

# SURGICAL SAFETY UPDATE

Cases from the Confidential Reporting System for Surgery (CORESS)

## Air embolism in coronary artery bypass perfusion error

The following case reflects a report recently submitted to CORESS. Cardiac surgery is a highly technical area in which a patient undergoing heart surgery may often be placed on heart-lung bypass, to ensure continued organ oxygenation whilst the heart is temporarily stopped. In this case, a technical error gave rise to an adverse incident.

On establishing cardiopulmonary bypass, the surgical team became aware that air had entered the heart after noting an air bubble within the cardioplegia cannula. The visible air was cleared and the operation continued.

Postoperatively, it was evident that the patient had sustained a hypoxic brain injury. The cause was identified as a significant air embolism during institution of bypass.

The patient did not regain consciousness postoperatively. Following repeated CT scanning and clinical reviews, the prognosis was felt to be extremely poor. Treatment was withdrawn and the patient died. The root causes were human error and equipment factors.

Whilst the specific clinical features of this case are not pertinent to all surgical practice, the principles of checking kit, ensuring knowledge of equipment operation prior to commencement of surgery, and of being aware of potential systems errors are relevant to all surgical practice. The Society for Cardiothoracic Surgery is aware of, and has commented on, this case.

## SCPS Safety Committee findings

This was an adverse event arising out of a highly technical and niche area of surgery in which misapplication of the perfusion apparatus was involved.

The equipment was checked and found to be functioning normally. Due to the design of the pumps, the risk of human error leading to an inadvertent change of flow direction to the vent pipe was real. This potential to inadvertently reverse the flow on this particular pump was

**Frank CT Smith**  
Programme  
Director on  
behalf of  
the CORESS  
Advisory Board  
[coress.org.uk](http://coress.org.uk)

demonstrated to all members of the perfusion team. It was recommended that once the heart-lung machine has been set up and existing safety checks completed, it should be switched to zero revolutions rather than placed in standby mode. This should be added to the perfusionist protocol checklist. Fluid should be aspirated into the vent line prior to its insertion (wet table test). This task should be included in normal checks undertaken by the scrub nurse. Human factors were contributory to this incident.

As part of the Massive Air Embolism protocol review the SCPS recommended introduction of one-way valves to the vent suction line. Other specific recommended actions included a wet table test of all suckers as standard to avoid errors. It was felt that wet testing of vents prior to insertion would further increase the safety of these devices.

## Double trouble

A 76-year-old male vascular patient with atrial fibrillation and a femoro-popliteal bypass graft was inadvertently prescribed both apixaban and enoxaparin together. Although the prescriptions were on different charts, it was an intentional attempt to 'bridge' the patient onto a direct oral anticoagulant (DOAC).

## Reporter's comments

Pharmacy advice made it clear that concomitant prescribing of two anticoagulants is contraindicated unless it is for a patient being started on warfarin for venous thromboembolism (VTE) or for an established warfarinised patient with a subtherapeutic or unstable international normalised ratio. DOACs have a rapid onset of action – hours not days. When switching from a parenteral anticoagulant to a DOAC, the first dose should be given when the next dose of low molecular weight heparin was due or on cessation of an IV unfractionated heparin infusion.

The higher initiation doses for both apixaban and rivaroxaban are not 'loading doses'. All DOACs have short

half-lives and this is a larger dose to cover the higher period of risk, acutely after a VTE.

#### **CORESS comments**

The Advisory Board commented that electronic prescribing might have averted this issue. It was also noted that the discipline of checking all drug charts in use remains an important function of the daily ward round.

#### **Inadvertent bladder injury at orchidopexy**

An eight-year-old boy presented for bilateral second-stage orchidopexy for intra-abdominal testes. The first stage, a Fowler-Stephens procedure, whereby the testicular vessels are divided to allow hypertrophy of the accessory supply via the vas deferens (Figure 1), had been carried out several years earlier with an unusually long period between first and second stages due to COVID. The parents were keen for both testes to be moved to the scrotum during the same operation to avoid further anaesthetics.

The procedure was approached laparoscopically. The primary port was inserted without complication, infra-umbilically, using an open technique. Insertion of two secondary ports was hampered by limited space despite using standard insufflation pressure and flows.

Both testes were seen within the abdomen. The left testis was associated with a large hernia sac and was managed through an open groin incision after a laparoscopic procedure on the right side. Visualisation was challenging due to the limited space so the pressure for the pneumoperitoneum was increased to 15mmHg, although the working space was still unusually small.

The testis was mobilised and then a Veress needle and 'step' port sheath were passed up from the scrotum into the peritoneal cavity under vision. The needle did not immediately pass into the peritoneal cavity and required some manipulation. An 11mm 'step' port was passed up the sheath, the testis grasped via the port and brought down into the scrotum. Postoperatively, there were no immediate

**We are grateful to those who have provided the material for these reports.**

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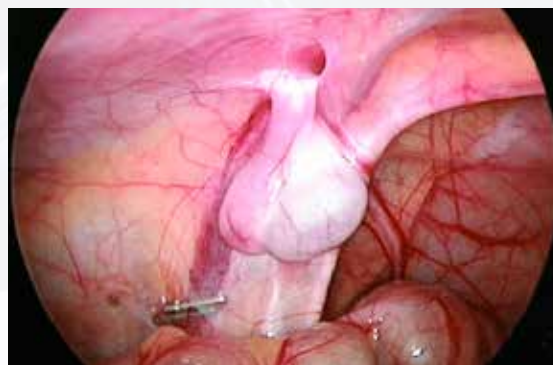
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concerns, but the family were anxious and the child was kept in overnight. He did not pass urine and was clearly peritonitic the next morning. Bloods and imaging were in keeping with a bladder leak, which was confirmed at exploratory surgery. The edge of the bladder had been injured by the Veress needle inserted via the scrotum and there was a clear urine leak. The patient made an uneventful recovery once the bladder had been repaired.

#### **CORESS and reporter's comments**

The pressure required for the pneumoperitoneum was higher than normal and might have pushed the bladder out more laterally than usual. The Veress needle was brought up medial to the medial umbilical ligament and did not pass smoothly, providing a clue about possible mis-passage that was not picked up at the time. Bladder injury is a recognised complication of this procedure.

In future, the approach should be lateral rather than medial to the medial umbilical ligament. The bladder should be empty prior to the key manoeuvre, although the role of catheterisation in young males prior to surgery is controversial and should be dealt with on a case-by-case basis.



Intra-abdominal testis following first stage Fowler-Stephens procedure with division and clipping of testicular vessels