Nonin Medical’s SenSmart™ Universal Oximetry System Monitors Cerebral and Distal Limb Perfusion During Minimally Invasive Mitral Valve Replacement; Right Thoracotomy with Femoral Cannulation

Case Overview

The patient arrived to the operating room and sensors were placed on the patient’s forehead and calves, to monitor distal perfusion, as this procedure required femoral cannulation. The procedure was a right thoracotomy. During the operative procedure, CO₂ was added to the surgical field to displace ambient air. CO₂ can be introduced into the heart-lung machine through various suction devices used throughout the procedure. Close monitoring was required to prevent very high PCO₂ levels in the blood, as demonstrated here. This case also demonstrates how steeply the cerebral perfusion can drop with CO₂ removal.

The patient had the following monitor and/or cannulation lines:

- Edwards® ProPlege®
- Edwards® EndoVent®
- Left radial
- CVP

What Nonin Medical’s SenSmart System Showed

In this case, Nonin’s SenSmart™ rSO₂ system showed how it can be useful in managing PCO₂ levels in closed chest cases, where large amounts of CO₂ are added to the surgical field. The system also showed how it can detect lack of distal flow to the leg when that flow is interrupted.

Discussion

The use of rSO₂ monitoring in minimally invasive cases provides valuable information regarding cerebral and limb perfusion, as this case demonstrates. Cerebral perfusion varies with different inputs (such as CO₂) during procedures, and some patients show more cerebral perfusion sensitivity to CO₂ manipulation than others. See graphs A and B on the reverse side of this page.

Femoral arterial cannulation can sometimes cause distal limb ischemia. In this case, as graphs C and D show, the perfusion was adequate and remained stable until the femoral artery was clamped at the end of the procedure. In other cases, where there is a drop-off distal to the cannula, repositioning or using a pigtail off the femoral line to perfuse distal to the cannula is beneficial and many times will bring the calf recordings back to baseline.

Perfusion on these minimally invasive cases can still be challenging. Nonin’s SenSmart System measures rSO₂, a key parameter for monitoring the adequacy of perfusion cerebrally or to the muscle tissue beds of the leg. This information is beneficial for optimizing PCO₂, bloodflow, blood pressure and transfusion.

Case submitted by David Klein, CCP, Borgess Medical Center, Kalamazoo, Michigan.
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Graph A Ch1 Cerebral

Graph B Ch2 Cerebral

Effect of increased PCO₂ from field
Aggressive CO2 removal

Graph C Ch3 Calf (Control Leg)

Graph D Ch4 Calf (Cannulated Leg)

Femoral artery clamped for repair