Editorial

Endovascular repair or best medical treatment: what is the optimal management of uncomplicated Type-B acute aortic dissection?

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Introduction

Acute aortic dissection (AAD) is a life-threating condition considered one of the most catastrophic pathologies affecting the aorta and nowadays its management represents a clinical challenge. The most common presentation of AAD is chest and/or back pain. Factors such as age, male, gender, and aortic wall structural abnormalities are main risk factors implied in the development of aortic dissection.

The anatomic classification of AAD is based on the origin of entry tear and its extension. Stanford Type-A AAD originates in the ascending aorta and the extension is variable to the arch or along descending aorta and distal branches. For Type-B AAD, the entry tear starts distal to the left subclavian artery and extends usually along thoracic and abdominal aorta. Both types of aortic dissection can be complicated at moment of presentation in terms of aortic rupture, intractable pain, aneurysm expansion or degeneration and organ malperfusion. Organ ischemia can happen in various locations due to involvement of aortic branches from the dissecting process causing mesenteric ischemia (mesenteric vessels), stroke (aortic arch vessels), renal failure (renal arteries), spinal ischemia, or limb ischemia (iliac or subclavian arteries).

A surgical approach is considered as the standard treatment in cases of Type-A AAD and for complicated Type-B AAD (open and endovascular surgery). In particular, promising results of thoracic endovascular aortic repair (TEVAR) have been well documented for those cases of Type-B AAD (1,2). It has been related with a superior early outcomes and improved midterm survival relative to conventional therapy. However, current management of uncomplicated Type-B AAD is still unclear and remains a controversial issue. Some groups recommend medical and conservative therapy for newly diagnosed uncomplicated Type-B AAD and reserve surgical management for complicated Type-B AAD who developed complications such as rupture, malperfusion, aneurysmal dilatation, and refractory pain. Actually, there is no consensus in relation to therapy election. Outcomes of recent studies are not strong enough to reach a definite conclusion. That is the reason why Qin *et al.* in their recent published article try to elucidate what is the best treatment of uncomplicated type-B AAD comparing the long- term effect of TEVAR with best medical treatment (BMT) alone (1-3).

Classical standards for treatment of uncomplicated Type-B AAD includes intensive surveillance, careful control of blood pressure and heart rate to prevent disease progression, for all cases diagnosed, even after TEVAR. Patients affected with uncomplicated Type-B AAD were historically managed in a conservative way (BMT). This therapy aimed to reduce the heart rate and systolic blood pressure (SBP). The mainstay of medical antihypertensive therapy includes calcium-channel blockers, nitroglycerin, β-blockers, angiotensin-converting enzyme inhibitors,

angiotensin receptor blockers, or a combination. However, current outcomes with conservative management are less than ideal and aneurysm degeneration and aortic rupture are seen and attributed to its high mortality.

With the continued success of TEVAR, the improved operator skills and refinements of aortic endograft technology, including branched and fenestrated endografts, TEVAR was introduced in the management of uncomplicated Type-B AAD patients to reduce late morbidity and mortality (3-6). The goals of endovascular treatment of Type-B AAD were to cover the entry tear, treat or prevent impending rupture, re-establish organ perfusion, restore flow in the true lumen, and induce the false lumen thrombosis. Because of the significant advancements in endovascular technology, open surgical repair of Type-B AAD has become increasingly rare and is reserved only for a select group of patients with uncertain long-term durability of endografts. Those patients who were subjected with genetic connective tissue disorders such as Marfan, Loeys-Dietz or Ehlers-Danlos syndromes, had already failed or were not amenable to TEVAR (7,8). With promising results obtained from series published, TEVAR emerged rapidly as the first-line therapy for uncomplicated Type-B AAD (1,9,10). Nevertheless, recent investigations have studied the short- and long-term outcomes of TEVAR comparing with traditional conservative medical management in terms of BMT. The results of these studies have been inconsistent, probably because of scarce study population included, discrepancies in enrolment criteria, and short follow-up duration (1,3,6,9-12).

Qin *et al*. have recently revised their cumulative experience with uncomplicated Type-B AAD since February 2003 to August 2014, in three medical centres in China. Patients were divided into two groups taking into account the management carried out: BMT or TEVAR. Baseline characteristics in terms of demographic data, comorbidities, extent of dissection and false lumen patency were retrospectively reviewed for all eligible patients (1). Exclusion criteria included pathologies as intramural hematoma, iatrogenic or traumatic aortic dissection and blunt aortic injury. Furthermore, those patients affected with connective disorders or cases of unfavourable aortic anatomy for receive TEVAR were excluded (1). The aim of this retrospective study published by Qin *et al.* was to determine the early and long-term outcomes of those patients submitted to TEVAR or medical management alone in the context of an uncomplicated Type-B AAD (1). Besides, all those patients with hypertension (regardless of the treatment group to which they belonged) were treated with antihypertensive treatments. Outcomes were analyzed in terms of aortic-related adverse events, early and long mortality rates and all-cause death (1,3). Historically, the early event rate calculated for uncomplicated Type-B AAD patients submitted to TEVAR has been unknown, since aetiology of deaths and events in such an acute situation is not always easy to determine. In terms of results, conventionally, early aortic-related adverse events have been defined as occurring within 30 days following the diagnosis (1). They include events as aortic rupture, aortic enlargement, strokes, retrograde Type-A AAD, endoleaks, aortic ulcers, or stent graft-induced new entry (SINE) in those cases treated with TEVAR. A retrograde dissection after TEVAR is a possible complication attributed to several causes as bare stents of prosthesis, aortic radial force and deployment systems. However, especially in those cases of retrograde dissection, MOTHER registry established that the use of a significantly oversized stent endograft was one of main reasons of this complication. Thus, a minimal oversizing is recommended to assure security of pre-emptive TEVAR procedures (8,13).

According to previous literature, patients belonging to BMT group showed more aortic-related adverse events in comparison to patients submitted to TEVAR. These outcomes coincided in part with recent published studies (1-3,9-11,14-16). In the short term (<30 days), Qin *et al.* reported fewer aortic-related events and deaths for the group of patients submitted to BMT. Early events seemed to be more frequent in the group submitted to TEVAR, but the difference was not significant and also they were not such severe as complications associated with BMT (1-3). Following previous series, survival rates for both groups tended to be equivalent (94–98%) in the follow up during first 12–24 months. However, survival rate and event-free survival changed in the long-term. The 60-month survival rate in TEVAR group was 25% higher than that in the medication group (medication 67.6% *vs.* endovascular repair 92.3%), and the 120-month survival rate in the medication group decreased to 20.3% compared with 68% in the endovascular group. Thus, TEVAR demonstrated in contrast to BMT a significant reduction in the rate of adverse events and mortality at 30 days and beyond (17).

On the other hand, late aortic-related events, have been defined as those occurred >30 days following the diagnosis of Type-B AAD. Aortic enlargement and rupture were the main causes described in previous studies (17,18), and both entities (aortic enlargement and aortic rupture respectively) have been also described and confirmed as more frequent events in article written by Qin *et al.* (1). BMT showed a high

rate of late event (retrograde dissection in 47.5% and aortic rupture in 32.2%) compared with the TEVAR group (1). While in patients treated with TEVAR, the presence of endoleaks (mainly type I endoleaks) and SINE have been the main late events which were associated with substantial mortality. Those type-B AAD patients managed with TEVAR and antihypertensive medications, evidenced fewer late adverse events than patients managed with BMT alone. However, there was no evidence of significant difference in 5-year mortality rates among the groups. In the case of all-cause deaths, the 5-year cumulative survival rate was not significantly different between both groups (3). Long-term outcome of medical therapy alone had demonstrated to be suboptimal. A variable 20% to 50% rate of delayed expansion of the false lumen of aortic dissection had been reported at 4 years of follow-up, and nearly 30% to 50% mortality at 5 years (1,18,19).

In the ADSORB trial, any death was reported during the first 30 days for TEVAR or BMT group. Compared with previous studies, the ADSORB study showed a lower 30-day mortality in patients treated with TEVAR (1,8,9). Nevertheless, several limitations of ADSORB trial suggested an inadequate discriminatory statistical power due to original endpoint assigned, scarce study population and basically owing to a limited follow-up (12). In the original INSTEAD trial, the 2-year survival or the adverse event rates were not improved by TEVAR in spite of positive results shown in aortic remodelling. INSTEAD-XL (Investigation of Stent Grafts in Aortic Dissection with Extended Follow-Up) trial consisted in a prospective randomized trial trying to establish the effectiveness of TEVAR for aortic dissections. It showed that TEVAR associated to BMT improved 5-year aorta-specific survival and besides. It deferred the advancement of the aortic disease (15). These results supported the promising outcomes of TEVAR, with an early mortality rates from 10% to 20% described by Qin *et al.* (1). Besides, mortality rate from all causes was significantly lower in patients treated with TEVAR compared with the BMT group (1). In the group of patients managed with BMT, mortality rates at 3, 5, and 6 years have been formerly described as 22.4%, 27.9%, and 42%, respectively (19-21). Also the rate of all-cause death at 5-year follow-up described by Qin *et al.* was statistically significant higher in BMT group (39.7%) compared to TEVAR group (29.3%) (1). Furthermore, overall survival rates for uncomplicated Type B-AAD managed with BMT in the longest follow-up (10 and 15 years) were reported in 35% and 17% (1). In view of these results, what seems to be clear is that patients included in the BMT group have more deaths compared with those belonging to TEVAR group. In conclusion, Qin *et al.* advocated that during first years of follow-up, morbidity and mortality rates associated to TEVAR were not significantly lower than rates evidenced with BMT. However, beyond the 5 years of follow-up, TEVAR demonstrated a reduction in mortality and aortic-related adverse events in comparison with BMT, which endorsed TEVAR as a feasible option for uncomplicated Type-B AAD in the acute setting. That is of paramount relevance because the TEVAR procedure did not significantly lower morbidity and mortality compared with BMT during the early years of follow-up. TEVAR should be considered as a therapy to improve late outcomes in young adults or patients with longer life expectancy. Probably, those patients with these characteristics can be benefited from a greater extent from TEVAR therapy (1-22). Although remaining concerns about TEVAR durability, it seemed to have a more favourable outcome regarding aortic remodelling and the aortic-specific survival rate when compared with BMT alone (23). Results following pre-emptive TEVAR for uncomplicated Type-B AAD require long-term observation to further demonstrate the survival benefits. Ideally, pre-emptive TEVAR procedures might be indicated to those patients whose aorta is prone to dilatation in the future.

Control and surveillance with axial computed tomography angiography (CTA) is essential (whether managed medically or with TEVAR) to assess for device-related changes or progression of disease. Findings on the 1 month CTA should dictate frequency of subsequent imaging. If aortic pathology maintains stable, the next imaging should be obtained 3 to 6 months later, and subsequently followed by annual imaging. Any complication detected or clinical change (refractory hypertension, signs of organ malperfusion or pain) should be promptly addressed and treated if possible (7).

Nowadays, only scarce long-term results exist, far to be able to obtain conclusions. There remains much to be learned about this complex vascular pathology in terms of early diagnosis, risk-prediction, and optimal therapeutic strategies. Further studies with larger sample size and longer follow-up are indispensable to identify those patients with high risk criteria that can become the target population to benefit of an early or pre-emptive intervention (22). Probably patients with high-risk criteria may be selected and treatment should be particularized. The development of reporting standards is necessary to homogenize available data and to strengthen our understanding of this pathology.

Randomized controlled trials focusing on the prognostic factors of early and late complications are needed to determine if TEVAR could be considered more effective and secure strategy than only medical management in the context of an uncomplicated Type-B AAD. It is necessary to establish the optimal timing for TEVAR and the indications for these procedures. How distal to extend the endograft, as well as what happens to the perfusion pattern of the downstream dissected aorta and its branches after TEVAR are some questions without a solid response today.

So, to answer the question title of this commentary "What is the optimal management of uncomplicated Type-B acute aortic dissection?", we simply don't know yet. Further efforts and analysis need to be done to avoid cursory conclusions.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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