

# Using NIRS (Near-Infrared Spectroscopy) when Systemic Blood Pressure Monitoring is not Possible; Repair of Long Segment Coarctation of the Aorta in a Neonate

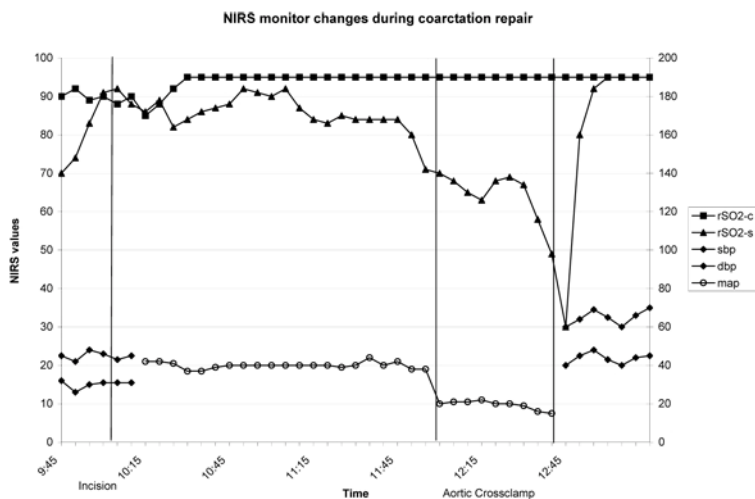
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**Introduction:** Coarctation of the aorta is a common disease affecting approximately 1:10,000 individuals. The coarctation commonly occurs in a juxtaductal position distal to the innominate artery, which allows use of R radial arterial pressure monitoring to assess cerebral perfusion during repair. At times the supply of the an anomalous origin of the R subclavian artery may make it impossible to monitor upper extremity blood and inferentially, cerebral arterial pressures during repair. These patients would benefit from alternative continuous monitoring when blood pressure cannot be measured. We present a newborn with coarctation and known aberrant takeoff of the right subclavian artery whose intraoperative anesthetic and surgical care was guided by NIRS.

## Case Report

The patient was a four day old male infant who presented for repair of coarctation of the aorta. Cardiac magnetic resonance angiography defined the unusual intrathoracic vascular anatomy. He was the infant of diabetic mother and was known to have a posterior fossa cyst by prenatal ultrasound and a small supraorbital facial hemangioma. Prior to surgery, the baby had decreased postductal perfusion despite receiving PGE<sub>1</sub> to maintain ductal patency and correction was deemed urgent; In the operating room, standard ASA monitors were placed, as well as pulse oximetry probes above ( nasal bridge) and below the coarctation,. NIRS monitors were placed on the forehead and thoracolumbar region as described by Berens.<sup>1</sup> Umbilical arterial and venous lines were in situ. The patient received fentanyl and forane for anesthesia. PGE<sub>1</sub> infusion was maintained throughout the procedure until the aortic crossclamp was removed and the NIRS provided evidence of good distal perfusion. rSO<sub>2</sub>. Once the surgeon began dissection of the major vessels, the arterial waveform disappeared and did not return until release of the aortic crossclamp. Early decreases in the rSO<sub>2</sub>-s were believed to reflect decreased perfusion and oxygenation to distal tissues. Transfusion of red blood cells returned the rSO<sub>2</sub>-s toward baseline values. The cerebral rSO<sub>2</sub> (rSO<sub>2</sub>-c) was greater than 90 throughout the repair. The patient had a normal neurological exam following the procedure.



**Discussion**

Berens reported a series of patients undergoing coarctation repair showing use of two-site near infrared spectroscopy (NIRS), demonstrating that neonates in particular had marked decreases of thoracolumbar/systemic  $rSO_2$  ( $rSO_2$ -s) during aortic crossclamping.<sup>1</sup> In this case, regional oximetry was the only monitor available to us that provided real-time trends in perfusion and oxygenation. Throughout the procedure, the NIRS data guided both anesthetic and surgical decisions. Cardiopulmonary bypass was available. However, because the  $rSO_2$ -s remained above 50 throughout the dissection and most of the crossclamp time, the surgeon repaired the lesion off-pump. We suggest that this non-invasive monitor can provide trend data which is useful in guiding therapy when arterial pressure monitoring is unavailable.

Berens R et al, Pediatric Anesthesia, 2006.