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EDITORIAL

Looking for the Holy Grail in Acute/Subacute Type B Dissection

Treatment of type B aortic dissection (TBAD) has been in constantly evolving over the past decade. For complicated acute TBAD, thoracic endovascular aortic repair (TEVAR) has become the standard of care over open repair. For uncomplicated acute TBAD, conservative treatment with surveillance and blood pressure control has been the subject of debate and controversy, and increasingly a more aggressive approach towards early TEVAR is being adopted in many institutions.

Global registries have shown suboptimal long-term results for medically treated uncomplicated TBAD patients with a five year mortality of 30–50%.[1,2] As the disease affects younger patients and many of the deaths during follow up are aortic related, the focus is on establishing a treatment that prevents complications and mortality in the long term. The classical definitions of complicated and uncomplicated TBAD have been challenged and some authors suggest that all should be considered a vascular complication requiring repair by an effective and durable strategy, advocating for the endovascular treatment of most patients with acute/subacute TBAD.[3]

The INSTEAD-XL was the first clinical trial to advocate endovascular treatment of all patients with TBAD.[3] The study included 140 patients with uncomplicated subacute/early chronic phase TBAD and aortic diameter $<$5.5 cm. Complete thoracic level false lumen thrombosis was noted in 90.6% of the patients after TEVAR, but no data were reported on abdominal remodelling. TEVAR proved to be better with regard to aorta specific mortality (6.9% vs. 19.3%; $p = .04$), and disease progression (27.0% vs. 46.1%; $p = .04$) after five years. This supports the idea that the early operative risk with TEVAR is likely to be counterbalanced with fewer complications during follow up.

However, it is important to note that a significant number of TBAD patients will not develop an aneurysm during follow up and (over)treatment of these patients by TEVAR may only mean operative risk without later benefit. Many studies have aimed to identify predictors of aortic growth in uncomplicated TBAD with the purpose of defining subgroups of patients that might benefit (more?) from early TEVAR. Clinical predictors include young age, white race, Marfan syndrome, high heart rate, etc. Radiological predictors include aortic diameter $\geq$40 mm, patent true lumen with elliptical configuration, large single entry tear in the inner curvature, false lumen diameter $\geq$22 mm on the proximal descending thoracic aorta, etc.[4] Most of these predictors originate from small series, in Asian patients (which may not extrapolate to Caucasians), and contradictory results between studies have been reported occasionally. A critical appraisal is therefore crucial for selection of suitable patients, despite accumulating data favouring TEVAR.

In this issue, Clough et al. analysed the outcomes of medical and endovascular treatment on 136 consecutive patients with TBAD over an 11 year period. This represents the largest single centre series published to date.[5] At five year follow up, overall survival and freedom from aortic events were 74.8% and 58.7%, respectively, with no differences between medical treatment ($n = 72$) and TEVAR ($n = 64$). TEVAR was used only in complicated cases, preventing a direct comparison between the two groups (conservative vs. TEVAR). Aortic events during follow up were associated with the size of the proximal entry tear, and the maximum total and false lumen aortic diameter. The study also points out two issues that are often neglected: i) the importance of continued adequate antihypertensive treatment (an increase of one drug in the number of antihypertensive medications resulted in a 32% decrease in hazard of death), and ii) the potential effect of undiagnosed connective tissue diseases in taller patients (10 cm increase in height resulted in a 48% increase in aortic events). In this study, the outcomes on aortic remodelling after TEVAR were consistent with the results of other series, in which thoracic, but not abdominal aortic remodelling was achieved during follow up.

Late distal aneurysmal degeneration after both medical treatment and TEVAR in uncomplicated dissections is a serious concern and has been the subject of discussion in recent years. This has resulted in an attempt to introduce several adjunctive techniques to counteract distal degeneration. The delicate balance between a durable repair with extensive remodelling and prevention of late complications and early complications that may occur from more extensive initial treatment with more invasive techniques has led to different strategies between centres.

The first well studied attempt was the Petticoat technique with additional stenting over the visceral arteries using a non-covered stent (Zenith Dissection Stent, Cook Medical, Bloomington, IN, USA). In two trials, the authors showed benefit with regard to true lumen perfusion but overall, there was no significant reduction of distal aneurysmal degeneration.[6]

The STABILISE concept was published in a series with 11 patients by Mossop's group in 2014, but did not generate a lot of followers because it seemed very counterintuitive to

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balloon and disrupt a lamella in a dissected aorta.[7] This technique indeed includes the use of a stent graft to cover the proximal entry tear, followed by a non-covered stent over the visceral arteries (like PETTICOAT), and then additional ballooning with a larger balloon to disrupt the dissection flap with the aim of obliterating the false lumen and restoring single lumen flow. The main limitation of the technique is the maximum diameter of the aorta at the level of the visceral arteries (below 40 mm, maybe even 36 mm). At present, the technique seems "hot" and an increasing number of studies have arisen analysing its outcomes. The original article from Mossop's group in 2014 showed promising results of aortic remodelling, with 100% complete false lumen obliteration in the thoracic aorta and 90% throughout the entire abdominal aorta. These results were confirmed by Melissano et al. in another small series with 10 patients.[8] Additional stenting was required in seven renal arteries and one superior mesenteric artery to preserve branches arising from the false lumen. More recently, Faure et al. published the largest report to date analysing mid-term results of the STABILISE technique in 41 patients with acute/subacute TBAD and abdominal aortic involvement with retrograde flow after TEVAR.[9] No intra-procedural complications were noted. In this series, 9% of the visceral branches needed additional stenting. During follow up, all patients showed complete aortic remodelling at the thoracic/visceral level and 39% had complete remodelling at the non-stented infrarenal aorto-iliac level. The primary visceral patency rate was 93%, with a 20% re-intervention rate at one year.

Where does this leave us? We still have a lot of questions regarding the need for treatment in uncomplicated TBAD. Further studies that aim to define subgroups of patients who will be more likely to have late aortic events, and therefore justify an early treatment with TEVAR, would be welcome. STABILISE appears to be a serious attempt to "cure" patients from this devastating disease, but clear indications and contra-indications are required, before widespread use can be advocated. Do we need to apply STABILISE if TEVAR shows no flow in the false lumen at all? Could STABILISE be considered for selected chronic TBAD as well? The diameter of the aorta at the visceral level appears to play an important role in success. Melissano together with other colleagues have worked on the creation of a registry on STABILISE which deserves support, with the aim of monitoring the technique, and defining in which patients it should be used.

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