hypo / hyper perfusion 2017

Permission to print:	Yes
Incident type	No Harm Incident
Type of incident:	Management
Catagory	hypo / hyper perfusion
Description:	A perfusionist handed over a case with primed and checked pump immediately prior to initiation of bypass to another perfusionist. The second perfusionist was told that the pump had been checked, and the pre bypass list had been ticked as checked and correct. [Of note] this was a case where a roller pump was used following a centrifugal pump. We have the pump controller for the centrifugal pump sitting in the way of the lid for the roller if the centrifugal pump was used last, as a prompt that settings need to be changed. Upon investigation, the second perfusionist identified that; 1. pre and post membrane pressure alarm limits were not linked to the arterial pump. 2. Main bubble sensor was not linked to the arterial pump. 3. The cardioplegia system was not linked to the main arterial pump. These items were fixed prior to initiation of CPB. Bypass was then initiated. However, full flow was not achieved due to low venous reservoir volume. Simultaneously patient blood pressure was noted to be high, and pre and post membrane pressures were also high. Flow was decreased to maintain venous reservoir volume and acceptable patient and circuit pressures. The surgical team were asked to assess venous the venous cannula, and the arterial canulation site. At this point it was noted by the perfusionist that the arterial pump boot was set to 3/8 inch pump boot while the actual pump boot was 1/2 inch. Arterial pump boot size was reset, and CPB continued uneventfully.
Preventive actions	Reiteration of the importance of properly checking CPB machine pre bypass, and accurately completing a pre bypass checklist.
GOOD CATCH - what went	Despite a completed check list, the second perfusionist re checked the pump. However, failed to catch the incorrect arterial pump boot setting. Quick identification of incorrect arterial pump boot setting.
Protocol issue	No
Rule issue	No
Skill issue	Yes
Team Issue	No
Violation	Yes
Manufacturer advised:	No
Discussed with team:	No
Hospital incident filed:	No
Ext Authority Advised	No
Procedure acuity:	Elective
Commentary	This interesting PIRS report identifies the importance of checklists in perfusion for managing highly complex systems - in this case variable use of centrifugal and roller arterial pumps as well as variable arterial pump tubing sizes that necessitated deactivating servoregulating alarms. A consideration of this checklist process would be prudent. All checklists become habitual and should be reviewed periodically. They should be signed and included in the patient

record. The question has been raised that checklists should be completed by two perfusionists however practicalities of current staffing models may preclude this. More frequently heart lung machines are set up days prior to surgery and thus perfusionists are increasingly reliant on aan HLM set up by another staff member. The rigour of the check processes is all the more critical. PIRS Ed.

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Description:	On initiation of bypass [with an Sorn S5 HLM and Sorin EOS oxygenator], an extremely low MAP was noted <10mmHg at full flow of 4L/min. All other parameters appeared to be within normal ranges. More blood [was] noted in the venous reservoir than expected. The radial arterial line checked for position and the zero checked - zero obtained and flushing well. Metaraminol used in an attempt to raise MAP with limited success. Initial scan of HLM circuit showed no kinked lines and line pressure <200mmHg. Anaesthesia gave Vasopressin to increase MAP and at the same time, the team decided to ventilate and fill the heart to generate some BP. When starting to fill, I noticed that the inlet line to the roller pump was sucking flat (similar to a blocked sucker or vent line) and a retrograde trace of the line showed a kink in the outlet of the venous reservoir, preventing blood from entering the pump and therefore affecting forward flow to the patient. Duration of the entire incident approx 2 minutes. It appeared that the reservoir outlet was resting on the oxygenator inlet connector. Priming was done at room temperature and the PVC was stiff. On warming the prime, the PVC would have become more pliable, potentially leading to the kinked line.
Preventive actions	: Check all lines for kinking also imminent change to Inspire oxygenator will solve the proximity issue.
GOOD CATCH - what went	Using a systematic check the source of problem was rapidly identified and resolved combined with good team work (the team decided to ventilate and fill the heart to generate some BP)
Protocol issue	No
Rule issue	Yes
Skill issue	No
Team Issue	No
Violation	No
Manufacturer advised:	No
Discussed with team:	Yes
Hospital incident filed:	No
Ext Authority Advised	No
Procedure acuity:	Elective
Commentary	While PIRS has received occasional reports of hypoperfusion this is the first due to kiniking and partial occusion of the inlet tubing to the roller arterial pump. There is no servoregulation for this situation (as opposed to a kinked line on the positive pressure side of the circuit) and thus less likely to be immediately recognised, especialy if the problem.is not in an immediate sightline. The team practice adjustments while the prblem was soved is a good example of the resilience of the system.