Jugular Bulb Venous Oximetry During Resection of an Intracranial Arteriovenous Malformation: A Case Report

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Introduction

Jugular venous oximetry is used to monitor cerebral oxygenation and optimize cerebral blood flow and oxygen delivery. The oxygen saturation of venous blood obtained from the jugular bulb (SjvO₂) can also be used to estimate the shunt fraction through an intracranial arteriovenous malformation (AVM) yet few reports exist in the literature about the use of this monitor during resection.¹ ² We present a case in which jugular venous oximetry was used to monitor the extent of resection of an intracranial arteriovenous malformation. Unlike previous publications, we fixed many factors that affect the SjvO₂ and our report includes a detailed account of the anesthetic management and neurophysiological conditions during resection.

Case Description

**Patient**
- 45 year old female
- PMHx: Seizures (controlled), smoking
- AVM: right parietal, Spetzler-Martin Grade 3, partial (50%) embolization 3 weeks prior to surgery

**Monitoring**
- 5 lead ECG, NIBP, pulse oximetry, esophageal temperature probe
- Arterial line, jugular bulb catheter, central line

**Anesthesia**
- Anesthesia maintained with sevoflurane and remifentanil infusion (0.15 mcg/kg/min)

Results

**Figure 1: Pre-Op T2 Weighed MR image slice through parietal lobe showing 3 X 4 cm AVM**

**Figure 2: Arterial (art) and jugular (jug) venous saturations during surgery**

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>FiO₂</th>
<th>SjvCO₂ (mmHg)</th>
<th>SjvO₂ (mmHg)</th>
<th>MAP (mmHg)</th>
<th>Temp (°C)</th>
<th>Hg (mg/ml)</th>
<th>% Sevo</th>
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</table>

Table 1: Physiologic and anesthetic parameters during course of surgery

**Results**

- Invasive Monitoring
  - Post operative imaging confirmed appropriate positioning of jugular bulb catheter
  - Estimated blood loss was 1000ml
  - Uneventful intraoperative course

**Variation of Fixed Parameters (Mean (SD))**
- P₂CO₂: 33 (1)
- P₂CO₂: 35 (2)
- End-Tidal Sevoﬂurane concentration (%): 1 (0.04)
- F₂O₂: 0.59 (0.04)

Conclusions

We provide an original case description in which intermittent SjvO₂ sampling was used to follow the decreasing shunt fraction during resection of an intracranial AVM while fixing many of the neurophysiological factors that influence the SjvO₂. Further research is required to determine the efficacy and safety of this technique.

References