

## EDITORIAL VIEW

# The rise of cardiac anesthesia!

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### ABSTRACT

History of cardiac anesthesia in itself is short, but the progress which it has made in the last few decades is enormous and to be reckoned with. The technological development of new invasive monitoring techniques and the capability to oxygenate blood in the arrested heart by mechanical pumps, and now the ability to perform on beating heart, has been some of the most remarkable achievements. New insights in coagulation and anti-coagulation, and the advent of new analgesic and anesthetic drugs and conjunctive techniques, e.g. thoracic epidurals, leading to the introduction of fast tracking has boosted the decisions regarding attempting risky cardiac cases. The next few decades are expected to introduce newer concepts and dramatic developments in concepts, expertise as well as in technical capabilities, which will truly revolutionize the cardiac anesthesia and with it cardiac surgery.

**Key words;** Cardiac anesthesia; Invasive monitoring; Epidural analgesia; General anesthesia; Cardiac surgery

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Cardiac anesthesia has grown enormously during the previous few decades, the pace being especially prodigious during the last few years. The magnificence to the subspecialty really came when Russell C. Brock while discussing closed surgery for tetralogy of Fallot expressed it most eloquently in his lecture at the Medical Society of London in the year 1949, "The anesthetist plays a part of fundamental importance which deserves a special tribute." From then started the victorious journey of cardiac anesthesia. The first journal 'The Journal of Cardiothoracic Anesthesia', was launched in February 1987, with an Editorial by Dr. Joel Kaplan entitled 'Cardiothoracic Anesthesia: A Subspecialty Speaks Out'.<sup>1</sup>

The horizons kept on expanding from then on, and several accomplishments of cardiac anesthesia were there to be witnessed. The state-of-the-art off pump coronary artery bypass (OPCAB) surgery was discovered, thereby anesthesiologist had more power and responsibility of hemodynamic management. Their armamentarium was consummated

by discoveries such as the capability to measure vital cardiac data by pulmonary artery catheterization (PAC). The flow-directed balloon-tipped Swan Ganz catheter became a monitoring standard in critical case scenarios.

Transesophageal echocardiography (TEE) is in vogue and is now a critically important cardiovascular imaging modality. Cardiac anesthesiologist has mastered the art of TEE; as it is one of the most useful tools to monitor the cardiac dynamics *in vivo*, in revascularization surgeries, surgery for valve and congenital heart disease, in an intensive care unit and a catheterization laboratory. The proximity of the esophagus to the heart and great vessels makes it an excellent ultrasonic window providing accurate information for several specific diagnoses and for many catheter based cardiac interventions.<sup>2</sup>

The next invent that set a trend was the thoracic epidural anesthesia (TEA) in conjunction with general anesthesia. TEA eased the postoperative management with excellent pain relief, low incidence of

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complications and the early mobilization; and has been the main tool in the comparatively recent introduction of the concept of fast track cardiac surgery.

The next masterwork to name is the 'Point of Care' (POC) testing. It has been embraced by many, following publication of results that POC-based transfusion algorithms reduce transfusions both in cardiac and non-cardiac surgery. Bleeding and coagulopathy are common in cardiac surgery mainly due to various different factors, including exposure to the perfusion circuit itself with resultant contact activation, hypothermia, anticoagulation with heparin, platelet activation and resultant dysfunction, and hemodilution, and fibrinolysis. POC testing helps in this regard as it provides a global look at whole blood coagulation, thus providing specific information on how all the various components of coagulation are working together. Thromboelastography (TEG) is a viscoelastic hemostatic assay which can be used to understand the hemorrhagic or thrombotic risk of the patient so as to deliver more targeted treatment. Rotational thromboelastometry (ROTEM) is where the cuvette itself is fixed providing a more stable platform. ROTEM tests can be done using various reagents and most common tests include intrinsic system (INTEM), extrinsic system (EXTEM), intrinsic system in presence of heparin (HEPTEM), and measures of fibrinogen levels (FIBTEM). The main advantage of ROTEM is acquisition of quick results than other POC options, thus reducing the time for decision making, a key consideration in trauma, cardiac, and liver transplant.<sup>3</sup>

Goal directed therapy is again a 'tour de force'. Tissue hypoxia may manifest in high-risk surgical patients despite normal conventional parameters, e.g., heart rate, blood pressure, central venous pressure, urine output and pulmonary capillary wedge pressure, which often do not reflect end-organ perfusion. The objective of goal directed therapy is to use flow-directed hemodynamic parameters to guide fluid and inotrope administration to maintain adequate circulating volume, tissue blood flow, and oxygen delivery.<sup>4</sup>

In today's time emphasis is on creating the next intellectual generation of anesthesiologist. The traditional teaching is modernized through simulation technology. We need to leverage the technology to enrich the training experience of our students. Simulation is an educational tool that improves trainees' knowledge and skills in cardiac critical care such as invasive procedures, management of medical and surgical emergencies, hemodynamic monitoring, and communication skills.<sup>5</sup>

All these advancements are very heartening and promising, and taking the subspecialty of cardiac anesthesia towards being recognized as a superspecialty. The next few decades are expected to introduce newer concepts and dramatic developments in conceptual thinking and expertise as well as in technical capabilities, which will truly revolutionize the cardiac anesthesia and with it cardiac surgery.

More glory to cardiac anesthesia will be witnessed in the coming years!

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