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

Open Cardiovasc Med J 2015; 9: 69–72

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**

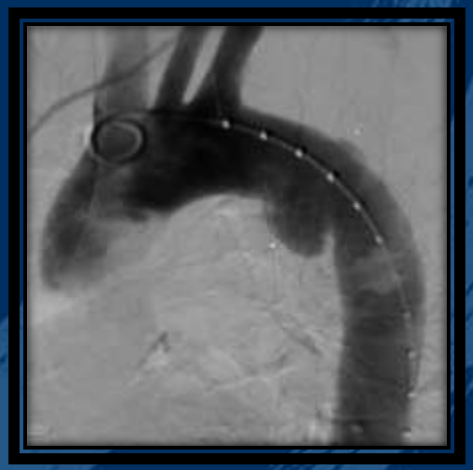
Effect of hypovolemia on device sizing

- 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

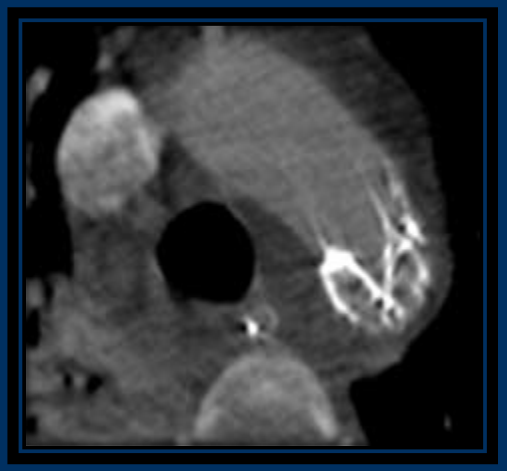
- **Smaller radius of aortic curvature**, in contrast to older patients with aortic aneurysms who have wider aortic curvature
- **Sharp aortic angulation** just distal to the left subclavian artery

Improper Device Placement- Bird Beak



Isthmic pseudo aneurysm

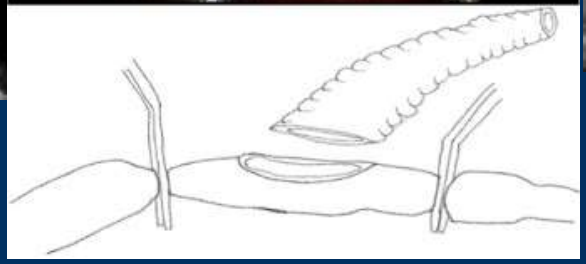
Treated with Gore TAG



Post stent grafting CT showing stent graft collapse

Treated using a Medtronic Valiant device

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 ,**Non operative 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**