anaesthesia for surgery, obstetrics, paediatrics and pain control in the lovely, historic town of Dresden. www.kenes.com/esra2011

10th International Conference on Complexity in Acute Illness (ICCAI)
Bonn, Germany (08/09/2011 - 11/09/2011)

10th International Conference on Complexity in Acute Illness (ICCAI) is a highly interdisciplinary, international meeting that focuses on bringing together critical care physicians, anesthesiologists, mathematicians, bioengineers, physicists, and computer scientists interested in improving acute care outcomes through the application of advanced quantitative methodology to clinical and experimental data to discuss recent advances in this field.For more information, please contact Dr. med. Sven Zenkerzenker@uni-bonn.de

3rd International Conference For Pain Treatment
Prizren, Republic of Kosova (09/09/2011 - 11/09/2011)

Professional Health Association (PHA) in cooperation with: Ministry of Health, Republic of Kosova ; Faculty of Medicine, UCCK, Clinic of Anesthesiology - Pristina; Regional Hospital " Prim. Dr. Daut Mustafa" Prizren ; Albanian Pain Association (APA) and European Federation of IASP Chapters - EFIC Organize:3rd International conference for Pain Treatment and 2nd Conference of Pain Management for Nurses. All health professionals are invited to attend this conference: anesthesiologists, neurologists, surgeons, gynecologists, dentists, neurosurgeons, physiotherapists, pharmacists, nurses and other health workers who have special interest for the diagnoses and treatment of pain.

Intensive course of regional anesthesia in Dubai UAE
Rashid hospital Trauma centre - DUBAI - UAE (25/09/2011 - 29/09/2011)

Peripheral nerve blocks and catheters under ultrasound combined to NS guidance. 5 consecutive days of training with lectures, hands on phantom, models, live case in the Ors, clinical cases, catheters management in the wards. Requirements to set up a unit of regional anesthesia and analgesia. Educational material: Book of 100 pages, forms and policies in soft copies. 8 participants/session.

Anesthesia Simulator Workshop
September 22, 2011 -San Francisco, California, United States

Hands-On Difficult Airway Management Workshop
September 22, 2011 -San Francisco, California, United States

Introduction to Transesophageal Echocardiography (iTEE) Workshop
Saturday, September 10, 2011 to Sunday, September 11, 2011

At Intercontinental Buckhead Hotel, Atlanta, Georgia, United States of America

The Third International Congress of Obstetric Anaesthesia and Perinatal Medicine with Recent Advances in Anaesthesiology, Perioperative Medicine and Pain Therapy
Poznan, Poland (06/10/2011 - 08/10/2011)

The main goal of the Congress is development and delivery of the state of art updates and refresher courses in the fields of obstetric anaesthesia, perinatal medicine and beyond.

ASA 2011 Annual Meeting
October 15-19, 2011 -Chicago, Illinois, United States

11th APICARE Conference-PSA Rawalpindi-Islamabad
14-16 October, 2011, PC Hotel Bhurban (Murree Hills)

Three day conference will be held by PSA Rawalpindi-Islamabad chapter at picturesque place of Bhurban (Murree Hills) near Islamabad-the capital city of Pakistan. It will comprise of plenary sessions and discussion penals. The scientific programme will be announced shortly.

XVIIth International Congress of Anaesthesiology and Intensive Care
Novotel Plovdiv, Bulgaria (27/10/2011 - 30/10/2011)

The Congress programme includes topics on anaesthesia and pain management, multidisciplinary treatment of trauma, sepsis, clinical nutrition. The event is organized with the support of Military Medical Academy and Bulgarian Society of Parenteral and Enteral Nutrition. For more information, please visit website www.anesthesiology.bg or e-mail ccbulg@abv.bg

European Society of Intensive Care Medicine 2011
01 Oct 2011 to 05 Oct 2011
Location: Berlin, Germany
Website: http://www.esicm.org

The Middle East Anaesthesia, Pain Management and Critical Care Conference;
23 - 25 October, 2011
Abu Dhabi National Exhibition Centre

Intubating robot

First there was McSleepy™. Now it's time to introduce the first intubation robot operated by remote control. This robotic system named The Kepler IntubationSystem (KIS), and developed by Dr. Thomas M. Hemmerling, McGill University Health Centre (MUHC) specialist and McGill University Professor of Anesthesia and his team, may facilitate the intubation procedure and reduce some complications associated with airway management. The world's first robotic intubation in a patient was performed at the Montreal General Hospital by Dr. Hemmerling. The KIS allows us to operate a robotically mounted video-laryngoscope using a joystick from a remote workstation. After successfully performing extensive tests in the airways of medical simulation mannequins, which closely resemble intubation conditions in humans, clinical testing in patients has now begun. One day, it might actually be the standard practice of airway management," concludes Dr. Hemmerling, whose laboratory developed the world's first anesthesia robot, nicknamed McSleepy™, in 2008, which provides automated anesthesia delivery.

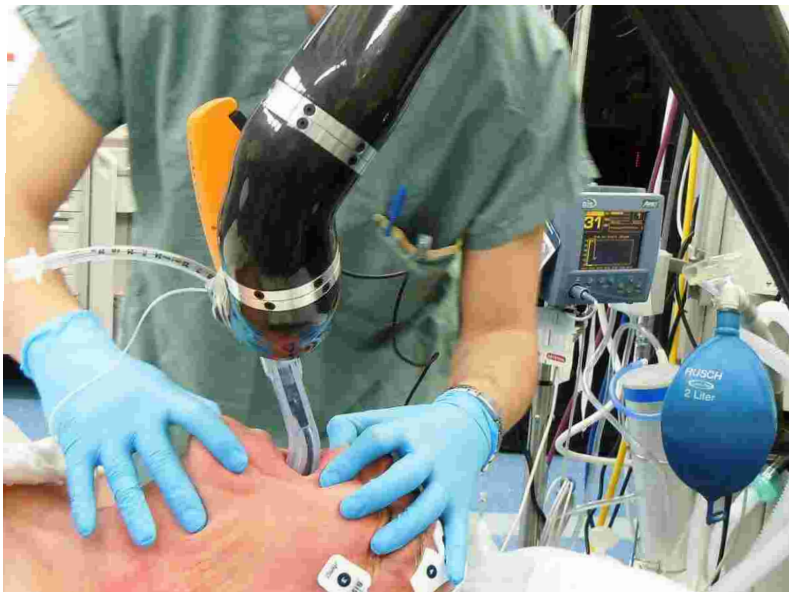


Photo Credits : Dr. Hemmerling's Research Laboratory.

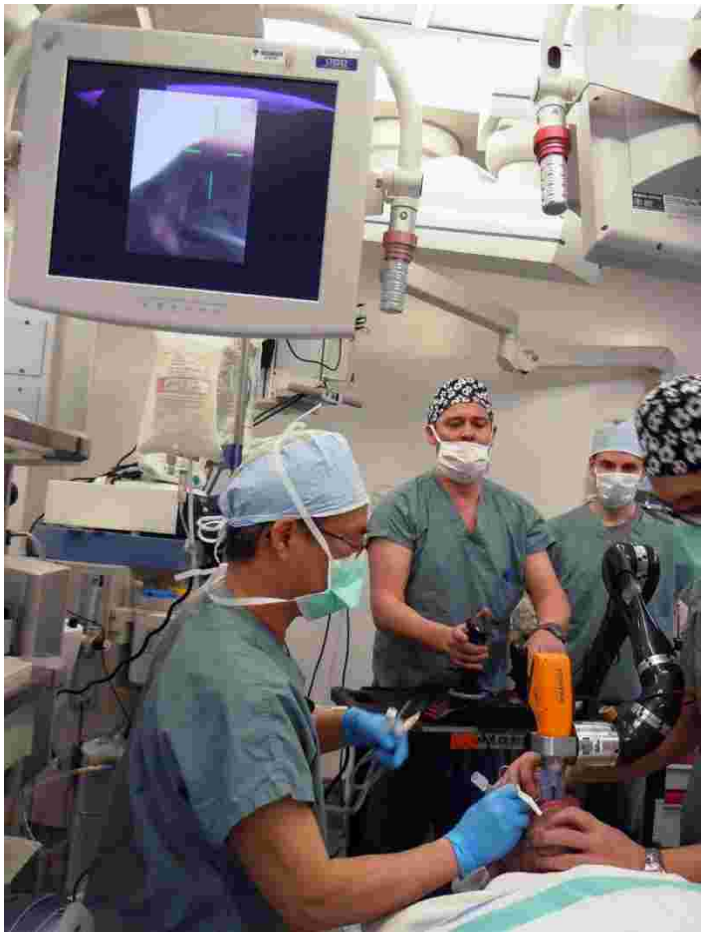
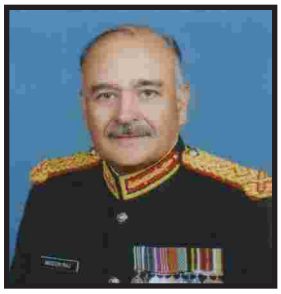


Photo Credits : Dr. Hemmerling's Research Laboratory.

Source: http://muhc.ca/newsroom/news/introducing-world%E2%80%99s-first-intubation-robot

Obituary



Major General (R) Muhammad Nasim Riaz

Month of June, this year, brought us the sad news of the demise of one of the senior anaesthesiologists of Pakistan, Major General (R) Muhammad Nasim Riaz who embarked on the journey to his heavenly abode, on 29 June 2011.

Gen Nasim Riaz was a colleague, a friend, an elder brother, a teacher and mentor to many of us from the anaesthesia fraternity of Pakistan Armed Forces. He was born in Attock City on 1st January 1944. He did his graduation from King Edward Medical College in 1969 and joined the Armed Forces during the 1971 war. He joined the specialty of anaesthesia in 1973 and, after serving at different military hospitals, joined the Armed Forces Institute of Cardiology & National Institute of Heart Diseases (AFIC-NIHD) in 1981.

He was one of the pioneers in cardiac anaesthesia in Pakistan and worked as cardiac anaesthesiologist in AFIC-NIHD for 20 years, at the end of which he was promoted to the rank of Major General and served as Advisor in Anaesthesia at Combined Military Hospital, Rawalpindi from 2001 to 2004. He worked hard for the training and improvement of anaesthesia care in the Armed Forces and even after his retirement from Army, he played an important role in establishing the cardiac center at the Pakistan Institute of Medical Sciences (PIMS), Islamabad.

He was an honest and upright man, a disciplined soldier, a dedicated teacher and a very competent professional. The vacuum created by his death is hard to fill. May Allah bless his soul in eternal peace.

إِنَّا لِلّٰهِ وَإِنَّا إِلَيْهِ رَاجِعُونَ ۝

By: Brigadier Shahab Naqvi