Endovascular management of traumatic aortic injuries: Challenges and solution

Sanjeev Kumar
Associate Professor
All India Institute of Medical Sciences-New Delhi-India
Disclosure

Speaker name: Sanjeev Kumar

I do not have any potential conflict of interest
AORTIC INJURY

• 70% die on the spot
• Survivors with TAI reach trauma centers 50% will die within 24 hours
• Hence, time is key in the management of thoracic aortic injury

Speed is life
Diagnosis and treatment of blunt thoracic aortic injuries: changing perspectives

- **Significant changes over the last decade**
- Compare 1997 (AAST1) and 2007 (AAST2)
- The AAST1 - 274 patients, The AAST2 - 193 patients
- **Major shift** in the diagnosis - widespread use of CT scan
- **Endovascular repair has replaced open repair to a great extent**
- These changes have resulted in a major reduction of mortality and procedure-related paraplegia but also a significant increase of early graft-related complications

J Trauma. 2008 Jun; 64(6): 1415-8
Endovascular Repair-Challenges

- **Sizing** of graft
- **Conformity** of the device to the arch
- **Coverage** of LSA for adequate proximal seal
- **Timing** of repair
- **Intra-procedural anticoagulation** in view of poly trauma
- **Remodeling & ageing** of adjacent aorta with time
- **Optimal time** to stop follow up imaging
- **Issue of** cumulative radiation exposure
Effect of hypovolemia on device sizing

• Hypovolemia decreases aortic diameter
• In hemodynamically unstable patients with heart rate of over 130 and MAP < 75, the aortic diameter was underestimated by an average of 13%
• This mismatch between the aortic diameter and the endograft could theoretically result in increased risks of endoleak or other endograft-related complications
• So, in such patients, 10% extra oversizing is suggested
• However, excessive oversizing would result in graft corrugation or collapse
Poor conformation of device to the arch

- **Smaller radius of aortic curvature**, in contrast to older patients with aortic aneurysms who have wider aortic curvature
- **Sharp aortic angulation** just distal to the left subclavian artery
Improper Device Placement - Bird Beak

Isthmic pseudo aneurysm

Treated with Gore TAG

Treated using a Medtronic Valiant device

Post stent grafting CT showing stent graft collapse
Small access vessel diameter
Timing of repair

• **Urgent (24 hours) repair** barring other serious concomitant nonaortic injuries
• Or repair immediately after other injuries have been treated
• But **at the latest prior to hospital discharge**, nonoperative management results in 46 % mortality
Coverage of left subclavian artery

- **Preservation** of *antegrade flow* in dominant *vertebral artery* is important with or without a *complete circle of Willis*
- In *face of emergency*, this might not be adequately assessed
- **After procedure**, if left SCA is covered, the status and dominance of the right vertebral artery has to be studied, and if *unfavorable*, *surgical revascularization* considered
Systemic heparinization

- **Routine heparinization but at a lower dose than in elective TEVAR**, however decision of dose should be individualized

Spinal drainage

- **Not routinely recommended** unless there are symptoms of spinal ischemia
Type of repair in the young patient

- **Uncertain natural history** of the repair given the younger age of trauma victims
- **Morphologic changes of the aorta** that come with age and smaller size of vessel
- Optimal **follow-up strategy** that may span several decades and the risks of **cumulative radiation exposure**
- **Endovascular repair regardless of age**
- If surgically fit and anatomy not favorable for TEVAR, surgical option is considered
Conclusion

• **Minimal aortic injury** without **external contour abnormality** should be **managed conservatively**

• **Endovascular repair** be performed preferentially over open surgical repair or non-operative management in serious aortic injuries

• **Urgent repair** (with in 24 h) in unstable patient, at least prior to hospital discharge

• Long term natural history not known and **optimal follow up strategies are required**