Appendix A. Conference discussion

Dr K. Kallenbach (Heidelberg, Germany): The manuscript carries two major messages. First, the modified DeBakey classification as you have presented here reflects late outcome and need for re-intervention on the downstream aorta better than the Stanford classification in acute aortic dissection. I agree completely.

Second, initial treatment of the descending pathologies in type I dissection with classic or frozen elephant trunk (55% in your study), reduces the re-intervention rate on the downstream aorta from 22%, for those treated only by proximal aortic repair, down to 9%, with a p value of 0.08. It can be speculated that this number will become statistically significant with a higher caseload.

These findings have implications for surgery. More radical treatment of descending pathologies by frozen elephant trunk in type I dissections may be indicated. This recommendation is supported by others in the literature. For example, the work of Dr Sun from Beijing reported a 30-day mortality of 3.7% and complete thrombus formation of 95% around the stent during 35-month follow-up with the same strategy but with a different stent-graft.

My questions for you are:

1. What is the 30-day mortality? You only provided the in-hospital mortality, but 30-day mortality is important to allow comparison with the literature.
2. How will the use of the modified DeBakey classification influence surgical treatment? In other words, apart from more precise documentation of the pathology, do the findings of this study influence your surgical strategy directly? What is your recommendation?

Dr Tsagakis: Concerning the first question, the mortality rate represents the in-hospital mortality rate which did not differ from the 30-day postoperative mortality rate.

Regarding the second question, the classification determines the surgical approach. If the descending aorta is not affected by the dissection, no intervention is needed. Thus, we only perform replacement of the ascending aorta and the arch.

Dr R. Di Bartolomeo (Bologna, Italy): What is the mean diameter of the stented graft in the acute dissection?

Dr Tsagakis: In most cases a 24 mm or 28 mm E-vita open stent graft was used.

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Editorial comment

Classification of aortic dissection: back to the future?

Keywords: Thoracic aorta; Aortic dissection; Classification

Aortic dissection is a pleiomorphic disease. A systematic approach requires adequate classification. The purpose of classification is to organize patients into groups or categories according to one or more discriminating criteria. The resulting groups should be mutually exclusive (nonoverlapping) and collectively exhaustive (contain all patients). Furthermore, the groups should be clinically informative in order to assist medical decision making. Numerous classification systems have been proposed over the years, but no consensus has emerged regarding which classification system should be used [1].

Among the existing classification systems, the Stanford [2] and the DeBakey [3] systems are the most commonly used. They were devised at a time when sophisticated aortic imaging was not available and surgical options were limited. Their main objective was to categorize patients into treatment groups (surgery vs medical treatment) rather than provide an exhaustive description of all possible types of aortic dissections.

The original Stanford classification system is based solely on the extent of the false channel irrespective of the location of the primary intimal tear [2]. Thus, it distinguishes aortic dissections which involve the ascending aorta (type A) from those which are limited to the descending aorta, below the left subclavian artery (type B). As such, the original Stanford classification does not consider aortic dissections involving the arch without affecting the ascending aorta. This subtype has been designated as non-A non-B dissections by some [4] or, for the sake of simplicity, has been considered as B types by others [1].

The DeBakey system classifies aortic dissection in terms of both the extent of the false channel and the site of the primary intimal tear. DeBakey I is used to describe aortic dissections where the primary intimal tear is in the ascending aorta and the false lumen extends distally to the left subclavian artery. DeBakey type II refers to dissections with a primary intimal tear in the ascending aorta but with a false lumen limited to the ascending aorta. DeBakey type III refers to an intimal tear below the left subclavian artery with the false lumen involving the descending thoracic or thoraco-abdominal aorta. However, by linking the site of primary intimal tear with the extent of the false channel, this classification system does not describe the whole spectrum of aortic dissections. Indeed, aortic dissections with retrograde propagation of the false channel to the arch or the ascending aorta are not addressed by the original DeBakey classification and have led some authors to propose additional subtypes.

The main difference between the Stanford and DeBakey classification systems appears to be the distinction made between type I and type II in the latter. Since both types led to similar surgical treatment, one might wonder about the utility of this distinction. It might however be justified from a prognostic point of view. Indeed, surgical resection of the ascending aorta can be considered as curative in type II patients, while it remains only palliative in type I patients. The latter are thus exposed to the development of long-term complications on the distal aorta such as aneurysm formation and/or rupture, leading to inferior long-term
survival. In the present manuscript, Tsagakis et al. propose a modification of the original DeBakey classification [5, in this issue]. They propose to extend original type II DeBakey type to include any dissection process which extends throughout the aortic arch but which stopped at the level of the left subclavian artery without extension into the descending thoracic aorta. This modification seems to be justified in the light of current surgical practice. Indeed, the consensus among the majority of surgical experts is that the distal anastomosis should be performed in an ‘open fashion’ during a period of hypothermic circulatory arrest in order to avoid aortic cross-clamp trauma, allow for aortic arch examination and more complete distal resection. Thus, modern surgical management of original type II and modified type II dissections will end up in similar surgical treatment and allow complete resection of the dissection in most cases. Therefore, immediate and long-term outcome of these patients can be expected to be similar and might justify the proposed upgrading of the original DeBakey classification. However, the major limitation of all these systems, namely, the incomplete anatomical description of the dissection, remains unaddressed.

In addition to reliable techniques for aortic arch surgery, surgical options for aortic dissection repair have recently been enriched by the advent of hybrid procedures. The stented (or frozen) elephant trunk technique combines conventional surgical replacement of the ascending aorta and the aortic arch with antegrade endovascular repair of the descending aorta. The latter is performed during the period of circulatory arrest by deploying a homemade or commercially available stent graft in the descending thoracic aorta. The expected benefit of this hybrid approach is immediate exclusion of additional intimal tears in the descending thoracic aorta. Some series, including the present one [5, in this issue], suggest that this procedure allows early thrombosis of the false channel and a reduction of late thoraco-abdominal aneurysm formation and re-operation rates [6]. Very recently, Chen et al. have reported a series of 30 patients operated on for acute DeBakey type I aortic dissection in whom they have performed ascending aortic replacement combined with open placement of a triple-branched stent graft into the true lumen of the arch, arch vessels, and descending thoracic aorta [7]. This approach allows extensive repair of the dissected thoracic aorta and appears simpler and more rapid than the previously described stented elephant trunk technique. Although the theoretical foundations of these hybrid approaches are sound and initial results encouraging, their precise indication remains to be determined. For these complex procedures, a simple binary classification (to operate or not) is obviously insufficient and the need for a precise anatomical description is striking.

The main anatomic and physio-pathologic features of aortic dissection are the location of the primary entry site, the extent of the false channel, and the distinction between antegrade and retrograde propagation. Some authors have proposed alternative classification systems which take into account at least some of these anatomic features. However, they either remain incomplete [8] or appear impractical [9] because of their complexity. In 1986, Roux and Guilmet have proposed a vanguard staging system which failed to achieve general acceptance at the time, mainly because of limited imaging capabilities and lack of treatment options back then [10]. This simple three-letter code (Table 1) allows exhaustive description of all anatomic types of aortic dissection and meets both the capabilities of modern imaging techniques and the demands resulting from an ever-growing surgical armamentarium.

References


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