

Peer Review File

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Comment 1: The frozen elephant trunk (FET) facilitates access to the ascending aorta, aortic arch, and the descending thoracic aorta via a median sternotomy, helping to address a wide range of aortic pathology. With increasing in popularity, over 30,000 hybrid prostheses have been implanted across the globe.¹ The understanding of aortic pathology and the pathophysiological mechanisms coupled with the advancements in the techniques and technology has produced excellent long-term results of survival probability of 5 years for acute Type A aortic dissection, chronic aortic dissection, and thoracic aortic aneurysm at 91%, 98%, and 92%, respectively. The authors manifested their experience and thoughts in this article highlighting that a 4-branch graft hybrid prosthesis facilitates reduced systemic-, cerebral-, and cardiac arrest time. Additionally, atherosclerotic ostial debris, intimal re-entries, and fragile aortic tissue in genetic disease can be excluded by using a branched graft instead of the island technique for reimplantation of the arch vessels. The authors provided a take-home message confluent on that despite many technical advantages of the 4-branch graft hybrid prosthesis, literature data do not show significantly better outcomes when compared to the straight graft, to support its routine use in all cases. I genuinely agree with this message and support that no stringent criteria and trends exist to provide supremacy of one graft over the other.

Reply 1: We thank the reviewer for the valuable comments.

Comment 2: The authors compare the use of a 4 branch FET vs. a straight FET prosthesis and analyse potential advantages/disadvantages in different areas such as mortality, stroke, paraplegia, time of CPB and Haemostasis.

Although the concept of the manuscript is good, one of the main concerns is that it was assumed that the straight FET is only used for zone 3 anastomosis and preimplantation of the supra-aortic trunks on an island technique.

The straight FET can be widely used for zone 0-1 anastomosis applying debranching techniques to the supra-aortic trunks.

It is not clear whether in the comparison based on the literature review the groups compared were equivalent in terms of sequence of the operation (branches first vs, distal anastomosis first) and the strategies used for organ protection. Hence, the conclusions made are anecdotal.

Reply 2: We thank the reviewer for addressing this important point. Although we do not regularly use the straight FET in a zone 0 approach, we do agree that this is possible in combination with debranching techniques. In our surgical approach, we always use the straight graft with the 'en bloc technique' and to address this important distinction, we have now referred in the manuscript to this technique as 'en bloc technique' (EBT) rather than straight graft.

Further, we agree with the reviewer that the sequence of the operation (i.e. branches first vs distal anastomosis first) is an important factor; unfortunately the available literature on these different surgical strategies and its relation to post-operative outcome in conventional ET surgery is lacking and therefore the cited manuscripts are indeed anecdotal.

Comment 3: This is a review paper which compared a 4-branch graft and straight graft in applying frozen elephant trunk for the aortic arch repair. The authors concluded that, despite many technical advantages of the 4-branch graft, there was no evidence of superiority of 4-branch graft over straight graft.

Overall, the manuscript was well written. I read this article with a great interest. I have one comment; there was no explanation for abbreviation of BGT and EBT, which was confusing.

Reply 3: We thank the reviewer for his positive review and for addressing this important textual point. We have made changes in the text accordingly and have now introduced explanation for the abbreviations throughout the manuscript.

Comment 4: The debate about reconnecting the supra-aortic vessels in FET surgery is very present. You should first of all correct some ambiguities in your text. The discussion about second-stage surgery following ET on the basis of this very old data that stems from before TEVAR is not contemporary anymore! LHB for thoracoabdominal is by all means not the only and in some people's minds also not the best way to perform distal perfusion and more importantly, it does by no means depend on the presence or absence of an ET! LHB and DHCA are not compatible but femoro-femoral distal perfusion may be performed with mild to profound hypothermia and is the method of choice in many groups. Hybrid grafts have been around for many years! The experience in Hannover started in 2001! You fail to mention, that for most of the current experience there were two grafts - but manufactured by two companies with very different properties apart from the presence or absence of branches! One should at least acknowledge this fact as it does raise the question of whether a direct comparison of the two techniques is at all valid or seriously disturbed by confounders! You should at least point to some newer technical aspects that have entered the discussion in the field like the SAVSTEB technique and the Hannover concept of beating heart arch surgery.

Reply 4: We thank the reviewer for his comments and will try to address point-to-point.

1. We agree with the reviewer that left heart bypass is certainly not the only technique for distal perfusion in thoraco-abdominal surgery. Of course, the use of partial (femoro-femoral) extracorporeal circulation or extracorporeal circulation with DHCA are also useful strategies in certain circumstances. We do however think that the presence of a ET does facilitate the use of LBH in a second stage open procedure as it provides a safe clamping site which is a condition sine qua non for the use of LHB; in mega-aorta syndrome without the possibility of clamping the

arch, the only viable alternative remains DHCA. The aim of this narrative manuscript (so called 'clinical practice review') however is to discuss the approach for surgical handling of the arch vessels (separate branch technique vs en bloc technique) in FET surgery. Accordingly, we do feel that this discussion is beyond the scope of the current manuscript.

2. The reviewer states that – apart from the presence or absence of separate branches – a section on the other technical (product design) differences between the commercially available FET prosthesis should be included in the manuscript. Although we fully agree that these design differences are very interesting and may have important clinical consequences, it is beyond the scope of this focused clinical practice review.
3. The same goes for the SAVSTEB (i.e. stent bridging of the supra-aortic vessels by introducing a covered stent in the supra-aortic vessel) technique; we fully agree that this is an interesting option but unfortunately is beyond the scope of this focused manuscript.
4. We do agree that the Hannover beating heart concept was not included in the manuscript and have referred to it accordingly.

Comment 5: Thank you very much for giving me the opportunity to review the manuscript entitled " Is a 4-branch graft FET hybrid prosthesis advantageous over a straight FET hybrid prosthesis?" by Smith T et al.

This paper presents an interesting overview and discussion comparing two different techniques (prostheses): 'Branched Graft Technique' (BGT) versus 'En-Bloc Technique (Island; EBT)' for aortic arch repair using frozen elephant trunk (FET) technique.

Generally, this is an interesting and actual topic; however, the article is NOT original NEITHER a proper review of the literature. Only 9 references are provided!

Many postulations such as: "Stroke risk is lower in BGT due to less manipulation" or "Bleeding risk is lower in BGT due to better visualisation" are very questionable and could be explained exactly in opposite way as well.

I've got some remarks and comments.

1. The authors use some abbreviation (BGT, EBT) without explaining them first.
2. The is well-written; however, some typing, English spelling, and syntax errors are present, therefore additional proofreading by native speaker would be of great benefit.
3. The authors completely ignore the new Trifurcated prosthesis from Artivion/Jotec

After you will target all these concerns and comments and revise the manuscript properly, I am sure the editors will again consider your paper for publication.

Thank you again for submitting this paper to the Cardiovascular Diagnosis and Therapy and good luck!

Reply 5: We thank the reviewer for the comments. We agree that the article is not a full systematic review of the literature. Rather, this invited focused narrative manuscript provides the reader with technical considerations and the author thoughts and ideas on the use of the branched graft technique vs the island technique in FET surgery. We do agree that some of the postulations have been too bold and have added this nuance accordingly.

1. We have added explanation for the abbreviations now throughout the manuscript;
2. We thank the reviewer for addressing this point and have improved the manuscript accordingly.
3. We agree that the trifurcated Jotec graft is not included; the invited topic (so called 'clinical practice review') however was to compare the 4-branch graft with the straight graft for this *focused* narrative review (so called 'clinical practice review') and we have therefore limited the discussion accordingly.