The Decreasing Use of Central Venous Catheter during Elective Craniotomy for Large Tumor Excision: Justified or Unjustified?

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We anesthetized a 51-year-old, 70kg, male with a left parietal tumor (5.7 × 4.3 × 5.2cm) (►**Fig. 1**) for parietal craniotomy and tumor excision in a supine position with 20 degrees head up, to begin with, and further head was elevated after draping to almost 40 to 50 degrees. Intraoperative monitoring included standard American Society of Anesthesiologists monitors and intraarterial blood pressure. Anesthetic induction was done with fentanyl (150 µg), propofol (100 mg), and rocuronium (50 mg) followed by propofol-based total intravenous anesthesia. Considering the large size of the mass and anticipated blood loss, a triple lumen central venous catheter (CVC) was placed in the right internal jugular vein under ultrasound guidance. The right atrial placement was confirmed using electrocardiogram with size of the P wave slightly smaller than QRS complex. Midway into tumor dissection, a sudden drop in end-tidal carbon dioxide (EtCO2) was noted from 29 to 21 mm Hg, then to 14 mm Hg within a few seconds, and was accompanied by oxygen desaturation (91%). There was no significant blood loss or hypotension. Chest auscultation to look for the cause of desaturation revealed a loud mill wheel murmur, characteristically heard as air whistling through the heart. Protocol for the management of VAE was activated immediately and simultaneously. The surgical site was flooded with saline, and the head-up position was leveled. Fluids rushed via peripheral cannulae. No other source of air entrapment could be found. Though ours is a high output neurosurgical setup, this was the first time we heard air churning through the heart. Blood aspirated from the CVC port contained air bubbles. Around 30 mL of air was aspirated until no further air bubbles could be seen. Dramatically, along with the aspiration of air from CVC, a parallel rise in EtCO2 (30 mm Hg) and oxygenation (100%) was seen. Fraction of inspired oxygen requirement decreased and no vasopressors were required. Total estimated blood loss of the surgery was around 700 mL. The further course was uneventful and the patient was extubated the next day.

The utilization of CVCs for elective craniotomy has become a subject of debate over the years due to various factors. These include risk of infectious, mechanical, and thrombotic complications, high risk of pneumothorax with subclavian cannulation etc.[1] Additionally, there is literature on the management of VAE without CVC[2] and dynamic monitors for intraoperative fluid management are becoming increasingly popular.[3] However, it is important to note that massive VAE-producing mill wheel murmur, as observed in our case, can be life-threatening without prompt air aspiration. Although we could not find literature regarding direct association between murmur and mortality, murmur suggests the entrapment of a significant amount of air within the heart. Older literature does exist, correlating the quantity of air with changes in heart sounds,[4] and some reports associate the presence of a mill wheel murmur with cardiovascular collapse. However, in today's practice, emphasis on changes in heart sounds is lacking, and recent literature on the occurrence of a mill wheel murmur and its association with the severity of VAE is limited.

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Fig. 1 Right parietal lesion.

Though a single-patient experience might not act as blanket recommendation for the placement of CVC in all cases, this incident suggests anesthesiologists to consider CVC placement rather than following the recent trends of avoiding use of central venous pressure (CVP) in elective craniotomy for large tumors. CVP remains an important tool in the armamentarium for VAE management in patients at risk of VAE, such as those with large tumors near sinuses or in sitting and semi-sitting positions.

We would also like to draw attention to the occurrence of a mill wheel murmur in the presence of VAE. Current VAE management protocols do not specifically address cardiac auscultation. We believe that incorporating heart auscultation during the management of VAE may provide valuable insights into the clinical spectrum of the condition.

Lastly, head reposition under the drapes is commonly done, one should be very attentive, and implications of changed position should be borne in mind.

Conflict of Interest
None declared.

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