Are Improved Results for Hybrid Repair of Thoracoabdominal Aortic Aneurysms Due to a Learning Curve or Better Patient Selection?

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Open repair of thoracoabdominal aortic aneurysms (TAAAs) has traditionally been accompanied by significant morbidity and mortality. The use of adjuncts such as hypothermia and selective visceral perfusion has decreased the rates of permanent paraplegia to <5%, renal failure requiring dialysis to <5%, and 30-day mortality to <10% when performed in high-volume centers of excellence.\(^1,2\) However, when this operation is applied across a broad spectrum of institutions, the overall morbidity and mortality can be significantly higher. One statewide registry reported a 1-year mortality rate of 40% when TAAA repair was performed in patients >75 years of age.\(^3\) In addition, there exists a subset of patients who are considered too high risk for open repair, usually because of the severity of their underlying pulmonary disease and other medical comorbidities.\(^4\)

Thus, vascular interventionalists have searched for less morbid ways to treat these complex patients. The use of thoracic endografts has been demonstrated to decrease the overall morbidity and mortality of patients undergoing repair of both elective and emergent thoracic aortic pathology.\(^5,6\) However, the availability of branched endografts to treat TAAAs involving the visceral vessels has been limited, particularly in the United States.\(^7,8\) Thus, the concept of combining a lesser open abdominal operation to bypass the visceral and renal vessels with the placement of an endovascular stent graft in the descending thoracic aorta has been developed as a hybrid open endovascular technique. As Moulakakis et al\(^9\) point out in this issue of Circulation, no prospective randomized trials have compared hybrid open endovascular technique procedures with standard open TAAA repair, repair using branched endovascular grafts, or even best medical therapy. Current results from multiple single-center series describe a wide range of morbidity and mortality.

Moulakakis et al\(^9\) performed a meta-analysis of 19 series published over the past decade describing the results of hybrid TAAA repair in 507 patients. Despite the wide range of outcomes, the pooled estimates for 30-day mortality of 12.8% (95% confidence interval, 8.6 to 17), for irreversible paraplegia of 4.5% (95% confidence interval, 2.5 to 7.0), and for renal impairment requiring dialysis of 8.8% (95% confidence interval, 3.9 to 15.5) seem to provide a realistic expectation of potential outcomes in this high-risk group of patients.\(^9\) We reported a slightly higher 30-day mortality of 17.4% with a comparable paraplegia rate of 4.3% and rates of renal insufficiency similar to that of open repair in a series of 23 high-risk patients undergoing debbranching procedures.\(^4\) However, the in-hospital mortality of 26% in our series and 1-year mortality of 32% provide a sobering perspective on the potential long-term risks of hybrid intervention in these patients. These outcomes have certainly caused us to apply this strategy conservatively in patients deemed unfit for open TAAA repair.

On the other hand, several institutions have reported mortality rates as low as 0%.\(^10,11\) with the hybrid open endovascular technique. Although the authors hypothesize that these improved results may be secondary to a learning curve related to the procedure, 2 institutions with no mortality treated relatively low volumes of patients, 10 and 17 patients, whereas the group with the largest series, 107 patients, had a 30-day mortality of 14.9%.\(^12\) If this difference were related purely to a learning curve, one would expect the results to improve with increased numbers of patients.

Another possible explanation for the disparate results between institutions may be patient selection. Some series with low morbidity had a high incidence of patients with either pararenal or type IV TAAAs, whereas our series included only type I, II, and III TAAAs.

Numerous groups, including our own, have documented excellent results with open surgical repair of type IV TAAAs. We recently reported a 30-day mortality rate of 2.8%, with a permanent paraplegia rate of 1% and dialysis-dependent renal failure in 2.5% of patients.\(^13\) Thus, in our institution, debbranching procedures are rarely applied to patients with juxtarenal and type IV TAAAs. Although certainly open to debate, we believe that the extent of operative dissection and duration of the procedure required may not be significantly less morbid than traditional open repair.

Finally, the long-term durability of these hybrid endograft procedures needs to be determined. In this report, 111 of 488 patients (22.7%) developed an endoleak, with 22.7% of these endoleaks requiring a reintervention. The impact of these reinterventions on long-term graft patency and freedom from aneurysm-related mortality needs to be assessed.
Because of these and other confounding factors, the authors correctly point out that future prospective studies comparing open repair, hybrid techniques, and total endovascular repair using branched grafts may be needed to help determine the best methods to treat these patients.

Disclosures
Dr Kwolek is a participant in clinical research trials with Bolton, Cook, Medtronic, and WL Gore.

References

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