Reducing radiation exposure in endovascular surgery

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Background:
- With rapid advancement in technology anatomically challenging procedures are becoming increasingly amenable to endovascular treatment.
- These complex procedures are often associated with longer procedural times, exposing both patients and surgeons to increasing fluoroscopic ionizing radiation associated with the risk of acute toxicity, and a demonstrable risk of long-term malignancy due to DNA damage.1,2
- The use of CO2 as a contrast agent has many advantages including wide availability, low cost, non-toxicity, rapid tissue solubility and clearance, low viscosity.
- There is evidence in the literature that the use of carbon dioxide angiography is associated with reduced operative time and screening time. 3

Objective:
- We sought to evaluate whether carbon dioxide (CO2) angiography in comparison to standard iodinate contrast (C) for the repair of abdominal aortic aneurysm (AAA) was associated with reduced intraoperative radiation exposure.

Methods:
- This study was performed as a prospective review of patients who underwent elective AAA repair between 2013 – 2018. Procedures were performed across two hospitals by a single surgeon.
- Primary outcomes included:
  - Procedure duration
  - Screening time
  - Number of runs
  - Radiation dose

Results:
- A total of 149 AAA repairs were performed - 96 using CO2 and 44 using C. (9 patients were excluded as contrast agent was not recorded)
- Mean ASA classification – 3
- Technical success was defined by achieving access, successful deployment and good position of the endograft. Technical success was comparable between both groups (99% CO2 vs 97.7% C)

Conclusion:
- CO2 angiography was associated with reduced intraoperative radiation exposure in comparison to standard contrast for AAA repair.
- CO2 angiography is feasible in patients undergoing endovascular repair of AAA
- Future randomised controlled trials evaluating the utility of CO2 in reducing radiation exposure are warranted.

Reference: