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The Ultimate Operative Protocol to Accomplish CO2-EVAR: Results From an Interventional Multicentric Study

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Objectives: CO2-angiography in endovascular aortic repair (CO2-EVAR) has been proposed for treatment of abdominal aortic aneurysms (AAAs), especially in patients with chronic kidney disease and/or allergy to iodinated contrast medium (ICM). Issues regarding the standardization of the technique, such as visualization of the lowest renal artery (LoRA) and the best quality image in angiographies performed from pigtail or introducer-sheath, are still unsolved. The aim of the study was to analyze different steps of CO2-EVAR to create an operative protocol to standardize the procedure.

Methods: Patients undergoing CO2-EVAR were prospectively enrolled in five European centers from 2018 to 2021. CO2-EVAR was performed using an automated injector (Pressure: 600 mmHg. Volume: 100 cc; a small amount of ICM was injected in case of difficulty in LoRA visualization or other doubts). LoRA visualization and image quality (1 = low, 2 = sufficient, 3 = good, 4 = excellent) were analyzed and compared at different procedure steps: preoperative CO2-angiography from pigtail and femoral introducer-sheath (first step), angiographies from pigtail at 0%, 50%, and 100% of main body deployment (second step), contralateral hypogastric artery (CHA) visualization with CO2 injection from femoral introducer-sheath (third step), and completion angiogram from pigtail and femoral introducer-sheath (fourth step). Intraoperative and postoperative CO2-related adverse events were also evaluated.$^x^2$ and Wilcoxon tests were used for statistical analysis.

Results: In the considered period, 65 patients undergoing CO2-EVAR were enrolled. 55 of 65 patients (84.5%) were male, with a median age of 75 years (standard deviation [SD], 11.5 years). The median ICM was 20 cc (SD, 54 cc) 19 of 65 procedures (28.2%) were performed with 0 cc ICM. In the first step, the median image quality was significantly higher with CO2 injected from the femoral introducer (pigtail, 2 [3] vs introducer, 3 [3]; P = .008). In the second step, LoRA was more frequently detected at 50% (93% vs 75.2%; P = .002) and 100% (94.1% vs 78.4%; P = 0.1) of main body deployment compared with first angiography from pigtail, similarly, the image quality was significantly higher at 50% (3 [3] vs 2 [2]; P ≤ 0.001) and 100% (4 [3] vs 2 [3]; P = .001) of main body deployment. CHA was detected in 93% of cases (third step). The mean image quality was significantly higher when final angiogram (fourth step) was performed from introducer (pigtail, 2.6 ± 1.1 vs introducer, 3.1 ± 0.9; P ≤ 0.001). The rates of intra- and postoperative adverse events (pain, vomit, diarrhea), all transient and clinically mild, were 7.9% and 12.5% respectively.

Conclusions: Preimplant CO2-angiography should be performed from femoral introducer-sheath. Main body stent bulk during its deployment should be used to improve image quality and LoRA visualization with CO2. CHA can be satisfactorily visualized with CO2. Completion CO2-angiogram should be performed from femoral introducer-sheath. This operative protocol allows to perform CO2-EVAR with 0 cc or minimal ICM with a low rate of mild transient perioperative complications.

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Arterial Thromboemboli in Hospitalized COVID-19 Patients: A Multi-center Experience

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Objectives: We assessed the incidence of arterial thromboembolic events in hospitalized patients with coronavirus disease 2019 (COVID-19).

Methods: We performed a retrospective review of prospectively collected data from 9460 hospitalized patients with COVID-19 from March 11, 2020 to December 20, 2021. The primary end point was the incidence of arterial thromboembolic events. The secondary outcomes included death, neurovascular events, and amputations in this carefully assessed case series.

Results: A total of 9460 hospitalized patients with COVID-19 were reported in the study period. There were 27 (0.3%) with an arterial thromboembolic event. There were 14 (0.15%) with thromboembolic events in the aorta, including eight (0.09%) in the abdominal aorta, five (0.05%) in the aortic arch, and 1 (0.01%) in the descending aorta. There were 12 patients (0.1%) with thromboembolic events in the distal limbs. 11 patients (0.1%) with thromboembolic events in the neurovascular tree, and two patients (0.02%) with thromboembolic events within the heart (Figure 1). The mortality rate was 30%, the stroke rate was 40%, and the amputation rate was 4%.

Conclusions: Although arterial thromboembolic events are much lower than the rate of venous thromboembolic events, the arterial thromboembolic event risk is not insignificant in the COVID-19 hospitalized patient population. Therefore, careful clinical vascular assessment of all patients with COVID-19 is strictly necessary.

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Aortic Biomechanics and Early Sac Regression After Endovascular Aneurysm Repair

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