

CASE SERIES

VATS without general anesthesia: initial experience of 18 cases

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ABSTRACT

Background: General anesthesia and selective ventilation has long been the traditional anesthetic approach for video-assisted thoracoscopic surgery (VATS). However it may not always be necessary or feasible in a certain variety of patients. VATS under locoregional anesthesia and sedation has proved to be a safer and more efficacious alternative to general anesthesia, especially in cases deemed unfit for the latter.

Methodology: We retrospectively reviewed medical records of patients who underwent VATS under regional anesthesia/nerve blocks with sedation in three private hospitals from April 2014 to November 2015. VATS are conducted in these hospitals by the same anesthesia team and operated by a single surgeon. Eighteen patients included in the case-series were either considered high-risk for general anesthesia or required minor to intermediate surgery. None of the patients required endotracheal intubation or conversion to thoracotomy during the procedure.

Results: Eighteen patients underwent successful VATS under locoregional anesthesia with sedation at our set-up from April 2014 to November 2015. The procedures included pleural biopsies, pleurodesis, empyema drainage, biopsies for mediastinal masses, lung tumors and apical infiltrates, all performed under video-assistance. There was no perioperative mortality or unanticipated ICU admission.

Conclusion: VATS under locoregional anesthesia and sedation is a valuable, efficacious and safe alternative to general anesthesia that needs to be incorporated more frequently in the modern anesthesia practice.

Key word: Video Assisted Thoracic Surgery; Sedation; Intercostal Nerve Blocks

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BACKGROUND

Locoregional anesthesia for VATS is gaining popularity on account of its simple yet safe patient management. Compared to the traditional anesthetic approach of endotracheal intubation and one-lung ventilation, the former has been associated with significantly shortened ALS (average length of stay in hospital), quicker recovery times, lower mortality and an overall healthcare cost reduction.¹ With more and more set-ups reporting a promising ratio of such procedures successfully, to be or not to be intubated for VATS is becoming

lesser of a quandary in modern anesthesia.

The patients who undergo VATS usually belong to one of three categories: healthy, undergoing diagnostic procedures or patients belonging to ASA class III/IV who are considered high-risk for surgery, and/or are inoperable and hence poor candidates for a thoracotomy.² Previously, general anesthesia accompanied by one-lung ventilation had been the gold standard for thoracoscopic surgery. Despite its advantages of providing a clear surgical view and isolating the non-diseased lung from the contaminated operative side,² general

anesthesia poses many risks. It has been found that in 4% of major lung resections, ventilator associated lung injury may progress to acute lung injury,^{3,4} with a mortality rate as high as 25%.² One-lung ventilation injury, tracheobronchial rupture, hypoxemia, arrhythmias, liver injury and natural killer cell impairment have been cited as other potential adverse events following endotracheal intubation.²

As the surgical trend has shifted towards the minimally invasive VATS, which uses minimal number of ports to allow the entry of a camera, stapling devices and other surgical equipment; a few centers have attempted to circumvent tracheal intubation with its associated risks, especially in cases requiring minor to intermediate surgery or patients deemed unfit for the latter. A low postoperative complication rate combined with a shortened hospital stay,¹ reduced post-operative analgesic requirement⁴, and an overall improved patient satisfaction.¹

In a case-series comprising 947 thoracic procedures mostly performed under general anesthesia, Junacovici et al. found that elderly patients with poor physical health or malignancies contributed the most to the overall perioperative mortality rate.² In view of locoregional anesthesia cutting down the global operating room time, duration under anesthesia and hospital stay,⁵ the authors suggested using local anesthesia in these patients to decrease mortality in thoracic surgery.

METHODOLOGY

Following an agreement between surgical and anesthesia teams to avoid endotracheal intubation and general anesthesia in selected cases, it was decided to use local/regional analgesia plus sedation in the following set of patients:

- Too sick to tolerate intubation or unlikely to be extubated easily once intubated.
- Surgical procedure was not prolonged and did not involve extensive manipulation.
- The procedure was either likely to provide relief to the patient or provide necessary diagnostic information.

Anesthetic plan included monitoring of ECG, SpO₂, NIBP and EtCO₂ using a probe placed close to the nares; peripheral intravenous access was obtained. Local anesthesia was administered using intercostal nerve blocks at 4 levels or paravertebral catheter. Patients were placed in lateral decubitus position;

head side of the table was raised to position where patient felt comfortable. The surgeon gave additional local infiltration on incision sites. Patient required sedation and analgesia in boluses when they felt pain, discomfort or had bouts of cough. Supplemental oxygen was given through nasal prongs or facemask. Supraglottic airway devices and facilities for endotracheal intubation were ready if required.

Anesthetic charts were reviewed for all VATS procedures performed from April 2014 to November 2015. Patients in whom the procedure was conducted without general anesthesia and endotracheal intubation were selected for this case-series. Primary endpoint was successful completion of the case without resorting to general anesthesia.

RESULTS

Eighteen patients ranging in age from 18 to 80 years, and weighing between 50-110 kg underwent VATS under regional anesthesia from April 2014 to November 2015. These included 14 males and 4 females. Eleven patients belonged to ASA status III, six to ASA II and one to ASA IV. Duration of the procedures ranged from 35 to 135 minutes. All patients were assessed individually by an anesthesiology consultant and were selected for the case series based on their high-risk status for general anesthesia. The modes of anesthesia included ultrasound-guided intercostal nerve block or paravertebral block, with IV sedation consisting of intermittent boluses of midazolam, ketamine and propofol. None of the patients required intra-operative endotracheal intubation or conversion to thoracotomy. No patient required central venous access or an arterial line placement. Only two patients needed transient manual ventilation via face-mask, while the rest breathed spontaneously for the entirety of their respective procedures. Only one patient developed tachypnea and hypoxia during creation of surgical pneumothorax while undergoing a mediastinal mass biopsy. In this case the procedure was carried out under a paravertebral block and IV sedation; he was successfully managed with intermittent CPAP via face-mask and respiratory distress improved once chest tube was attached to underwater seal. None of the patients reported awareness of the procedure afterwards and there was no unanticipated ICU admission.

VATS without general anesthesia

Table 1: Procedures

| Procedure | No. |
|-------------------------------------|-----|
| Biopsy Mediastinal Mass | 2 |
| Biopsy Apical Lung Tumor | 1 |
| Biopsy Bilateral Lung Infiltrates | 1 |
| Empyema Drainage with VAC placement | 1 |
| Pleurodesis/Pleural Biopsy | 13 |

Table 2: Co-morbidities

| Co-morbidity | No. |
|-----------------------------|-----|
| Hypertension | 10 |
| Diabetes Mellitus | 8 |
| Ischemic Heart Disease | 9 |
| COPD | 5 |
| ESRD | 4 |
| Asthma | 2 |
| Chronic Atrial Fibrillation | 1 |
| Acute Renal Failure | 1 |

Eleven patients were treated post-operatively with SOS boluses of intravenous tramadol. Three required an intravenous opioid infusion and one a paravertebral catheter infusion of bupivacaine. Two patients were pain-free in the absence of any pain medication given post-operatively. The PACU stay of all patients was uneventful and discharge from the PACU was done on the same or next day depending on the hospital policy and surgeon's request. All the patients were discharged home without a need for extended hospital stay.

DISCUSSION

It would be apt to describe VATS under locoregional anesthesia – more colloquially referred to as MACTS (Monitored Anesthesia Care Thoracic Surgery) as the emerging future of thoracoscopic surgery.² The history of thoracoscopic surgery and MACTS can be traced back to nearly a century. Thoracoscopic surgery began as early as 1910 with Dr. Jacobaeus reported a successful thoracoscopic intervention for tuberculous pleural effusion.² Thoracic surgery without general anesthesia dates back to 1914, when a world war resulted, among other things, in innumerable gunshot injuries, which opened the doors to an understanding of surgical pneumothorax.² The introduction of the

double-lumen tube led to endotracheal intubation and one-lung ventilation becoming the standard anesthetic approach to thoracoscopic surgery, but with the advent of fiberoptic illumination and the subsequent video-assisted thoracoscopic surgery (VATS), locoregional anesthesia re-emerged as an equally efficacious alternative.^{6,7,8}

This rather small series reports early experience of a center utilizing local anesthesia and sedation for VATS. Katlic reported 126 and 384 cases of VATS with local anesthesia in 2006 and 2010 respectively.^{9,10,11} One of the major criteria for patient exclusion in their study was hemodynamic instability. Despite the small sample size of our case-series, we found the results to be promising since our selection-criteria ensured the inclusion of patients who were unfit or high-risk for general anesthesia, whether due to hemodynamic instability or the requirement of a minor to intermediate surgical intervention. Our study could thus serve as a small but significant milestone as it provided a safe alternative to general anesthesia in patients otherwise unfit to tolerate the stress of endotracheal intubation or not easy to wean once intubated. Previous studies have shown MACTS to significantly decrease operating room time¹² and decrease average length of stay in hospital by more than half.⁹⁻¹² A study by Vanni et al. also reports an increased lymphocyte and natural killer cell count in patients undergoing VATS under local vs. general anesthesia on the first post-operative day, thereby allowing for a more rapid recovery.¹³ Given the retrospective nature of our case-series, we would choose to withhold any observations in that regard. However, given the encouraging outcome of our case-series, we appreciate the fact that there is a need for a follow-up with a prospective study at our center comparing the overall operating room time, average length of hospital stay and patient satisfaction between patients undergoing VATS under general vs locoregional anesthesia.

CONCLUSION

VATS under regional anesthesia and IV sedation, in our experience, has shown a lot of promise. A reduced incidence of peri-operative complications, a shortened operation room time and hospital stay, and an overall reduced incidence of peri-operative morbidity and mortality makes regional anesthesia for VATS an exciting new prospect full of promise. With the understanding that the necessary equipment and staff should be available if the need for an unanticipated endotracheal intubation arises

during a procedure, we would advocate opting for regional anesthesia for VATS whenever the opportunity presents, due to its enormous benefits over general anesthesia.

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