A 57 year old male presents to the operating room for a first time CABG procedure. He has had a negative history in the past, runs 3-5 times a week and weighs approximately 90kg. He has a new onset of chest pain, in the last 2 weeks and had a non-STEMI 5 days ago. Prior to anesthesia induction the cerebral oximeter is placed and baseline recordings show readings of approximately 70-75% sat. With induction and during the pre-bypass period these values range between 65-72 and again are bilaterally equal. The patient undergoes euvolemic hemodilution with the withdrawal of 2 units of whole blood which are stored on the back table. His initial Hgb was 14.5gm/dl. After withdrawal of these two units his Hgb drops to 12.5gm/dl. On placement of the cannulas for CPB retrograde autologous prime maneuvers are performed and 800 cc of clear prime is removed. On initiation of CPB the cerebral oximetry drops to 35 % bilaterally and the perfusion pressure drops to 35mmHg. Over the first 5-10 minutes of CPB the perfusion pressure climbs (bolus of neosynephrine utilized at least 4 times) and it stabilizes around 60mmHg. The first blood gas returns and shows a normal pH and PaCO2 or 38mmHg. The cerebral oximetry stays bilaterally equal but is bouncing in the low 40’s. During the bypass period (75 minutes) the pressure stays stable but the oximetry tends to stay in the low 40’s and occasionally goes into the high 30’s. No specific measures were undertaken to improve the cerebral oximetry. On re-establishment of pulsatile flow the oximetry readings proceed to the low 50’s and by the time the patient is fully weaned from the CPB machine, the protamine has been administered and the chest is being closed the cerebral oximetry is trending towards low 60’s.

1. What should we do about these readings?
2. What does cerebral oximetry teach us in routine heart surgery?
3. What maneuvers should we could we utilize to improve the cerebral mixed venous oxygen levels?
4. Clearly mild hypothermia, non-pulsatile flow etc affect the readings as well as perhaps oxygen supply demand. What should we do in the OR.
5. When do you intervene based upon cerebral oximetry measurements? What do you do?

A 75 year old male with severe vascular disease presents with searing severe chest pain and a type A dissection of the aorta. As the team gets underway the surgeon expresses to the perfusion team that he will want retrograde cerebral perfusion and he asks the anesthesia team to have cerebral oximetry working so we can continuously assess how adequate flow is to the contra lateral and ipsolateral sides of the brain. The first reading prior to induction shows a baseline of 62. On commencing CPB and cooling the levels rapidly drop to essentially below 20. With deep hypothermic circulatory arrest the levels
are zero bilaterally, but they come back up into the teens with retrograde flow. There is now a discrepancy with the right and left side. The right side is 5-9 higher than the left. Upon re-warming the cerebral oximetry climbs only back into the 30’s and the left side stays always lower than the right.

1. What does the literature say with regards to cerebral oximetry and circulatory arrest, versus retrograde perfusion?
2. What levels should be concern levels versus what interventions can you make?
3. How do these numbers correlate with cerebral outcome?

References for Reading


