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STROKE VOLUME VARIATION GUIDED FLUID MANAGEMENT INTRA OPERATIVELY USING CARDIAC OUTPUT MONITOR IN A CASE OF CRANIO FACIAL RESECTION

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Abstract : Early aggressive resuscitation of critically ill patients may limit or reverse tissue hypoxia, progression to organ failure, and improve outcome. Similarly, a protocol to optimize preload and cardiac output in patients undergoing major surgery reduced postoperative complications and length of stay. However, overzealous fluid resuscitation has been associated with increased complications, increased length of intensive care unit (ICU) and hospital stay, and increased mortality.Cardiac filling pressure including CVP and pulmonary artery occlusion pressure have been traditionally used to guide fluid management. Studies conducted over past decades demonstrate that cardiac filling pressures are unable to predict fluid responsiveness Currently stroke volume variation that normally occur during phases of respiratory cycle is used as guide for fluid responsiveness during major surgeries.

Keyword : Stroke volume variation(SVV) ,fluid responsiveness,cardiac output

CASE SCENARIO:

We report a 36 year old male Mr.Narasimmalu presented with complaints of ulcer over hard palate and bleeding from the ulcer site for 30 days and ear pain with discharge. No h/o epistaxis/giddiness. On examination patient is moderately built weighing 60 kg. Other system examination was found to be normal. Echocardiography, spirometry and other blood investigations are within normal limits. Patient had been diagnosed as recurrent carcinoma hard palate(well differentiated squamous cell carcinoma) and subsequently underwent partial maxillectomy with supra omohyoid neck dissection in September 2011. Now because of intra cranial extension ,Middle craniofacial resection and reconstruction with temporalis flap and superficial temporal artery based osteoplastic flap was planned

ANAESTHETIC MANAGEMENT:

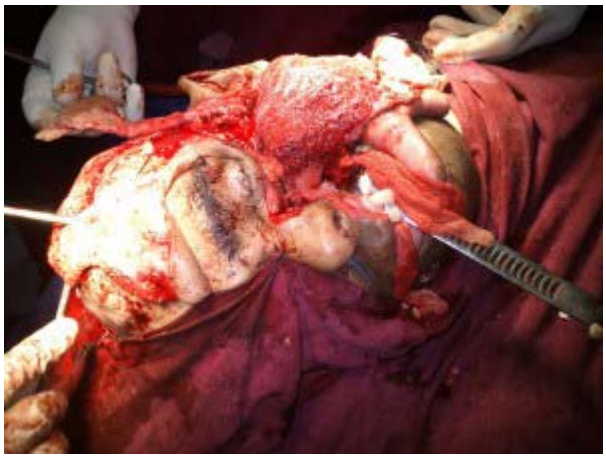
After getting high risk informed consent, the patient was scheduled for surgery. Patient was premedicated with Inj.Glycopyrolate 0.2 mg iv Inj.Ranitidine 50 mg iv Inj.Ondansetron 8 mg iv Inj.morphine 4 mg iv In the operating room peripheral line was established with 16 guage venflon. Other monitors like NIBP, pulse oximeter and ECG were used. A continous spinal catheter was placed at L2-L3 level with 19G epidural catheter to reduce the intra cranial pressure. After local infiltration and anaesthetising lower airway tracheostomy was performed and 8 size flexometallic tube inserted. After checking tube position and air entry patient was induced with inj.propofol 130 mg iv and inj.atracurium 35 mg

Anaesthesia was maintained with isofluraneoxygen- nitrous oxide volume controlled ventilation with tidal volume of 8 ml/kg was maintained .Right subclavian vein was cannulated with 7 Fr 20 cm triple lumen catheter for central venous pressure measurement and left radial artery was cannulated with 18 guage venflon and connected to vigileo cardiac output monitor. After induction the following variables are measured : CVP,SV,CO,SVV . Then SVV was measured at 15 min intervals Whenever SVV is more than 13 % fluid was given with crystalloids and heta starch in increments of 50 to 100 ml to maintain SVV around 10 and CVP of 6 to 10 mm hg .

DISCUSSION:

A number of dynamic tests of volume responsiveness are reported. These tests dynamically monitor change in stroke volume after a maneuver that increases or decreases venous return. Tests such as pulse pressure variation(PPV) derived from analysis of arterial waveform, stroke volume variation derived from pulse contour analysis and variation of amplitude of pulse oximeter plethysmographic waveform are highly predictive of fluid responsiveness. Systolic arterial pressure variation(SPV) and pulse pressure variation(PPV) are also influenced by vasomotor tone which is supposed to be less the case with SVV.We used Stroke Volume Variation(SVV) for assessing fluid responsiveness in this patient. SVV is the change in stroke volume during respiratory cycle .it occurs due to cyclic changes of intra thoracic pressure induced by mechanical ventilation and can be assessed continuously by any beat to beat cardiac output monitor. SVV as a percentage of SV during the ventilator cycle is assessed by following equation : SVV=SV max-SV min/SV mean Where maximum and minimum SV are mean values of four extreme values of SV during a period of 30 S and mean SV is the average value for this time period. Major determinant of this variable is the reduced venous return during mechanical inspiration. Both arrhythmias and spontaneous breathing will lead to misinterpretation of PPV and SVV. For any specific preload, PPV/ SVV will vary according to tidal volume and airway pressure. Many studies show that a rise in SVV predicts the subsequent appearance of hypotension and necessity for additional fluid particularly when SVV exceeds 15 % Intermittent positive pressure ventilation induces cyclic changes in loading conditions of the left and right ventricles. Mechanical ventilation decreases preload and increases afterload of left ventricle. The right ventricle preload reduction is due to decrease in venous return pressure gradient. The inspiratory reduction in right ventricular ejection leads to decrease in LV filling after a phase lag

of 2 to 3 heartbeats Thus the left ventricular preload reduction may lead to decrease in left ventricular stroke volume.



cranio facial resection being done

cardiac output monitor showing SVV and SVI

A variation of greater than 12% to 13% is highly predictive of volume responsiveness.SVV was advocated to be more accurate than SPV and PPV .studies in patient during sepsis state and undergoing neurosurgery demonstrated the ability of SVV to predict fluid responsiveness

CONCLUSION:

Thus SVV have the potential to serve as useful indicator of fluid responsiveness in mechanically ventilated major surgical patient. But further studies are required to demonstrate the usefulness of both automatically calculated variables to guide volume optimization in critically ill patients to improve outcomes.

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