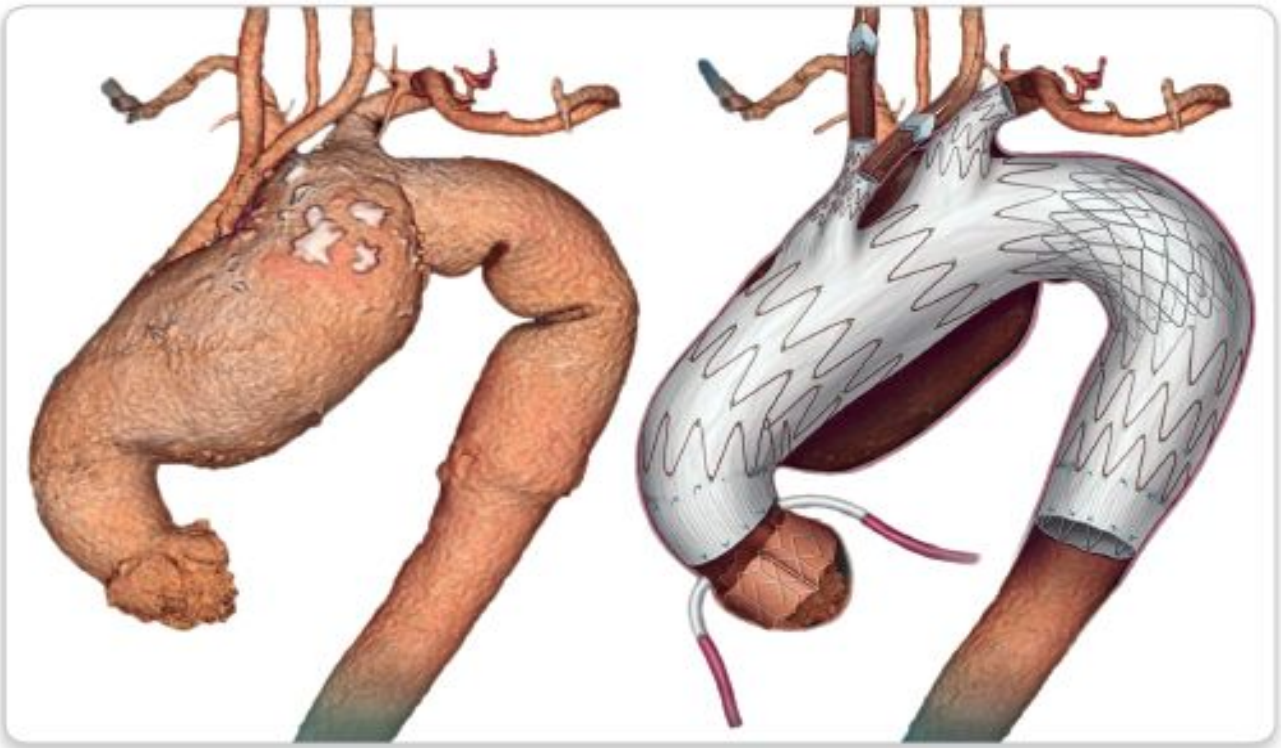
# Endovascular and Hybrid Therapies for Structural Heart and Aortic Disease

Edited by Jacques Kpodonu and Raoul Bonan



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# Contents

# Index

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# Preface

Since the first reports of endovascular repair of abdominal aortic aneurysm (AAA) and transcatheter aortic valve replacement in the early 1990s and 2000s, there has been an explosion in the volume and complexity of endovascular and hybrid procedures for the treatment of aortic diseases and structural heart diseases. Endovascular and hybrid techniques and technologies have evolved from the initial devices and continue to evolve allowing for the treatment of most aortic pathologies and most structural heart pathologies. These new endoaortic surgical procedures and transcatheter valve therapies have proven to shorten hospitalization, reduce morbidity and mortality, speed recovery, and hasten return to normal life. The evolution and conceptual design of the endoaortic grafts and transcatheter valves used to treat these complex pathologies would obviously not be possible without the-simultaneous explosion in medical imaging technologies and the development of advanced hybrid surgical rooms and hybrid surgical techniques, which has taken place over a similar time period.

With chapters written in a comprehensive yet concise manner and numerous illustrations, this book aims to engage readers further with additional video materials. We hope that this textbook will be a useful tool for practitioners planning to execute treatment on patients with these various aortic and structural heart pathologies as well as serve as a useful reference as the field of segment continues to evolve.

Jacques Kpodonu, MD
Raoul Bonan, MD

# List of videos

| | |
|---|---|
| **Video 5.1** | Construction of an 8 mm Dacron conduit on the right axillary artery. |
| **Video 5.2** | Advancement of a thoracic aortic device through the axillary conduit. |
| **Video 5.3** | Positioning of a thoracic aortic device with contrast aortography. |
| **Video 5.4** | Deployment of a thoracic aortic device under fluoroscopic guidance. |
| **Video 5.5** | Balloon angioplasty of a thoracic aortic device. |
| **Video 11.1** | Video demonstration of vascular robotic cannulation of fenestration in an in vivo model. |
| **Video 12.1** | Aortic valve replacement with the help of intraoperative DynaCT imaging and overlay of reconstructed 3D volumes on live fluoroscopy. The video is described comprehensively in the legend of Fig. 12.3. Courtesy of the Heart Center, Leipzig; prototype software under clinical trial. |
| **Video 12.2** | The abdominal aortic aneurysm was diagnosed with multislice CT. The rendered 3D volume of the aorta was registered with an intraoperatively obtained DynaCT volume. Contours of the 3D volume are then overlayed on live fluoroscopy and are automatically adjusted by changes of projection, table position, zoom factor, etc. Courtesy of St. Olav's Hospital, Trondheim; prototype software under clinical trial. |
| **Video** | Intraoperative DynaCT of a fenestrated stent-graft |

| | |
|---|---|
| **12.3** | for the repair of a complex abdominal aneurysm. Courtesy of Dr. Roy Greenberg, Cleveland Clinic Foundation, Cleveland, OH. |
| **Video 15.1** | Animation Edwards Ascendra 2 system. |
| **Video 15.2** | Case presentations: Edwards Ascendra 2 transapical heart valve (Sapien XT 23 mm). |
| **Video 15.3** | Case presentations: Medtronic Engager transapical heart valve (Engager 26 mm). |
| **Video 15.4** | Animation of the transapical deployment of the JenaValve. |
| **Video 17.1** | Surgical implantation of the Perceval S sutureless aortic valve prosthesis. |
| **Video 18.1** | MitraClip procedure. |
| **Videos 18.2–18.6** | Transapical neochord procedure. |
| **Video 20.1** | Transapical aortic valve replacement under MRI guidance. |

# PART I

# Aorta

# CHAPTER 1

# Access techniques

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## Brachial access techniques used for aortic endografting

Brachial and radial access techniques allow the utilization of angiographic catheters to assist with proximal deployment of thoracic stent-grafts [1]. They allow for easy identification of the left subclavian artery, and angiography can be performed to avoid coverage with the proximal end of a thoracic stent. When coverage of the left subclavian artery is required for an adequate proximal landing zone, subclavian to carotid bypassing may be required. The radial or brachial access can therefore accommodate subclavian artery coil embolization to minimize the risk of type II endoleaks.

The brachial artery has an enveloping fascial sheath, therefore, when a hematoma does occur, brachial plexopathies are more common. In addition, upper extremity vessels tend to spasm more frequently during

manipulation, making access more challenging. Brachial access does carry the added risk of distal ischemia and embolization over radial access. Although sheaths up to 6 or 7 Fr (3 Fr ≈ 1 mm) may be percutaneously placed in either vessel, radial access should be preferred over brachial because of a lower complication profile, and open access used for larger sheaths or on smaller patients.

The left brachial artery is preferred over the right so as to avoid the origin of the right common carotid artery. The technique requires that the arm be abducted on an arm board with the arm circumferentially prepped. The artery is palpated just proximal to the antecubital fossa where the biceps muscle thins out to its tendinous insertion. Percutaneous retrograde puncture of the brachial artery with a 21 gauge micropuncture kit is preferred to the 18 gauge due to the smaller size of the vessel (Fig. 1.1a). Catheter-over-wire exchange can then be performed to the desired sheath. Sheaths up to 6 Fr can be placed with relative safety (Fig. 1.1b). Long sheaths can help deal with the inherent vasospasm.

In tortuous aorta, the use of the brachio-femo ral wire may be required to aid advancement and deployment of an endograft. Deployment of an endoluminal graft in a tortuous aorta may be difficult, requiring the use of a brachio-femoral wire (Fig. 1.2). Use of brachio-femoral access wires can help straighten the most angulated of vessels. The presence of a tortuous aorta requires brachio-femoral access to deploy an endoluminal graft (Fig. 1.3). Brachial access is obtained by a percutaneous retrograde puncture of the right brachial artery with an 18 gauge needle or a micropuncture needle. An extra long 450 cm, 0.035 inch angled glide wire is advanced through the brachial sheath into the tortuous thoracic aorta, snared and pulled out through the groin sheath. The technique requires that a protective guiding catheter be placed over the brachial artery to protect the

subclavian artery from injury. It is important to have at least a 260 cm long wire and constant tension must be placed on both ends of the wire as the delivery sheath is passed into the aorta [2,3]. By pulling on both ends of the wire an endoluminal graft can be advanced up into the tortuous arch aorta with precise deployment of the endoluminal graft.

**Fig. 1.1** (a) A retrograde percutaneous puncture of the brachial artery with (b) the placement of an introducer sheath.