

# The Sun procedure—a new paradigm of treatment in DeBakey type 1 acute aortic dissection?

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The frozen elephant trunk (FET) technique, which combines open total arch replacement and endovascular stent-grafting of the proximal descending thoracic aorta (DTA), has emerged as a noteworthy hybrid option of treatment in patients with extensive disease of the thoracic aorta. Its main rationale in acute dissection patients is to minimize the occurrence of late adverse aortic events including aneurysmal degeneration of the distal false lumen, distal aortic rupture, distal malperfusion, distal aortic re-interventions, and aortic death by promoting DTA remodelling. While these valuable long-term outcomes remain to be confirmed, the safety of FET in the acute setting still remains controversial. In comparison to conventional hemiarch replacement, FET adds technical complexity and unavoidably requires prolonged periods of cardiopulmonary bypass (CPB), visceral and myocardial ischemia, and cerebral perfusion, all of which are expected to increase mortality and major post-operative morbidity (1). Furthermore, FET has been found to be associated with an increased risk of post-operative spinal cord injury, a catastrophic complication that has been reported very rarely after conventional arch surgery (1).

The issue of the safety of FET in acute dissection has been addressed in the study by Wei-Guo Ma *et al.*, from Professor Sun's group, titled "Sun's procedure of total arch replacement using a tetrafurcated graft with stented elephant trunk implantation: analysis of early outcome in 398 patients with acute type A aortic dissection" and published in this issue of *Annals of Cardiothoracic Surgery* (2). The authors examined in-hospital outcomes in the largest series of patients with acute dissection who underwent FET surgery published to date, and used a logistic regression model to identify the independent predictive risk factors of early mortality.

This study reported outstanding early outcomes, for which

Professor Sun and his group should be greatly admired. Hospital mortality was 7.8%, and permanent neurologic dysfunction and spinal cord injury each occurred in only 2.5% of patients. Other serious postoperative complications such as renal failure, re-exploration for bleeding and left recurrent nerve injury were consistently infrequent, occurring in only 4.3%, 2.5%, and 1.0% of cases, respectively. As indicated by the multivariate logistic regression, survival was mostly affected by patients' pre-operative characteristics and dissection-related complications, including cerebrovascular disease, acute heart failure, and spinal cord and visceral malperfusion. The negative prognostic weight of CPB time on survival was also confirmed in this study.

The excellent results reported by the authors indicate that the Sun's procedure is a safe approach in patients with acute dissection, and will likely pave the way for wider employment of FET. However, there are two important aspects to consider that lessen the general applicability of these results. Firstly, the study cohort was extremely young with a mean age of 46 and with only 12.9% of patients above the age of 60. This is in contrast with demographic data reported by western registries. Trimarchi *et al.* (3) from the International Registry of Acute Dissection (IRAD) recently showed that (I) patients aged more than 70 years represented 32.2% of the IRAD (type A dissection) cohort; (II) older patients were more likely to present with a higher risk profile; and (III) age greater than 70 was an independent predictor of mortality. Secondly, the extraordinary nature of the aforementioned results is certainly influenced by the extensive experience gained by Sun and his group from the approximately 1,000 FET procedures performed so far. Such (favorable) conditions are not commonly found or replicated elsewhere. Indeed, surgery of

acute dissection remains a formidable challenge, particularly in the case of FET, which is a complex procedure that may result in catastrophic effects when performed by teams with limited experience in both total arch replacement interventions and endovascular techniques.

Long-term studies that definitively show a significantly increased survival and freedom from distal aortic re-interventions of FET surgery compared with more conservative management are yet to be reported. However, this study from Wei-Guo Ma *et al.* strongly suggests that extensive remodelling aortic procedures are safe and can be performed with excellent results by experienced operators, even in the setting of DeBakey type 1 acute aortic dissection.

Professor Sun and his team should be commended for the formidable outcomes they have reported and for their indefatigable efforts in the aortic field. We are all looking forward to seeing long-term data from this large series of patients, which will certainly expand our understanding of FET surgery in acute dissection patients.

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