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Bệnh viện Việt Đức

BỆNH VIỆN HỮU NGHỊ VIỆT ĐỨC UNIVERSITY HOSPITAL

Kinh nghiệm chẩn đoán và điều trị bệnh lý Chấn thương động mạch chủ ngực bằng phương pháp can thiệp nội mạch tại BV HN Việt Đức

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TOPIC: Kinh nghiệm chẩn đoán và điều trị bệnh lý Chấn thương động mạch chủ ngực bằng phương pháp can thiệp nội mạch tại BV HN Việt Đức

Non – disclosure

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Member of Vietnam Cardiovascular Surgery Association.
Member of Vietnam Cardiovascular Association.
Member of Vietnam Vascular Disease Association – VNVDA
Member of Aortic Association.

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VIET DUC University Hospital

- Oldest modern hospital in Viet Nam (since 1906)
- Focus on surgical activities (more than 75,000 operations / year)
- Oldest Center of Cardiovascular and Thoracic Surgery in Viet Nam (since 1958)

Old main Gate of VIET DUC hospital


Viet Duc University Hospital

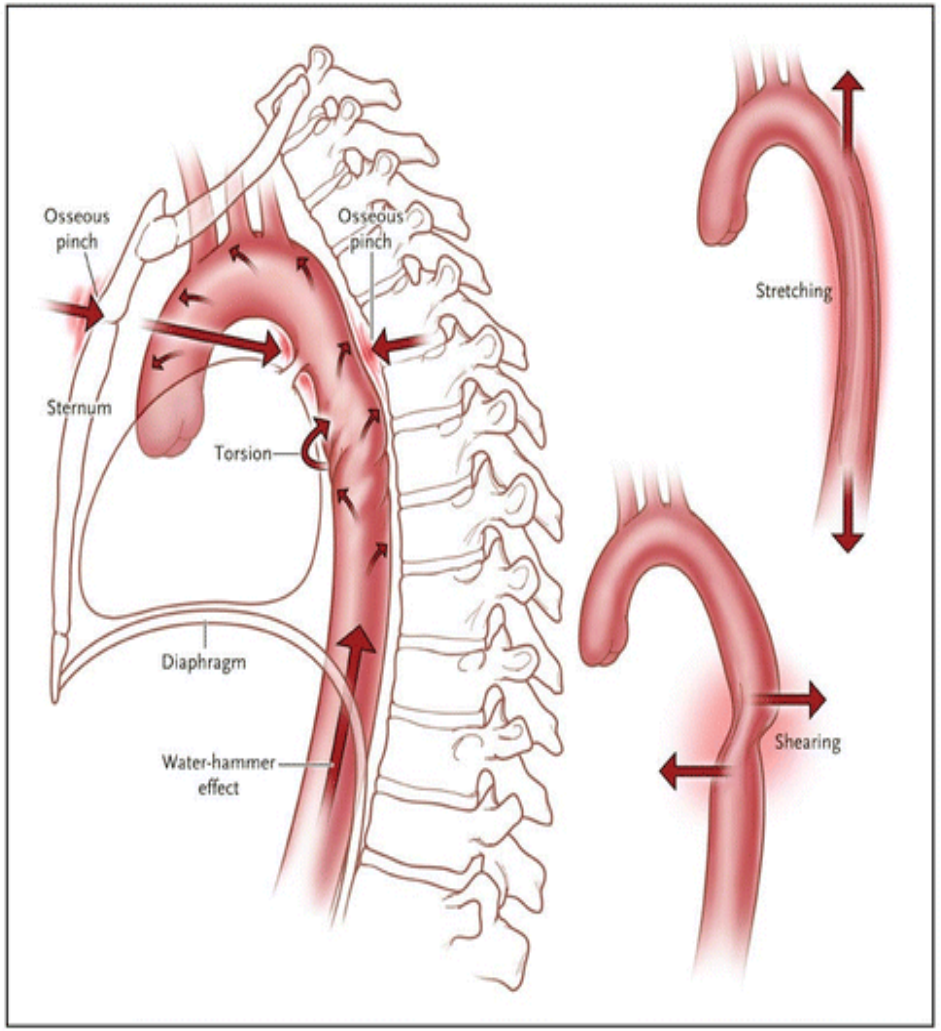
Blunt Traumatic Aortic Injury (BTAI)

- Life-threatening surgical emergency.
  - 85% die at the scene.
- Scene survival
  - 30% died in 06 hrs
  - 49% died in 24 hrs

Circulation 1958; 17: 1086-1101

Etiology of BTAI

- Overall incidence: < 0.5%
  - Traffic accidents: 0.3%
  - High-level falls: 0.1%
- Mechanism
  - Motor vehicle crash (70%)
  - Motorcycle crash (13%)
  - Fall from heights 7%
  - Auto vs pedestrian 7%
- BTAI incidence: age ↑ / pediatric population ↓
- <16 yrs. → 7 times lower than in adults



Richens D. Eur J Cardiothoracic Surg. 2002:21:288-293

BTAI

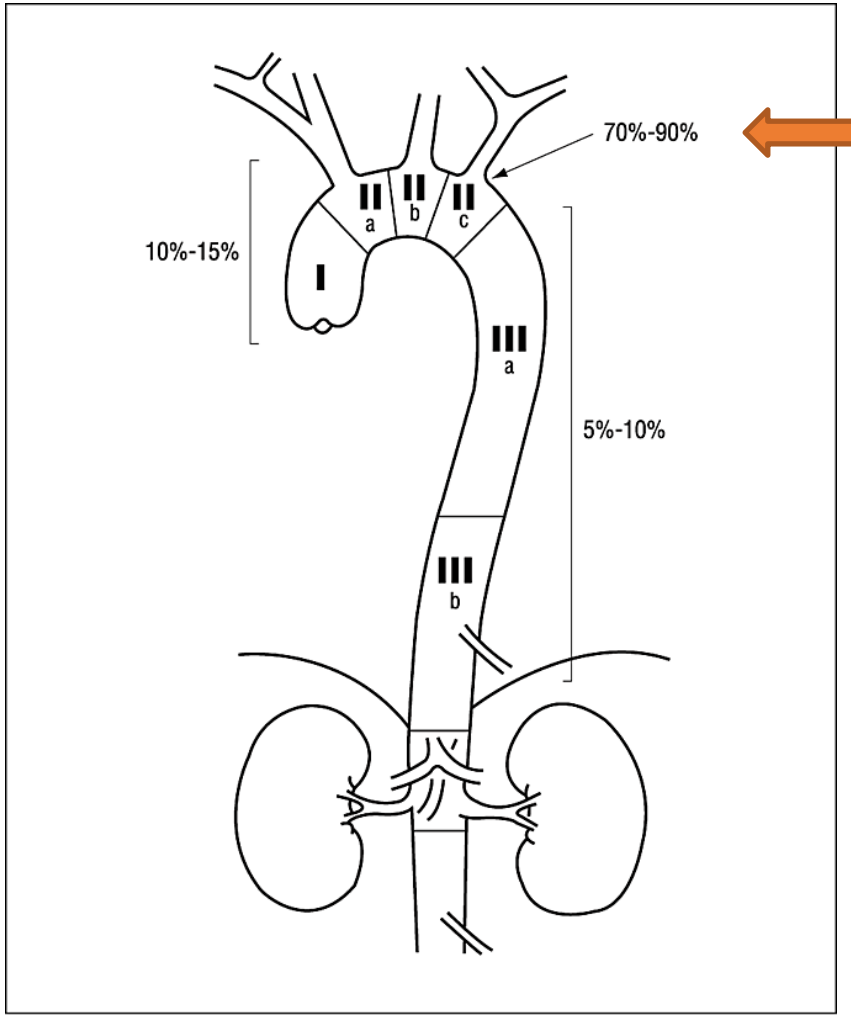
Natural progress

- Die at the scene (57%)
- Pre-hospitalization mortality: 70 – 80%
- Patients arriving to the hospital alive, 50% died within 24hrs.
- < 4 hrs. of admission (≈ 37%)
- > 4 hrs. of admission (≈ 6%).

Emerg. Med J 2004;21:414-419

- In computer simulation and cadaver studies, showed that at the crash the intra-aortic pressure increases to a mean of 1449 mmHg
- This high pressure combined with rotational forces, exerts a highly focused stress at the isthmus.
- In addition, the tensile strength at the isthmus was found to be only 63% of that of proximal aorta

Distribution of Aortic Injuries



Screening and diagnosis

Routine CT high-risk blunt trauma patients

⇔ **CT angiography = Conventional angiography.**
- **100% sensitivity**
- **99% specificity**

⇔ **Less time consulting**

⇔ **Less invasive**

⇔ **Identify other injury**

2015 EAST GUIDELINES

❖ All trauma patients with high-risk deceleration injuries undergoes routine helical CT evaluation of mediastinum irrespective of chest X-ray finding

Demetriades, D.et al. Arch Surg 1998,133:1084-1088

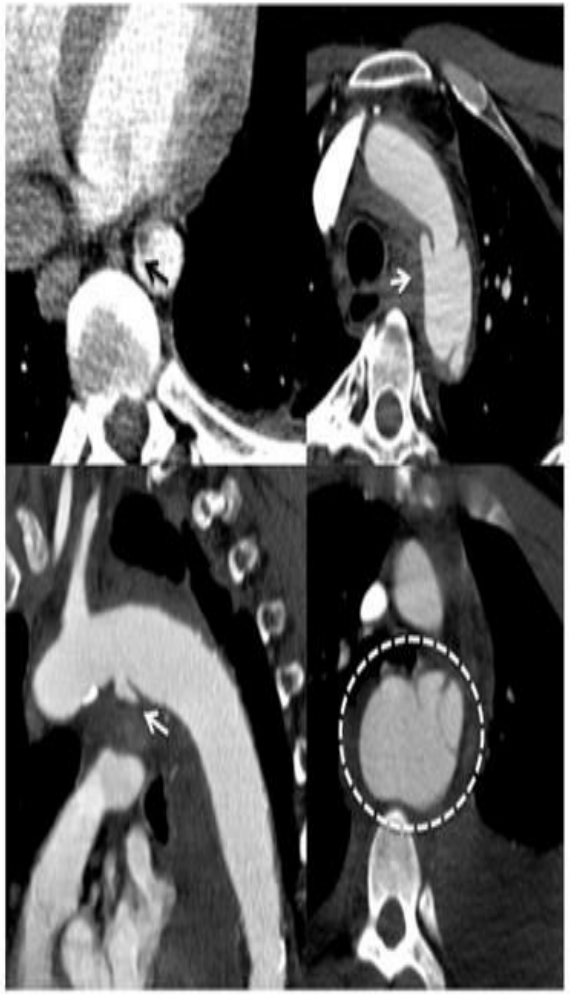
Classification on CT

Absent External Contour Abnormality Present External Contour Abnormality

Type of Aortic Injury	*Definition*	*Example*	*Type of Aortic Injury*	*Definition*	*Example*
Intimal Tear	No aortic external contour abnormality: tear and/or associated thrombus is <10mm		**Pseudoaneurysm**	Aortic external contour abnormality: contained	
Large Intimal Flap	No aortic external contour abnormality: tear and/or associated thrombus is >10mm		**Rupture**	Aortic external contour abnormality: not contained, free rupture	

Grade I
Intimal tear
or
localized hematoma

Grade II
Pseudoaneurysm
involving less than
50% of the total aortic
circumference



Grade III
Pseudoaneurysm
involving more than
50% of the total aortic
circumference

Grade IV
Rupture
or
complete section

Classification of BTAI

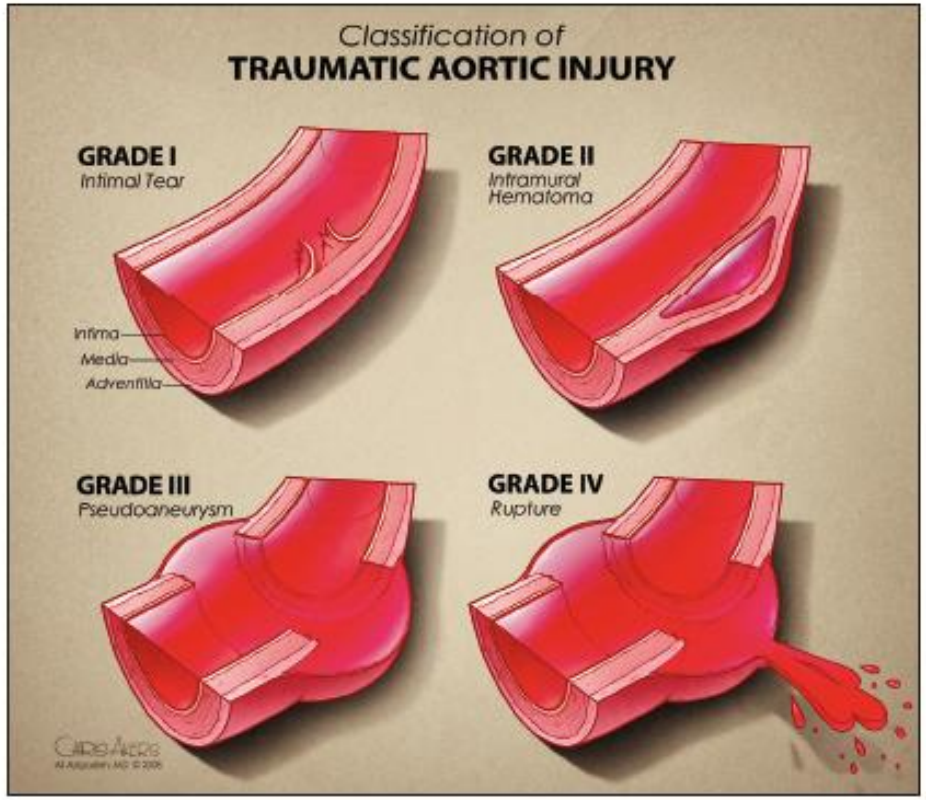


Figure 1. Classification of traumatic aortic injury. Reprinted with permission from the *Journal of Vascular Surgery*, Vol 49, Azizzadeh A, et al, Blunt traumatic aortic injury: initial experience with endovascular repair, Page 1403–1408, Copyright Society for Vascular Surgery 2009.[11]

- **Grade I: Intimal tears.**
- **Grade II: Intramural hematoma**
- **Grade III: Pseudo-aneurysm.**
- **Grade IV: Rupture**

Azizzadeh.A, Page 1403-1408,Society for Vascular Surgery 2009

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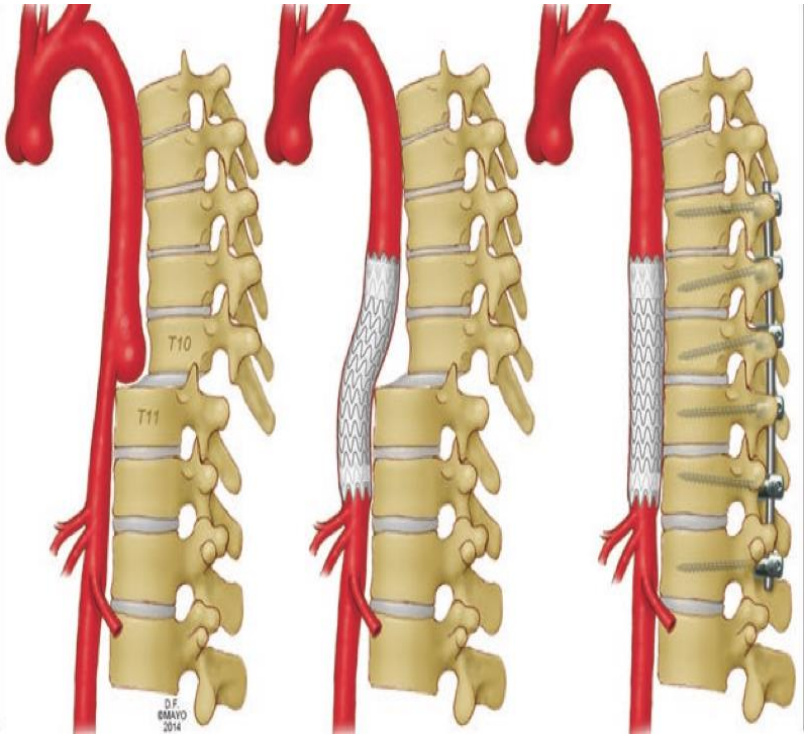
Treatment modalities

Literature



Ann Thorax Surg 2010;90: 64-71

- **Operative repair**
  - + Mortality remain about 15-57%
  - + Related to the severity of associated injuries
  - + Paraplegia 10%
- **Endovascular repair**
  - + Avoidance of thoracotomy
  - + Avoidance of heparin
  - + No need one lung ventilation
  - + No aortic cross-clamping
  - + Increase ICP(Intracranial Pressure) ↓
  - + Paraplegia ↓
  - + Distal ischemia ↓
- **Conservative management → Grade I - II**

Operative repair vs. TEVAR

Outcome	All Patients (N=193)	Operative Repair (N=68)	TEVAR (N=125)	Odds Ratio (95%CI)	p
Mortality					
Percent (x) died	**13.0 (25)**	**23.5 (16)**	**7.2 (9)**	**3.97 (1.65 to 9.56)**	**0.001**
Any systemic complications					
Percent (x) yes Complications	45.1 (87)	50.0 (34)	42.4 (53)	1.36 (0.75 to 2.46)	0.311
Percent (x/n) paraplegia	1.6 (3/193)	2.9 (2/68)	0.8 (1/125)	3.76 (0.33 to 42.21)	0.284
Percent(x/n) renal failure	9.1 (17/187)	10.4 (7/67)	8.3 (10/120)	1.28 (0.46 to 3.54	0.630

Surgical Repair

Table 1. Comparison of Operative Approaches to Blunt Aortic Injury.

Variable	Relative Degree of Risk*		
	Clamp and Sew	Shunt–Bypass	✔ Endovascular Repair
Complication			
Operative stress	High	Medium	Low
Blood loss	Medium	Medium	Low
Operative time	Medium	High	Low
Paraplegia	High	Medium	Low
Clinical scenario			
Patient with high surgical risk	High	Medium	Low
Patient with severe lung injury	High	Medium	Low
Patient with severe head injury	High	High	Low
Patient with challenging anatomy	Medium	Low	High

* Relative degree of risk refers to a general comparison among the three operative procedures.

Guideline	Consensus	Grade of recommendation 1 – strong 2 - weak	Quality of evidence A – High B – Moderate C – Low or very low
Choice of treatment	We suggest endovascular repair be performed preferentially over open surgical repair or nonoperative management	**2**	**C**

American Association for the Surgery of Trauma Multicenter Study(AAST2) J Trauma. 2008;64:561-571

Timing of TEVAR in stable patient

Endovascular repair of traumatic thoracic aortic injury: Clinical practice guidelines of the Society for Vascular Surgery

W. Anthony Lee, MD,[a] Jon S. Matsumura, MD,[b] R. Scott Mitchell, MD,[c] Mark A. Farber, MD,[d] Roy K. Greenberg, MD,[e] Ali Azizzadeh, MD,[f] Mohammad Hassan Murad, MD, MPH,[g] and Ronald M. Fairman, MD,[h] *Boca Raton, Fla; Madison, Wisc; Palo Alto, Calif; Chapel Hill, NC; Cleveland, Ohio; Houston, Tex; Rochester, Minn; and Philadelphia, Pa*

Guideline	Consensus	Grade of recommendation 1 – strong 2 - weak	Quality of evidence A – High B – Moderate C – Low or very low
Timing of repair	We suggest urgent (<24h) repair, and at the latest prior to hospital discharge	2	C

Evaluation and management of blunt traumatic aortic injury: A practice management guideline from the Eastern Association for the Surgery of Trauma

Nicole Fox, MD, Diane Schwartz, MD, Jose H. Salazar, MD, Elliott R. Haut, MD, Philipp Dahm, MD, James H. Black, MD, Scott C. Brakenridge, MD, John J. Como, MD, Kimberly Hendershot, MD, David R. King, MD, Adrian A. Maung, MD, Matthew L. Moorman, MD, Kimberly Nagy, MD, Laura B. Petrey, MD, Ronald Tesoriero, MD, Thomas M. Scalea, MD, *and* Timothy C. Fabian, MD

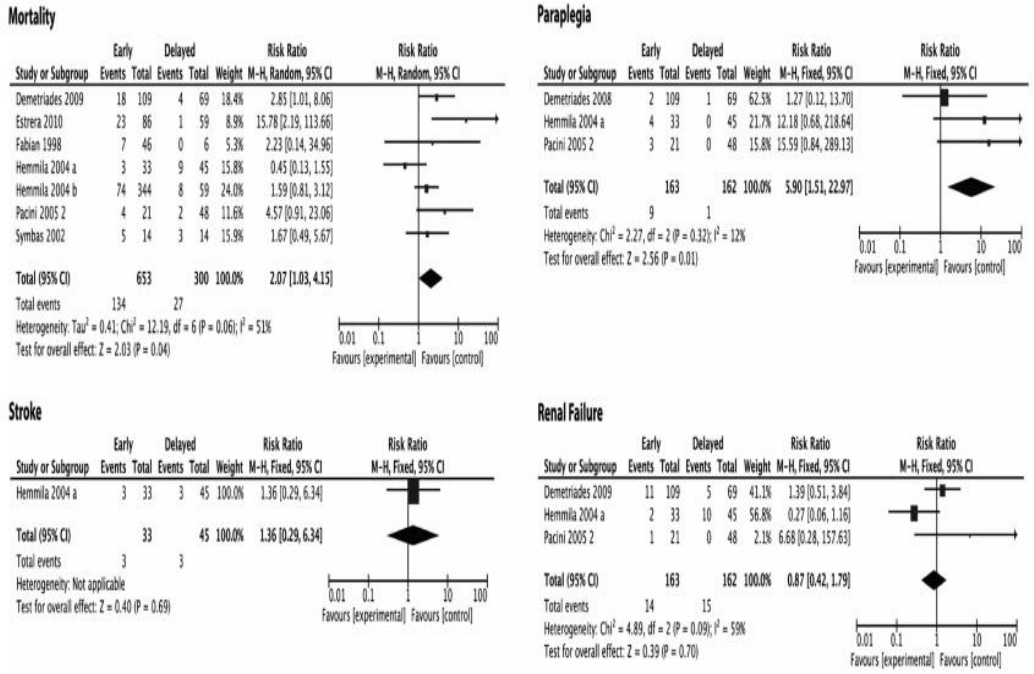


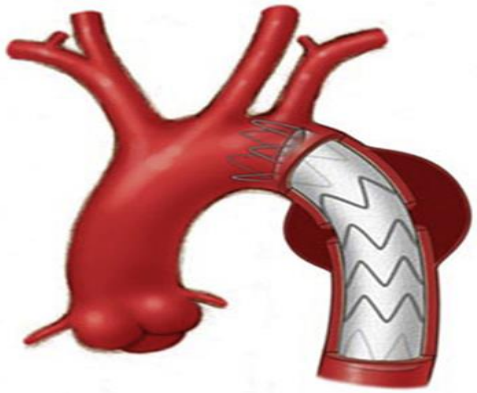
Figure 4. Forest plots for delayed versus open repair of BTAI.

Timing of TEVAR in stable patient

Timing of Repair of Blunt Thoracic Aortic Injuries in the Thoracic Endovascular Aortic Repair Era

Retrospective review of National Trauma Data Bank Registry

2821 patients with blunt traumatic aortic injury



Mortality*

TEVAR within 24 hours	TEVAR after 24 hours
9.8%	4.4%

P=.001

*Mortality difference persisted across injury severity groups and was independent of serious extra-thoracic injuries.

JVS Journal of Vascular Surgery
Official Publication of the Society for Vascular Surgery

Alarhayem et al. *J Vasc Surg March 2021*

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→ Với những trường hợp chấn thương ĐMC ngực ổn định can thiệp nội mạch có trì hoãn cải thiện tỉ lệ sống còn, nguy cơ liệt, nguy cơ đột quỵ so với can thiệp cấp cứu trong 24h.

Management of minimal aortic injury

Endovascular repair of traumatic thoracic aortic injury: Clinical practice guidelines of the Society for Vascular Surgery

W. Anthony Lee, MD,[a] Jon S. Matsumura, MD,[b] R. Scott Mitchell, MD,[c] Mark A. Farber, MD,[d] Roy K. Greenberg, MD,[e] Ali Azizzadeh, MD,[f] Mohammad Hassan Murad, MD, MPH,[g] and Ronald M. Fairman, MD,[h] *Boca Raton, Fla; Madison, Wisc; Palo Alto, Calif; Chapel Hill, NC; Cleveland, Ohio; Houston, Tex; Rochester, Minn; and Philadelphia, Pa*

Guideline	Consensus	Grade of recommendation 1 – strong 2 - weak	Quality of evidence A – High B – Moderate C – Low or very low
Management of minimal aortic injury	We suggest expectant management with serial imaging for type I injury	2	C

→ Với CT type I khó đưa ra quyết định, cần theo dõi sát dấu hiệu lâm sàng và tiến triển trên phim chụp CLVT cách nhau 7 ngày.

Choice of repair in young-TEVAR vs Open

Guideline	Consensus	Grade of recommendation 1 – strong 2 - weak	Quality of evidence A – High B – Moderate C – Low or very low
Type of repair in the young patient	We suggest endovascular repair regardless of age if anatomically suitable	**2**	**C**

→ Can thiệp nội mạch vẫn là ưu tiên kể cả với bệnh nhân trẻ tuổi nếu giải phẫu phù hợp

Suitability and the unmet needs of current FDA-approved thoracic endograft

- Không có dụng cụ nào ưu thế hay là "best-choice" trong can thiệp nội mạch điều trị bệnh lý CT ĐMC.
- **Cung trong ĐMC** – là mốc giải phẫu vô cùng quan trọng → Endoleak hay Collapse.
- **BN trẻ tuổi** → ĐK ĐMC nhỏ → Khó chọn lựa kích cỡ endograft
- **Oversizing** không có sự đồng thuân: 0 - 5-10% - more – khuyến cáo nhà sản xuất.
- Các hãng được FDA approved: TX2 LP – Medtronic – T-Gore. Việt Nam hiện nay: TX2 LP (Cook), Valiant (Medtronic) – E-vita Thoracic (Jotec), Relay (Plus) (Terumo), Sakura (Lifetech).

LSA management during Zone 2 coverage

Guideline	Consensus	Grade of recommendation 1 – strong 2 - weak	Quality of evidence A – High B – Moderate C – Low or very low
Management of left subclavian artery	We suggest selective revascularization of the left subclavian artery	**2**	**C**

→ **Phụ thuộc: kinh nghiệm phẫu thuật, tình trạng bệnh nhân, và những thương tổn phối hợp**

→ **Tỉ lệ che phủ LSA không tái thông 30%**

→ **CT có kế hoạch (mọi trường hợp) vs CT cấp cứu (BN nguy cơ cao thiếu máu tủy hoặc đột quỵ)**

Systemic Heparinization

The role of heparin in endovascular repair of blunt thoracic aortic injury

Check for updates

Stefan Kenel-Pierre, MD, Elizabeth Ramos Duran, MD, Andrew Abi-Chaker, MD, Fiorella Melendez, MD, Hattan Alghamdi, MD, Arash Bornak, MD, Alberto J. Lopez, MD, *and* Jorge Rey, MD, *Miami, Fla*

CONCLUSIONS

Heparin in critically ill patients with BTAI undergoing TEVAR may be used at the surgeon's discretion, although nonheparinization remains a safe alternative. Special consideration should be given to patients with concomitant hemorrhagic injuries, such as ICH.

Guideline	Consensus	Grade of recommendation 1 – strong 2 - weak	Quality of evidence A – High B – Moderate C – Low or very low
Systemic Heparinization	We suggest routine heparinization but at a lower dose than in elective TEVAR	**2**	**C**

→ Phụ thuộc quyết định của PTV tuy nhiên trong trường hợp **nguy cơ chảy máu cao** có thể **không dùng** hoặc dùng **liều thấp (half-dose)** so liều chuẩn

Spinal drainage

Guideline	Consensus	Grade of recommendation 1 – strong 2 - weak	Quality of evidence A – High B – Moderate C – Low or very low
Spinal drainage	We do not suggest routine spinal drainage	**2**	**C**

→ Mức độ bằng chứng thấp **không khuyến cáo thực hiện trước TEVAR**. Theo dõi sát, chỉ thực hiện nếu có biểu hiện lâm sàng.

Choice of anesthesia

Guideline	Consensus	Grade of recommendation 1 – strong 2 - weak	Quality of evidence A – High B – Moderate C – Low or very low
Choice of anesthesia	We suggest general anesthesia.	**2**	**C**

→ Khuyến cáo sử dụng **gây mê toàn thân** để kiểm soát huyết động và cáo chấn thương khác an toàn hơn mặc dù cũng có thể sử dụng gây tê tại chỗ.

Femoral access technique – OPEN vs PERCUTANOUS

Guideline	Consensus	Grade of recommendation 1 – strong 2 - weak	Quality of evidence A – High B – Moderate C – Low or very low
Femoral access technique	We suggest open femoral exposure	**2**	**C**

→ Khuyến cáo lựa chọn phẫu tích bộc lộ đường vào.

→ Phụ thuộc vào từng trung tâm tuy nhiên dùng dụng cụ đóng mạch qua da dễ sử dụng và tránh được những biến chứng của bộc lộ mạch, phù hợp trường hợp khẩn cấp.

*** Note:

- Khảo sát kĩ đường vào trước thủ thuật.
- Thủ thuật bổ sung tạo đường vào: bắc cầu, nong bóng, stent hoặc Coverstent trước TEVAR.

Optimal follow-up strategy

→ Dựa vào chụp CLVT 64 dãy hệ ĐMC ngực.

→Thời gian: 1 tháng - 3 tháng - 6 tháng - 1 năm - sau đó 1 năm / 1 lần.

→ Có thể sử dụng MRI tuy nhiên cân nhắc thành phần kim loại của stentgraft có ái từ hay không và khuyến cáo của nhà sản xuất (MR safe or not)

BTAI – VDUH Data

- Method ⇔ A retrospective review.
- **From May 2013 to February 2022.**
- **48** patients
- **44 male 4 female**.
- Age: **19 – 74 yrs** (mean 38 yrs.)
  - **Emergency** !!!
  - MS-CT for 100% cases
  - Average time from onset to intervention ≈ 24h
  - Multi-organ Injury = 100% / BTAI group.
  - **Shock: 10/48 BTAI (21%).**

Grade classification

1. Grade I: 0 patients (0%).
2. Grade II: 6 patients (12,5%).
3. Grade III: 36patients (75%).
4. Grade IV: 6 patients (12.5%).

Location

1. Ascending Aorta: 1 patient (2 %).
2. Arch: 11 patients (23%).
3. Isthmus: 24 patients (50%).
4. Descending Aorta: 9 patients (18%).
5. Abdominal Aorta: 3 patients (7%).

BTAI – VDUH Data

1. **Medical treatment**: 1 patient (Abdominal Aorta Injury) **(2%)**
2. **TEVAR:** 29 patients (4 case Fenestration for LSA) **(60%)**
3. **Hybrid:** 14 patients (3 case – Total debranching supra-aortic vessels, 1 case REBOA technique +TEVAR, 4 cases RCC – LCC – LSA bypass, 6 cases transposition of LSA (2 cases included Left vertebra artery) **(30%)**
4. **EVAR:** 2 patients. (Endurant II – Limb) **(4%)**
5. **OR (operation):** 2 patients **(4%)**
    1. Aortic Arch Replacement;
    2. Ascending Aortic Replacement and total debranching supra-aortic vessels.

BTAI – VDUH Data

- **29** cases of TEVAR ⇔ Coverage LSA **without revascularization (30%)**
- **4** cases of TEVAR ⇔ **Fenestration for LSA**
- **1** case was **used "Homemade Stent-graft technique**"
- **2** cases was used **Rapid Pacing**.
- **3** cases **"Femoral access trouble"** : 1 bypass + 2 angioplasty by balloon only.
- **5** cases used **"non-bare stent graft"** – 2 cases Limbs (1 + CUFF), 1 case Zone 1, 2 case Zone 2 and 2 cases Zone 3
- **Follow-up**: Clinical + X-rays + MS CT 64s (1 month – 3 months – 6 months – 1 year …)
- **8 years** no late complication. (Endo-leak, Migration, collapse, no re-intervention).

Parameters	BTAI (n=48)
Hybrid	14
Endoscopic thoracic surgery for blood clot	0
General anesthesiology	**34 (14 local)**
Heparin IV	Half-dose
Complications (0%)	- No paraplegia - No cerebral ischemia - No early endo-leak
Death (3 cases – 6.25%)	1 by septic shock on 7th day from multi-organ injuries (+ cross rupture)
	1 by peritonitis on 2nd day from multi-organ injuries
	1 by rupture before Operation

Conclusion

- Chấn thương ĐMC là tình trạng đe dọa tính mạng và nguy cơ tử vong cao
- Chụp CLVT ít nhất 64d giúp chẩn đoán và đưa phương án điều trị
- Can thiệp nội mạch ưu thế hơn so với phẫu thuật kinh điển nếu giải phẫu phù hợp
- Thời điểm can thiệp với trường hợp người bệnh ổn định có thể >24h
- Heparin có thể sử dụng giảm liều hoặc không sử dụng với nguy cơ chảy máu cao (đặc biệt chay máu nội sọ hoặc trong ổ bụng).
- Có thể che phủ ĐM dưới đòn trái tuy nhiên ưu tiên bảo tồn trường hợp nguy cơ cao.
- Kết quả trung hạn tốt với can thiệp nội mạch tuy nhiên cần thêm nghiên cứu kết quả lâu dài.

Thanks you for your attendtion!!!