How To Manage Heparin In TEVAR For BTAI when Head Injuries are Present

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Disclosures

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Introduction

Thoracic endovascular aortic repair for traumatic aortic transection

Michael R. Go, MD, Joel E. Barbato, MD, Ellen D. Dillavou, MD, Navyash Gupta, MD, Robert Y. Rhee, MD, Michel S. Makaroun, MD, and Jae-Sung Cho, MD, *Pittsburgh, Pa*

- Initial success was good (90% Heparin No 30 Day Mortality).
- Systemically heparinized with 80 U/kg.
- TEVAR emerging as a viable alternative.

J Vasc Surg 2007;46:928-33.

Clinical Guidelines

SOCIETY FOR VASCULAR SURGERY® DOCUMENTS

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] *Bon Secour, Fla; Madison, Wis; Palo Alto, Calif; Chapel Hill, NC; Cleveland, Ohio; Houston, Tex; Rochester, Minn; and Philadelphia, Pa*

- Safety of heparin in trauma is controversial.
- Routine use but in a lower dose range.
- High risk cases are individualized.
- Minority "heparin may not be necessary".

J Vasc Surg 2011;53:187-92.

Evolution of Technique

From the Society for Clinical Vascular Surgery

Evolution of treatment for traumatic thoracic aortic injuries

Rolando I. Celis, MD,[a] Sun C. Park, MD,[a] Ankur J. Shukla, MD,[a] Mazen S. Zenati, MD,[b] Rabih A. Chaer, MD,[c] Robert Y. Rhee, MD,[d] Michel S. Makaroun, MD,[e] and Jae-Sung Cho, MD,[e] *Pittsburgh, Pa*

- Refinement in techniques (Faster, Percutaneous)
- N=91, TEVAR group only 28/50 (56%) received heparin.
- Clinical benefits on reducing hemorrhage remain unknown.

J Vasc Surg 2012;56:74-80.

Sheath Flushing

Outcomes of endovascular repair for blunt thoracic aortic injury

Gabriele Piffaretti, MD, PhD,[a] Filippo Benedetto, MD,[b] Mirko Menegolo, MD, PhD,[c] Michele Antonello, MD,[a] Antonino Tarallo, MD,[a] Franco Grego, MD,[c] Francesco Spinelli, MD,[b] and Patrizio Castelli, MD,[a] *Varese, Messina,*

J Vasc Surg 2013;58:1483-9..

From the Vascular and Endovascular Surgery Society

N=87

Implementation and results of a practical grading system for blunt thoracic aortic injury

Elina Quiroga, MD, Benjamin W. Starnes, MD, Nam T. Tran, MD, and Niten Singh, MD, *Seattle, Wash*

J Vasc Surg 2019;70:1082-8.

- N=46
- 40-50 units/kg was used.
- Sheath flushing if concerns for TBI or abdominal bleeding.

Heparin Use in Patients with TBI

AAST 2016 Plenary Paper

Long-term outcomes of thoracic endovascular aortic repair: A single institution's 11-year experience

Megan Brenner, MD, MS, William Teeter, MD, MS, Muhammed Hadud, Melanie Hoehn, MD, James O'Connor, MD, Deborah Stein, MD, MPH, *and* Thomas Scalea, MD. *Baltimore, Maryland*

- Heparin was given in 23 with TBI.
- 12/88 were not heparinized.
- No neurologic or embolic events were noted.

J Trauma Acute Care Surg 2017; 82: 687-93.

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Trauma Literature Summary

AAST 2016 Plenary Paper

Long-term outcomes of thoracic endovascular aortic repair: A single institution's 11-year experience

Megan Brenner, MD, MS, William Teeter, MD, MS, Muhammed Hadud, Melanie Hoehn, MD, James O'Connor, MD, Deborah Stein, MD, MPH, *and* Thomas Scalea, MD. *Baltimore, Maryland*

"It seems that TEVAR without heparin appears to be safe, and use of heparin is also safe in TBI patients, particularly when repair is conducted more than 24 hours after injury".

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Heparin Dose: Full, Some, or None?

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*

- Full vs Low vs 0: ACT > or < 250 sec. (82 v 45 u/kg).
- Time to repair for full heparin grp. took 3 x longer.
- No significant differences in outcome (n= 42 vs 18 vs 17)
- Lack of heparin appears to be safe and avoids delay.

J Trauma Acute Care Surg 2019;70:1809-15.

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Heparin In Stable ICH

Management of Moderate Blunt Thoracic Aortic Injuries in Patients with Intracranial Hemorrhage

Elina Quiroga,[1] Michael R. Levitt,[2,3,4,5] Matias E. Czerwonko,[1] Benjamin W. Starnes,[1] Nam T. Tran,[1] and Nitin Singh,[1] Seattle, Washington

- N= 52 All endovascular study group.
- 20 (38%) had moderate BAI + ICH.
- 19/20 stable ICH received 80 units/kg + Protamine.
- Heparin during TEVAR does not worsen ICH.
- Time to OR 58 hrs. (+ICH) vs 26 hrs. (Non-ICH)

Ann Vasc Surg 2021;73:15-21.

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VQI Registry Data

Intraoperative heparin use is associated with reduced mortality without increasing hemorrhagic complications after thoracic endovascular aortic repair for blunt aortic injury

Vy T. Ho, MD,[a] Elizabeth L. George, MD,[a] Kara A. Rothenberg, MD,[b] Jason T. Lee, MD,[a] Manuel Garcia-Toca, MD,[a] *and* Jordan R. Stern, MD,[a] *Stanford and Oakland, Calif*

- 655 patients 2013-2019.
- Heparin on multivariate analysis did not increase risk of hemorrhage.
- No heparin had greater inpatient mortality 12.9 vs 5.1%

J Vasc Surg 2021;74:71-8.

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A Reasonable Approach with TBI

- **Severe BAI-** Immediate repair & heparin flush.
- **Moderate BAI-** ICU admission, serial CT's & delayed repair.
  - Anti-impulse therapy.
  - TEVAR with 80 u/kg heparin.
  - Protamine reversal.
  - Post TEVAR head CT.

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Conclusion

- The use of heparin dosing remains variable.
- A reduced dose appears to be a common practice.
- Heparin sheath flush does not appear to have complications
- Heparin use in stable ICH does not worsen outcome.
- The lack of complications should bias toward the use of intraoperative heparin.