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Patients with acute or subacute uncomplicated type B aortic dissection should routinely receive thoracic endovascular repair

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The incidence of aortic dissection is increasing[1]. Best medical therapy (BMT) is a key initial step in the management of any patient with an acute aortic dissection, and comprises analgesia and antihypertensive medications to limit aortic shear stress. Although dissection involving the ascending aorta (type A) requires surgical management, until recently interventions for acute type B aortic dissections (TBADs) have been reserved for patients with complications (principally aortic rupture and malperfusion). However, there is an increasing awareness that long-term sequelae of acute type B dissection are not as benign as previously thought. Even though reported data suggest that BMT is successful in 75 per cent of patients with acute (within 14 days) uncomplicated TBAD, the long-term prognosis for these patients remains suboptimal, with a cumulative mortality rate of up to 50 per cent at 5 years; this is related to the development of aortic events[2]. The risk of aortic growth despite adequate medical therapy is as high as 40–70 per cent after only a few years. Emerging data have identified anatomical pre-existing predictors of short-, mid- and long-term aortic events that alter prognosis and, therefore, determine the treatment strategy; among them, an aortic diameter of over 40 mm or false-lumen diameter exceeding 22 mm at the onset, as well as the size and number of entry tear(s) that predict subsequent aortic events[3].

Consequently, the potential for offering preventive thoracic endovascular aortic repair (TEVAR) during the initial phase of acute uncomplicated type B dissection, excluding the main proximal entry tear, favouring aortic remodelling and improving the patient's prognosis, is attractive. Contemporary data suggest that the perioperative risks associated with TEVAR are low, with mortality rates comparable to those in cohorts of patients managed with BMT alone (0.5 *versus* 2.6 per cent respectively) and acceptable early adverse event rates (10.3 per cent following TEVAR *versus* 4.5 per cent with BMT)[4–6].

Increasing experience with TEVAR has identified that treatment in the subacute phase (14 days to 3 months after presentation) may be somewhat safer than that in the acute phase (less than 14 days). After 3 months (chronic phase), remodelling of the aorta appears less likely; many patients require extensive aortic reconstruction with thoracoabdominal branched or fenestrated stent-grafts or open surgery, which is prohibitively risky for many of these patients and very costly[7,8].

To date, two RCTs (INSTEAD[9] and ADSORB[10], with 140 and 61 patients respectively) evaluating the benefit of TEVAR compared with BMT alone in the acute or subacute phase have been conducted. These RCTs reported no additional morbidity, and an improvement in overall survival (88.9 *versus* 80.7 per cent) and aorta-specific survival (93.1 *versus* 80.7 per cent) at 5 years with TEVAR. Based on these results, the European Society for Vascular Surgery[11] suggested that TEVAR may be considered selectively for uncomplicated TBAD in the acute (class IIb, level B) and subacute (class IIa, level B) phases to prevent further aortic complications.

The majority of what is known about acute and subacute uncomplicated TBADs comes from several retrospective registries. In one of the largest, comprising 357 patients, the cumulative incidence of aortic rupture at 5 years was much lower after TEVAR (5.1 per cent) than with BMT (13.7 per cent)[12]. A systematic review and meta-analysis[13] of all the studies on uncomplicated TBAD to date suggested that TEVAR significantly reduces the risk of late all-cause mortality, aorta-related mortality, and late aorta-related adverse events.

Meticulous anatomical selection is particularly important to limit the perioperative risk, and provide a more durable and effective procedure with TEVAR. Compromising anatomical selection has the potential to increase perioperative adverse events, such as retrograde type A aortic dissection (often fatal), and influence long-term outcomes. It is important to stay within the manufacturer's usual instructions for use (proximal aortic neck length at least 20 mm, no tight inner radius or type 3 configuration of the aortic arch, aortic diameter 23–40 mm, and an aortic segment free from dissection/haematoma). The frequent aortic diameter discrepancies between the expected proximal landing zone and the intended true lumen distal landing zone can be difficult to accommodate. Tapered stent-grafts represent an interesting solution to the management of aortic diameter discrepancies[14].

Thoracic aortic stent-grafts were designed principally for patients with aneurysmal disease, not aortic dissection. An acutely dissected aorta presents a number of unique challenges that have required stent-graft manufacturers and surgeons to modify their approach in order to improve patient outcomes. The sizing of stent-grafts is quite different in the setting of dissection compared with aneurysmal disease. The acutely dissected aorta is fragile and

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stent-grafts that are significantly oversized (20 per cent or more as in aneurysmal disease) have the potential to cause additional aortic damage. Oversizing of the stent-graft should be restricted to less than 10 per cent to prevent the risk of retrograde type A dissection and stent-graft-induced new entry tear.

As experience with TEVAR in acute aortic dissection evolves, other important factors associated with outcome continue to be evaluated. Initial experience suggested that patients treated within the first few hours of the initial phase (acute dissection) were at higher risk of adverse events, specifically retrograde dissection[15]. However, as experience accumulates, there appears to be less certainty around this observation, with new evidence concluding that performing TEVAR beyond the first 24 h would not affect immediate outcome[4–6].

Specific subgroups, such as those with connective tissue disease, appear to do less well with TEVAR. These have been associated with a higher incidence of reinterventions and retrograde dissection (up to 25 per cent), and limited remodelling[16].

Over recent years, the long-term sequelae of uncomplicated TBAD treated with medical therapy alone have become increasingly clear, at a time when the weight of evidence for use of TEVAR in acute and subacute uncomplicated TBAD is strengthening. Increasing experience and improved devices have contributed to better outcomes. Consequently, clinical guidelines[11] are now supportive of extending the role of TEVAR in this population of patients.

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