HYBRID TREATMENT OF SYMPTOMATIC ABERRANT RIGHT SUBCLAVIAN ARTERY ASSOCIATED WITH KOMMERELL DIVERTICULUM

Nazzareno Stella
UOC Chirurgia Vascolare
Sapienza, Università di Roma
Facoltà di Medicina e Psicologia
Disclosure

Speaker name: Nazzareno Stella

I have the following potential conflicts of interest to report:

- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

I do not have any potential conflict of interest
Background

ARSA, originating as the most distal aortic arch vessel, is the most common congenital anomaly of the aortic arch, with an incidence of 0.5% to 1.5%. ARSA pathologies have traditionally been treated by conventional open repair, which carries considerable mortality (11% to 24%) even in the largest published series. Recently, hybrid repair has been reported. In these hybrid procedures, Chimney and Periscope Grafts to Facilitate Endovascular Treatment of Aortic Transection in a Patient With Aberrant Right Subclavian Artery (J Endovasc Ther 2014;21:123-126)

However, spontaneous rupture, dissection, and death associated with KD have been reported [3, 4]. The mere presence of KD may be a risk factor for the development of an acute aortic syndrome and therefore an indication for surgical intervention. (Ann Thorac Surg 2014;98:1347-54)

Most aberrant subclavian artery symptoms are related to development of aneurysmal disease that usually occurs at the level of its origin. This aneurysm, occurring in nearly 60% of cases of aberrant right subclavian artery, is known as Kommerell diverticulum. Verzini et al. Journal of Vascular Surgery August 2015

due to a high incidence of rupture (22.6%) and 100% mortality associate with rupture.
Fig. 2. In a case of the left aortic arch with Kommerell’s diverticulum, the right dorsal aorta involutes proximal to the right subclavian artery and leaves the subclavian artery attached to the left descending aorta via the distal portion of the right dorsal aorta [7, 13] (Fig. 2d). On the contrary,

Background

Kommerell diverticulum (KD) with or without an associated aberrant subclavian artery (ASA) is an uncommon arch anomaly [1]. Indications and techniques to treat patients with KD continue to be debated. The KD or the ASA can compress the esophagus or the trachea causing dysphagia, stridor, or asthma. Patients with symptoms (ie, dysphagia lusoria) have long been referred for corrective surgery. In the absence of symptoms, KD sided aortic arch [4, 5]. Traditionally, open repair has been the preferred treatment modality for ASAs and associated Kommerell diverticulum. However, over the last decade operative techniques have evolved to include endovascular and hybrid approaches for this pathology.

The specific approach for ASA and associated Kommerell diverticulum is chosen based on patient comorbidities, anatomy, and preference of the surgeon. Unique
Case report
M.G. 86 yrs ♂

- Hypertension
- Atrial fibrillation
- Persistent cough
- Dysphagia
- Mild COPD
Preoperative CT scans
Therapeutic options

Surgical Approach

Fig 5. Open surgery solutions for aneurysm of aberrant right subclavian artery (AARSA) repair. Details are listed in Table 1.

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dovascular or hybrid. Open surgery can involve a thoracotomy, a median sternotomy, a cervical incision and even cardiopulmonary bypass in some cases. Open surgery is associated with significant morbidity and mortality, especially in elderly patients. A total endovascular treatment
Therapeutic Options

Hybrid Repair

Fig 3. Hybrid solutions for aneurysm of aberrant right subclavian artery (AARSA) repair. Details are listed in Table 1.

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sufficient sealing of the graft. Hybrid operations for an aneurysm of an aberrant right subclavian artery have previously been described by several authors including Attmann et al. Lacroix et al., or Shennib et al. and might be used in a situation where the landing zone is inadequate. This approach has not previously been associated with perioperative mortality in published cases. Long-term results are not known.
Therapeutic Options

Totally Endovascular Approach
Preoperative Planning

✓ ARSA & KD anatomy
✓ Caliber of ARSA & KD

Kinking of ARSA
Ø 42 mm
Preoperative Planning

- Anatomy and caliber of LSA
- Truncus bicaroticus and LSA distance
Preoperative Planning

- Proximal and distal landing zone

Ø Thoracic Aorta + ½ Ø Chimney
Single stage Procedure
(Operating Theatre)

- Right carotid-subclavian bypass (Dacron Ø 6mm)

- Proximal and distal ARSA/KD embolization:
  Amplatzer Vascular Plug Ø 18 and 22 mm
Aortic endograft deployment:
Valiant Captivia 46-46x150 mm
via surgical approach to right CFA ;

“Periscope graft” deployment:
Endurant 16-16x156 mm in left subclavian artery via surgical approach to left axillary artery.
Post-operative course

- Transient left leg mild movement deficit
- Diffusion-weighted MRI: pontine and fronto-parietal ischemic lesions
Cough and dyspnea: phrenic nerve palsy

- Chest X-ray: elevation of the right hemidiaphragm
- Antibiotic and costicosteroid therapy

Discharged in 10th post-operative day

Pre-operative X-ray

Post-operative X-ray

Discharge

Discharged in 10th post-operative
CT-angio @ 1 month

Complete relief of dysphagia lusoria symptom @ 1 month
CT-angio @ 6 months

No gutter at distal landing zone

No kinking of periscope graft
Conclusions

• Hybrid Repair of KD represents a feasible and safe alternative to conventional open surgery, less invasive and well tolerated in elderly and frail patients

• The advanced work-station 3-D imaging reconstructions make it possible an accurate pre-operative planning in the complex anatomy of KD

• Custom-made devices are not required; therefore it is also suitable for emergency settings

• “Periscope graft” for the LSA avoids a possible bilateral phrenic nerve palsy, related to surgical SA exposure, preserving flow in dominant vertebral artery

• The choice of treatment strategy for KD should be based on the anatomy, comorbidities of the patient, and surgical/endovascular expertise available.
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