Endovascular repair of traumatic rupture of the aortic isthmus: Midterm results

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Introduction

- Blunt thoracic aortic rupture usually occur at the level of the aortic isthmus in thoracic crushing injury.
- 80% patients die at the scene of the accident.
- Aortic disruption is most of the time associated with other life-threatening injuries.
- Surgical intervention is controversial and mortality and morbidity rate remain high.

Patients and methods

Patients

- 33 patients
  - 29 male (35.8 ± 17.8 y/o)
  - 4 female (55.6 ± 9.8 y/o)
  - 12 pts : the first 24 hrs
  - 12 pts : day 0~ 14 (acute)
  - 21 pts: day 14~ 252 (subacute)

Associated injuries

- The mean Injury Severity Score: 40.2 ±10.7.
- 29 pts (87.8%): severe encephalic injury
- 33 pts (100%): severe thoracic traumatism with lung contusion or contralateral flail chest.
- 26 pts (78.8%): major fractures
- 18 pts (54.5%): intra-abdominal lacerations.

Preoperative morphologic assessment

- Multidetectors computed tomographic scan with multiplanar reconstruction
  - For aortic injury and iliofemoral access
- All localized at aortic isthmus
  - Mean diameter 37.1 ±10.6 mm
  - Mean proximal aortic neck diameter 25.9 ±3.2 mm
  - Mean distance between lesion and the ostium of the left subclavian artery (LSCA) :17.9 ±13.7mm
  - Diameter of the iliofemoral junction: ≥ 6 mm
### Patients and methods

**Intravascular devices**
- 4 Excluder
- 27 Talent
- 2 Vanguard
- Stent graft 10~15% oversized than normal and 30~40 mm longer than the lesion
  - Mean diameter of stent graft: 28.4 ± 4.1 mm
  - Mean length: 111.8 ± 17.4 mm
  - Mean covered length: 97.2 ± 13.6 mm

**Endovascular procedures, postoperative treatment, and follow-up of patients**
- Long-term post-op care: aspirin 325mg qd
- TEE, CT or MRI before discharge and at 3rd, 6th, 12th and 18th months.
- 2 patients were lost f/u
- Mean f/u duration: 2.7 ± 2.4 years

### Patients and methods

**Definitions**
- Primary technical success
  - Complete exclusion of the false aneurysm without the necessity of any additional procedure and without perioperative death or complication.
- Secondary technical success
  - Complete exclusion of the false aneurysm after an additional endovascular procedure or after spontaneous thrombosis of primary endoleak within the first month.
- Failure
  - Intraoperative or perioperative death
  - Primary or secondary endoleak
  - Failure of the endovascular device
  - Reintervention
  - Death related to an aortic rupture
  - Sudden unexplained late death

### Patients and methods

**Statistical analysis**
- The evaluation of actuarial survivals
  - Kaplan-Meier nonparametric method
  - Reported at 1,3,5 years
- Analysis performed with the STATA program

### Results
- Intrainguinal iliofemoral access was performed.
- Single stent graft
- The ostium of the LSCA was covered in 9 patients (27.3%)
- **Immediate results:**
  - Primary success: 30 pt (90.9%)
  - 3 pt with endoleak: 1 proximal type I, 2 type IV
  - 1 pt: a rupture of the external iliac artery
### Results

- **Early post-op course, endo leaks, and early reinterventions (<30 days):**
  - 5 early complications
    - 1 with covered LSCA: transient paraparesis
    - 1: acute ischemia of the left upper limb
    - 2: false aneurysm of the left brachial artery
    - 1: atelectasis of the left main bronchus
  - Mean shrinkage in 1st month: 11.5 ± 7.9 mm
  - 3 pts (9.1%) had transient progression
  - All pt had complete shrinkage

### Results

- **Midterm results:**
  - No deaths/secondary endoleak/migrations/twist/kinks/device infection
  - All grafts were patent
  - 2 (6.1%) midterm complications:
    - Asymptomatic thrombus at the distal part of the stent graft in year 2.9, despite a daily low dose aspirin. (treated after oral anticoagulant for 3 mos.)
    - Asymptomatic fracture of the nitinol stent in year 7.

### Discussion

- Actuarial survival and actuarial freedom from aortic reintervention 5 yrs after procedure: 100%
- Actuarial freedom from complication
  - 1 yr after the procedure: 96.1% ± 3.8%
  - 5 yrs after the procedure: 85.5% ± 10.6%
Discussion

- In stable patients, endovascular management is performed within 24 hrs if there is contraindication for conventional surgical intervention.
- Indication for surgical intervention:
  - Collapse and massive left hemothorax
  - Minor aortic injury (≤1cm intimal flap with no or minimal periaortic hematoma)
    → observation and treated medically

Conclusion

- Endovascular treatment of blunt traumas of the descending thoracic aorta is a safe and effective therapeutic method with decreased midterm morbidity and mortality rates.
- The main technical improvements should relate to the reduction in the size of the delivery devices and the use of more flexible devices.

Conclusion

- Despite these good results in short and midterm, the long-term results remain unknown. It’s essential for close monitoring.
- In the case of hypothetic long-term complications, endovascular procedures would be possible, and if conventional surgical intervention was necessary, the operation would be performed under stable condition than when being undertaken in an emergency.

Thank you very much~~