PIRS 2016 - Coagulation

Permission to print:	Yes
Incident type	No Harm Incident
Type of incident:	Management
Catagory	Coagulation
Description:	CPB on 4yo, 17kg patient. A crystalloid prime [was used] - Plasmalyte 148 (580ml), Albumex 20% (150 ml), Calcium Chloride (1.5ml), Sodium Bicarbonate (25 ml) and Heparin (1700 units). Unexpectedly low ACT results on bypass. First ACT post CPB initiation 143s (Pre-Hep 171s, Post-Hep pre CPB 455s).Our acceptable ACT for bypass initiation is 400s, at 300s it is commonplace for cardiotomy suckers to be turned on. Certainly 455s is on the lower side of normal but not enough to trigger alarm bells, especially given that there is heparin in the circuit prime. Following ACT result of 143s, 1000 i.u. of heparin was immediately given, ACT was repeated within 2 minutes and reading returned 185s. Following this, a new batch of heparin was obtained, a further 1000 i.u. were administered and paired ACTs were performed with different cartridge LOT numbers and different machines. ACT used were Hemochron Jnr. Paired ACT results were similar and consistently low, further heparin was administered (Total given to patient 22,000 i.u.). Patient identified as having chromosome 8p23 deletion - this gene is responsible for Factor VII regulation. Activated factor VII reverses the anticoagulant effects of heparin. (See Guy et. Al. 2007 Recombinant activated factor VII effectively reverse the anticoagulant effects of heparin, enoxaparin, fondaparinux, argatroban, and bivalirudin ex vivo as measure using thromboelastograhy). The team was aware of the chromosome deletion prior to surgery but not of its significance in reference to clotting. During surgery a literature review was performed, returning one 30 year old article suggesting that this region of chromosome 8 contains a gene responsible for Factor VII regulation. There is very little in the literature about this rare chromosome deletion
Preventive actions	Following a 5000 i.u. bolous of heparin, ACT reached 947s but rapidly decreased in the following 15 minutes. FFP was urgently requested and administered. Following this, ACT remained over 400s.- FFP in the circuit prime or certainly during bypass appeared to assist with anticoagulation. It appears that these patients have a varied response to anticoagulation depending on the severity of the deletion. Certainly early and regular coagulation monitoring during CPB is necessary, for patients with consistently low ACTs it would appear their heparin demand is far greater than normal and FFP + larger doses of heparin may help
GOOD CATCH - what went	TEAM WORK and COMMUNICATION. Effective Performance Adjustments were made to manage the unexplained low ACT and complete the procedure without any resultant patient sequelae.
Protocol issue	No
Rule issue	No
Skill issue	No
Team Issue	Yes
Violation	No

Manufacturer advised:	No
Discussed with team:	Yes
Hospital incident filed:	No
Ext Authority Advised	No
Procedure acuity:	Emergent
Commentary	The subsequent finding (very rarely reported) of the impact of this rare 8p23 deletion syndrome on anitcoagultion during CPB is of particular note to paediatric cardaic surgical teams and should be submitted as a case report