ADVANCES IN MANAGEMENT OF AORTIC DISSECTION

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Last reviewed: October 2026

I SURGICAL INNOVATIONS: THE TYPE A AND ARCH REVOLUTION

- **The "Frozen Elephant Trunk" (FET) Technique:**
  - **The Advance:** Converts extensive Type A dissection repair involving the aortic arch and descending aorta from a two-stage operation into a single-stage hybrid procedure.
  - **Mechanism:** The surgeon sews a surgical Dacron graft to replace the ascending aorta and arch while simultaneously deploying a pre-attached endovascular stent-graft ("trunk") antegradely into the descending thoracic aorta.
  - **Clinical Impact:** Immediately expands the true lumen, obliterates the proximal false lumen, and reduces the need for secondary downstream operations.
  - **Valve-Sparing Aortic Root Replacement (VSRR / David Procedure):**
  - **The Advance:** Shifts away from composite mechanical valved conduits (Bentall procedure) in selected patients.
  - **Clinical Impact:** Re-suspends the patient's native aortic valve within a synthetic root graft, eliminating the lifelong need for anticoagulation and reducing endocarditis risk in younger patients.
  - **Shift in Arterial Cannulation Strategy:**
  - **The Advance: Right Axillary Artery Cannulation** is the preferred standard for establishing cardiopulmonary bypass during dissection repair, replacing femoral artery cannulation.
  - **Clinical Impact:** Delivers antegrade cerebral and systemic blood flow, reducing the risk of retrograde cerebral embolization (stroke) from pushing atheroma or thrombus backward via the femoral route.

II THE ENDOVASCULAR REVOLUTION: TYPE B PARADIGM SHIFT

- **Pre-Emptive TEVAR for "High-Risk" Uncomplicated Type B Dissection:**
  - **The Advance:** Uncomplicated Type B dissection was traditionally managed with medical therapy alone; pre-emptive Thoracic Endovascular Aortic Repair (TEVAR) is now a **Class IIa** recommendation (ESC 2024) for patients exhibiting high-risk anatomical features (such as initial false lumen diameter greater than 22 mm, primary entry tear greater than 10 mm, or partial false lumen thrombosis).
  - **Clinical Impact:** Proactively induces positive aortic remodeling before the dissected aorta degenerates into an aneurysm.
  - **The FLIRT Concept (False Lumen Interventions to Promote Remodeling and Thrombosis):**
  - **The Advance:** Addresses chronic Type B dissections in which the false lumen remains pressurized and expands via distal re-entry tears despite proximal TEVAR.
  - **Techniques and Impact:** Includes the **"Candy-Plug" technique** (deploying a modified vascular occluder plug directly into the distal false lumen) or coil/glue embolization to induce complete false lumen thrombosis and halt aneurysmal expansion.
  - **Fenestrated and Branched TEVAR (F-TEVAR / B-TEVAR):**
  - **The Advance:** Utilizes custom-made stent-grafts with precise fenestrations (holes) or directional side-branches when a healthy landing zone is absent.
  - **Clinical Impact:** Enables endovascular sealing across the arch or thoracoabdominal aorta while preserving perfusion to critical visceral and arch branches (celiac, superior mesenteric, and renal arteries) without open thoracoabdominal surgery.

III PHARMACOLOGY AND MEDICAL THERAPY UPDATES

- **TGF-Beta Antagonism (The ARB Advantage):** Angiotensin Receptor Blockers (specifically **Losartan** and Irbesartan) inhibit the Transforming Growth Factor-beta (**TGF-beta**) signaling pathway in the aortic media, slowing adverse aortic wall remodeling and secondary aneurysmal expansion (evidence mainly from Marfan syndrome).
- **Strict Hemodynamic Targets:** Long-term blood pressure control targets **less than 130/80 mmHg** (SBP below 120 mmHg in the acute phase) to minimize lifelong shear stress (dP/dt) on the dissected aortic wall.

IV THE INDIAN CLINICAL CONTEXT

- **18F-FDG PET-CT for the "Vulnerable Aorta":** High focal uptake of 18F-FDG in the false lumen wall identifies active macrophage-driven vascular inflammation, an investigational predictor of rapid future expansion in medically managed patients.
- **Dedicated Multidisciplinary Aortic Clinics:** To reduce high loss-to-follow-up rates in the Indian subcontinent, dedicated Aortic Clinics (integrating cardiology, cardiothoracic/vascular surgery, and radiology) are recommended to enforce strict 1-, 3-, 6-, and 12-month CTA surveillance protocols.

V LANDMARK TRIALS (THE EVIDENCE BASE)

Landmark Trial	Study Population & Comparison	Key Clinical & Morphological Outcome
INSTEAD-XL Trial	Uncomplicated Type B dissection: **TEVAR + OMT vs. OMT alone**	Significant improvement in **5-year aorta-specific survival**, true lumen recovery, and false lumen thrombosis with TEVAR
ADSORB Trial	Acute uncomplicated Type B dissection: **Early TEVAR + OMT vs. OMT alone**	Superior **false lumen thrombosis** and prevention of aortic dilation at 1 year with early TEVAR

KEY REFERENCES

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- **Nienaber CA, Kische S, Rousseau H, et al. (INSTEAD-XL Investigators):** Endovascular repair of type B aortic dissection: long-term results of the randomized investigation of stent grafts in aortic dissection trial, *Circulation: Cardiovascular Interventions*.
- **Brunkwall J, Kasprzak P, Verhoeven E, et al. (ADSORB Trialists):** Endovascular repair of acute uncomplicated, type B aortic dissection promotes aortic remodeling: 1 year results of the ADSORB trial, *European Journal of Vascular and Endovascular Surgery*.