Multicenter Early and Mid-term Outcome of 3D-Printed Guided Total Endovascular Repair [F/B-(T)EVAR] for Complicated Aortic Disease

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Objective:

This study endeavors to evaluate the effectiveness, safety, and complication mitigation strategies of 3D-printed guided total endovascular aneurysm repair (F/B-(T)EVAR) for managing complex aortic diseases, leveraging multicenter follow-up data.

Background: Aortic diseases pose formidable therapeutic challenges. Traditional open surgery, hybrid procedures, and multi-chimney techniques each harbor their own limitations. The advent of 3D-printing technology has ushered in precise planning and execution of F/B-(T)EVAR, heralding the potential for improved clinical outcomes.

Methods:

Study Design: Multicenter retrospective study.

Participants: 606 patients from 87 hospitals across 28 provinces in China, treated between December 2017 and April 2023.

Procedure: Patients underwent F/B-(T)EVAR guided by 3D-printing for precise fenestration. Devices used included Medtronic, MicroPort, and other aortic stent grafts.

Follow-Up: Patients were followed for 1 to 73 months post-procedure.

Results:

Demographics: 210 male and 34 female patients underwent F/B-TEVAR guided by 3D-printing, mean age of 62.57±12.15; 293 male and 69 female patients underwent F/B-EVAR guided by 3D-printing, mean age of 60.25±11.97.

Success Rate: 1733 branch vessels were targeted for reconstruction, with a 98.9% success rate (623/630) in group of F/B-TEVAR and 99.0% success rate (1092/1103) in group of F/B-EVAR.

Major Complications:

Overall mortality: 4.1%(10/244) in group of F/B-TEVAR; 3.6%(13/362) in group of F/B-EVAR, with 9 cases of surgical-related deaths.

Renal injury: 6.0%(19/362) in group of F/B-EVAR, with 4 cases of permanent renal failure.

Spinal cord ischemia (SCI): 0.4%(1/244) in group of F/B-TEVAR; 3.3%(12/362) in group of F/B-EVAR. No permanent paralysis occurred during follow-up.

Endoleaks: 7.8% (19/244) in group of F/B-TEVAR; 7.2%(26/362) in group of F/B-EVAR.

Neurological complications: 4.1% (10/244) in group of F/B-TEVAR; 1.9 %(7/362) in group of F/B-EVAR.

Reinterventions: 9.4% (23/244) in group of F/B-TEVAR; 8.8 %(32/362) in group of F/B-EVAR.

Conclusion:

Utilizing 3D-printing technology, F/B-(T)EVAR presents notable advantages over conventional open surgery in the treatment of thoracoabdominal aortic diseases.