

2024 Coagulation (Protamine)

Permission to print:	Yes
Category	Coagulation
Category 2	Protamine
Severity	Good Catch Near Miss
Description:	<p>After doing an Aortic dissection case with DHCA, using a Terumo System One Pump and Medtronic Affinity Fusion Oxygenator, Protamine was started as well transfusions of clotting factors including platelets, Cryo, and Prothrombinex. It is the practice at our institution to keep the pump suckers on until 1/3 of the protamine dose had been given. This practice has been challenged on several occasions to no avail. The case was very busy and noisy, with the anesthetist concentrating on administering products while the surgeon was trying to control the bleeding. We had been off bypass for approximately 10minutes when the cell saver reservoir had started clotting off. The second perfusionist on hand was able to change out the cellsaver reservoir, but this had taken the attention of the primary perfusionist. While the second perfusion had left the room to dispose of the clotted cellsaver reservoir, the surgeon noted that the patient's aorta had actually began to tear down into the root. He told the anesthetist to give heparin and to prepare to go back on bypass. It is unclear when the bypass suckers had been switched off, but the primary perfusionist noted that there was obvious clot in the reservoir. They notified the surgeon and asked for someone to run to the pumphroom to grab another oxygenator to change the reservoir. The second perfusionist was on hand to help make the change and they were able to commence bypass with a patient ACT of 480+. The surgeon went on to then perform a Bentall's procedure with no further incident. The patient was later transferred to ICU in a stable condition and has woken up cognitively intact having appropriate discussion with the doctors and nurses. The complexity of this case was exacerbated by being in an unusual theatre that did not have our usual setup, screens, or equipment. It was the only theatre available with a 15 amp plug for the Heater cooler.</p>
GOOD CATCH - what went well	<p>The clot was noted before going back on bypass and there was just enough time to change out the reservoir. Also having a second perfusionist to help.</p>
What could we do better	<p>The suckers could have been turned off at the start of Protamine and also better communication. Having a changeout box located in the theatre we were working in.</p>
Preventive actions	<p>An email has been sent to all cardiac surgeons and cardiac anesthetists with the ANZCP guidelines attached bringing attention to Standard 8.6 "Cardiotomy suction shall be discontinued at the onset of protamine administration to avoid clotting within the extracorporeal support circuit". Initial adoption of the standard has been observed.</p>
Type of incident:	Management
Duration of incident:	minutes
Hospital incident filed	Yes
Ext Authority Advised	No
Knowledge issue	No
Protocol issue	Yes
Rule issue	Yes
Skill issue	No

Team Issue Yes

Violation Yes

Patient outcome variance Nil

Commentary

This high level near miss report draws attention to serious risks associated with coagulation in the CPB circuit and potentially in the patient due to a deliberate rules and risk violation of accepted perfusion guidelines (1). The report highlights the benefit of having an additional attending perfusionist (N+1) in an out of hours acute procedure.

Alarming, a recent survey of perfusion practice in the USA revealed pump suction was terminated prior to protamine administration in only 41.4% of responding centers, with 31% terminating suction after 1–25% of protamine has been delivered, and 27.6% terminating suction when 26–50% of protamine is administered (2).

A quality improvement initiative to improve cardiomy suction practice compliance with guidelines published this year demonstrated the effectiveness of multidisciplinary collaborative quality improvement in advancing agreed-upon cardiomy suction practices without negatively impacting clinical outcomes (3).

Australian and New Zealand perfusion management hasn't been surveyed since 2003 (4) and did not address timing of cessation of cardiomy suction post CPB, however there are anecdotal accounts that the established and accepted guidelines for stopping cardiomy suction before starting protamine administration are variably ignored in Australia and New Zealand and very likely other jurisdictions. There are opportunities for quality improvement and benchmarking initiatives to address guideline compliance.

A negative patient outcome relating to continued use of cardiomy suction after protamine administration in the face of clear standards and guidelines would be difficult to justify. PIRS2 Ed/

1 □ (ANZCP Standard 8.6: ("Cardiomy suction shall be discontinued at the onset of protamine administration to avoid clotting within the extracorporeal support circuit.") and AmSECT's Standard 12.1 ("Cardiomy suction shall be discontinued at the onset of protamine administration to avoid clotting within the CPB circuit"5).

2 Lohbusch B, Olson K, Magowan B, Cherichella R, Wolverton J, Dell'Aiera L, Likosky DS, Fitzgerald D. Adult Clinical Perfusion Practice Survey: 2020 results. J Extra Corpor Technol. 2023 Mar 24;55(1):3-22.

3 Stewart JW 2nd, Nieter D, Wu X, DeLucia A 3rd, Graebner BN, Paone G, Fitzgerald DC, Dickinson TA, Zhang M, Pagani FD, Likosky DS. Advancing cardiomy suction practices for coronary surgery via multidisciplinary collaborative learning. JTCVS Open. 2023 Nov 21;17:121-144

4 Sigrid C. Tule PhD, CCRC, Timothy W. Willcox CCP (Aust) and Robert A. Baker PhD, CCP (Aust). Australian and New Zealand Perfusion Survey: Management and Procedure J Extra Corpor Technol 2009, 41, 64-72