

# 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.<sup>1,2</sup>
- The use of CO<sub>2</sub> 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.<sup>3</sup>

## Objective:

- We sought to evaluate whether carbon dioxide (CO<sub>2</sub>) 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 CO<sub>2</sub> 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% CO<sub>2</sub> vs 97.7% C)

Figure 1

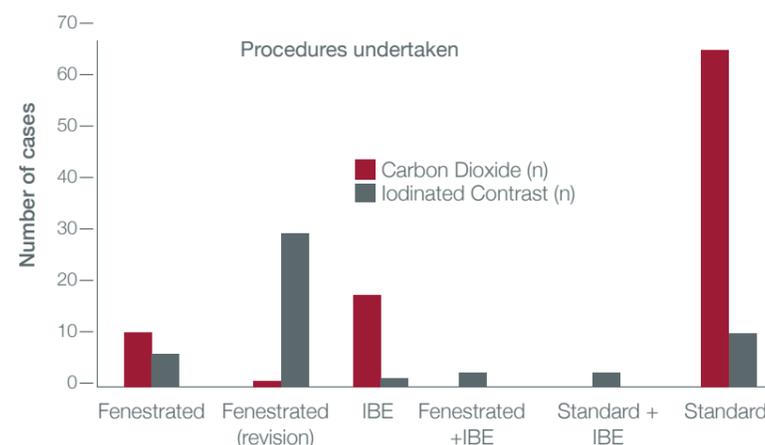


Figure 2

Patient comorbidities	CO <sub>2</sub> angiography	Contrast angiography
Hypertension	67 (70%)	30 (68%)
Hyperlipidemia	62 (65%)	27 (61%)
<b>Diabetes</b>		
Type 1	2 (2%)	1 (2%)
Type 2	24 (25%)	12 (27%)
Cardiac conditions	45 (47%)	19 (43%)
<b>Renal disorders</b>		
Mild impairment	9 (9%)	1 (2.3%)
Moderate/Severe impairment	5 (5%)	4 (9.1%)
Renal calculi	5 (5.2%)	2 (4.5%)
Other	47 (49%)	32 (73%)

Figure 3

	Carbon Dioxide (n=96)	Contrast (n=44)
Procedure duration (mins)	102.9 (SD 67.1)	127.1 (SD 65.5)
Screening time (mins)	35.3 (SD 26)	41.6 (SD 25.2)
Runs	13 (SD 8)	20 (SD 8)
Radiation dose (uGym <sup>2</sup> )	35001.7 (SD 31617)	112632.0 (SD 166250.5)

## Conclusion:

- CO<sub>2</sub> angiography was associated with reduced intraoperative radiation exposure in comparison to standard contrast for AAA repair.
- CO<sub>2</sub> angiography is feasible in patients undergoing endovascular repair of AAA
- Future randomised controlled trials evaluating the utility of CO<sub>2</sub> in reducing radiation exposure are warranted.

## Reference:

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