

# 23rd BELGIAN SURGICAL WEEK

Expanding The Field  
of Surgery

5th - 7th May 2022  
Thermae Palace  
Ostend

  
**RBSS**  
Royal Belgian  
Society for Surgery



## TREATMENT OF BLUNT AORTIC ISTHMUS RUPTURE: 19-YEARS SINGLE CENTER EXPERIENCE

Minga Lowampa Elie, Kerzmann Arnaud, Desiron Quentin, Boesmans Evelyne,  
Sakalihasan Natzi, Defraigne Jean-Olivier

Department of Cardiovascular and Thoracic Surgery, CHU Liège, Belgium

  
CHU  
de Liège

  
LIÈGE  
université



# INTRODUCTION

Aortic injuries are involved in 0,4% of admissions in trauma patients

The autopsy examination attributed 33% of death in trauma patient from aortic injury

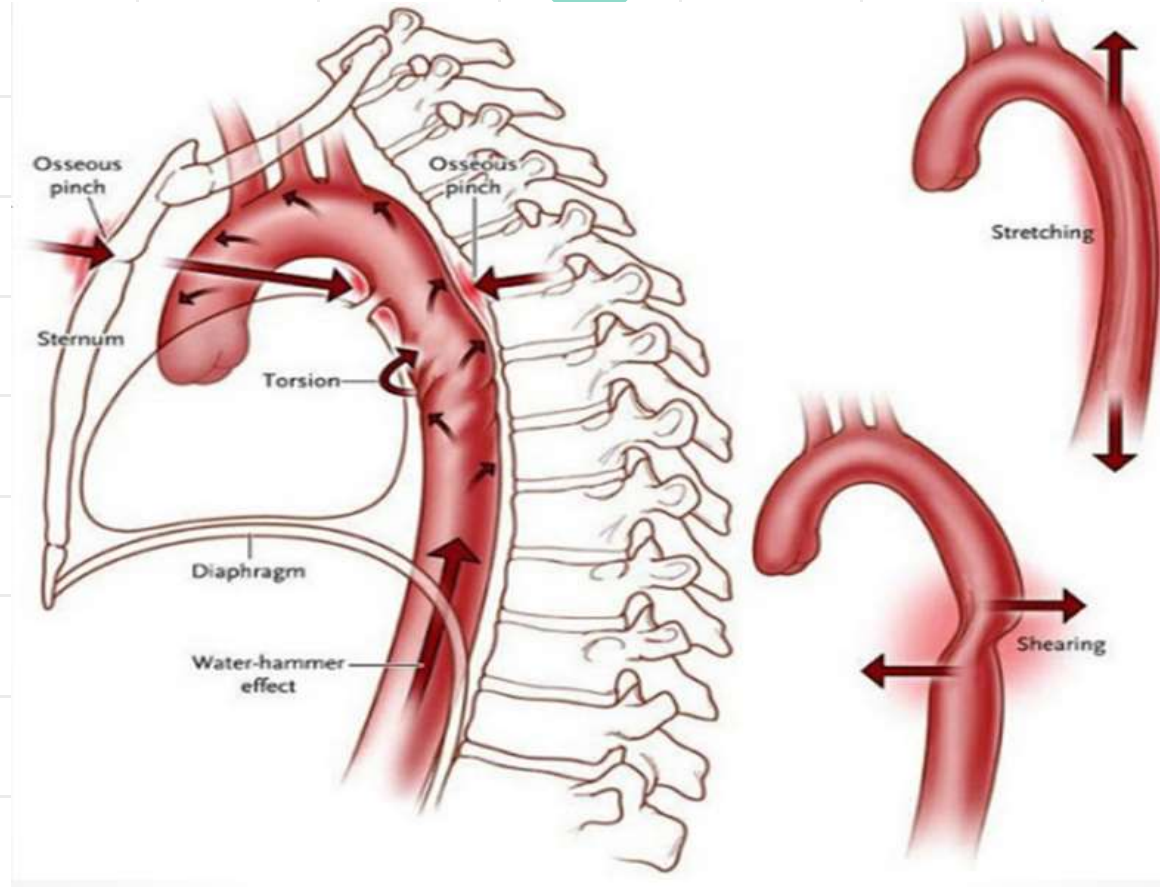
80% occurs at the scene of the accident

20% occurs in hospital

Diagnosis and management of blunt aortic isthmus rupture have improved the last 20 years.



***What is the mechanism?***



Blunt Aortic Injury

Neschis DG, Scalea TM, Flinn WR, Griffith BP.

[N Engl J Med](#). 2008 Oct 16;359(16):1708-16. doi: 10.1056/NEJMr0706159.

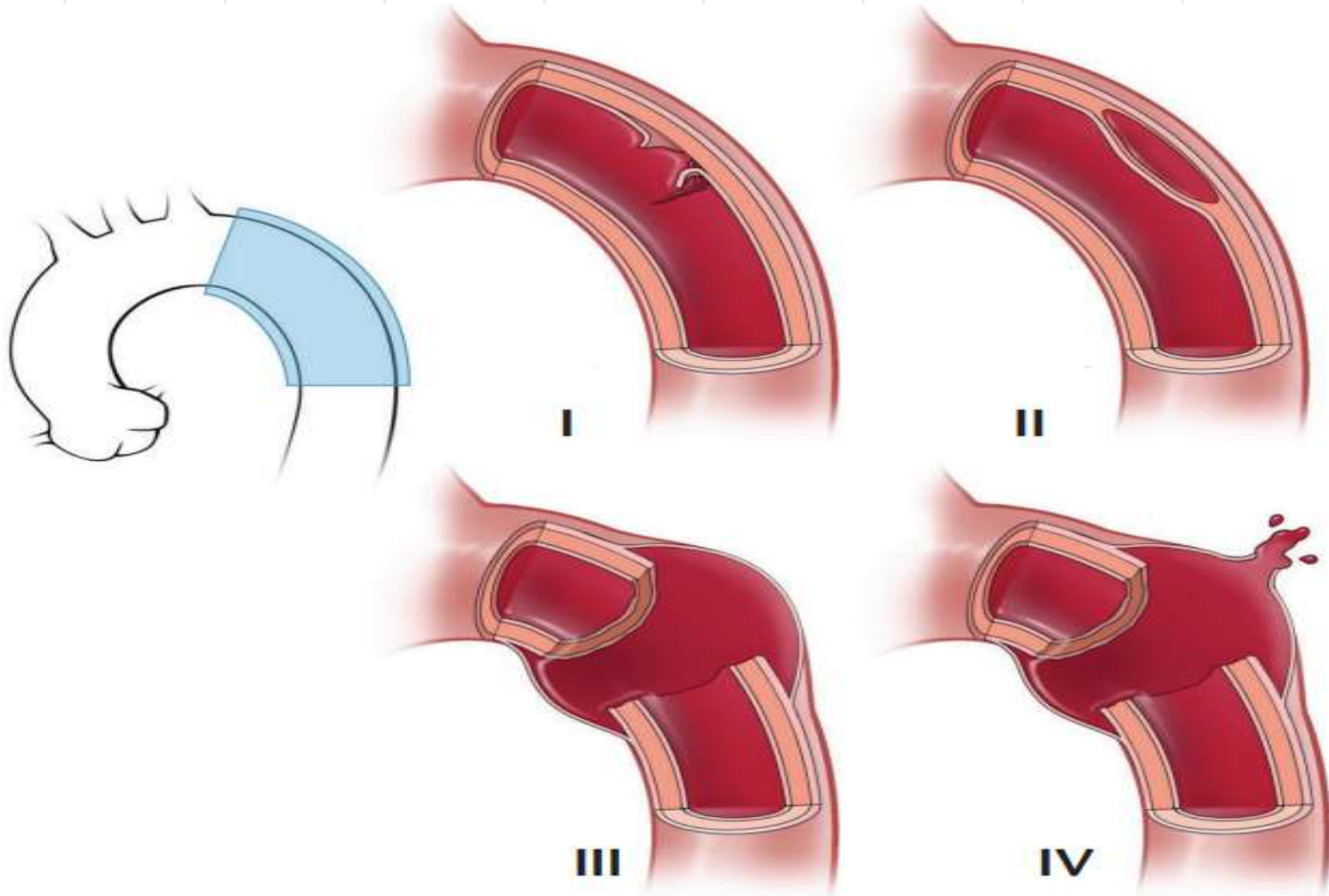


The NEW ENGLAND  
JOURNAL of MEDICINE



***Do you know the  
classification?***

Blunt thoracic aortic injury classification: grade I (intimal tear/ flap), grade II (intramural hematoma), grade III (pseudoaneurysm), and grade IV (rupture)





***According to the  
classification, what kind of  
treatment?***

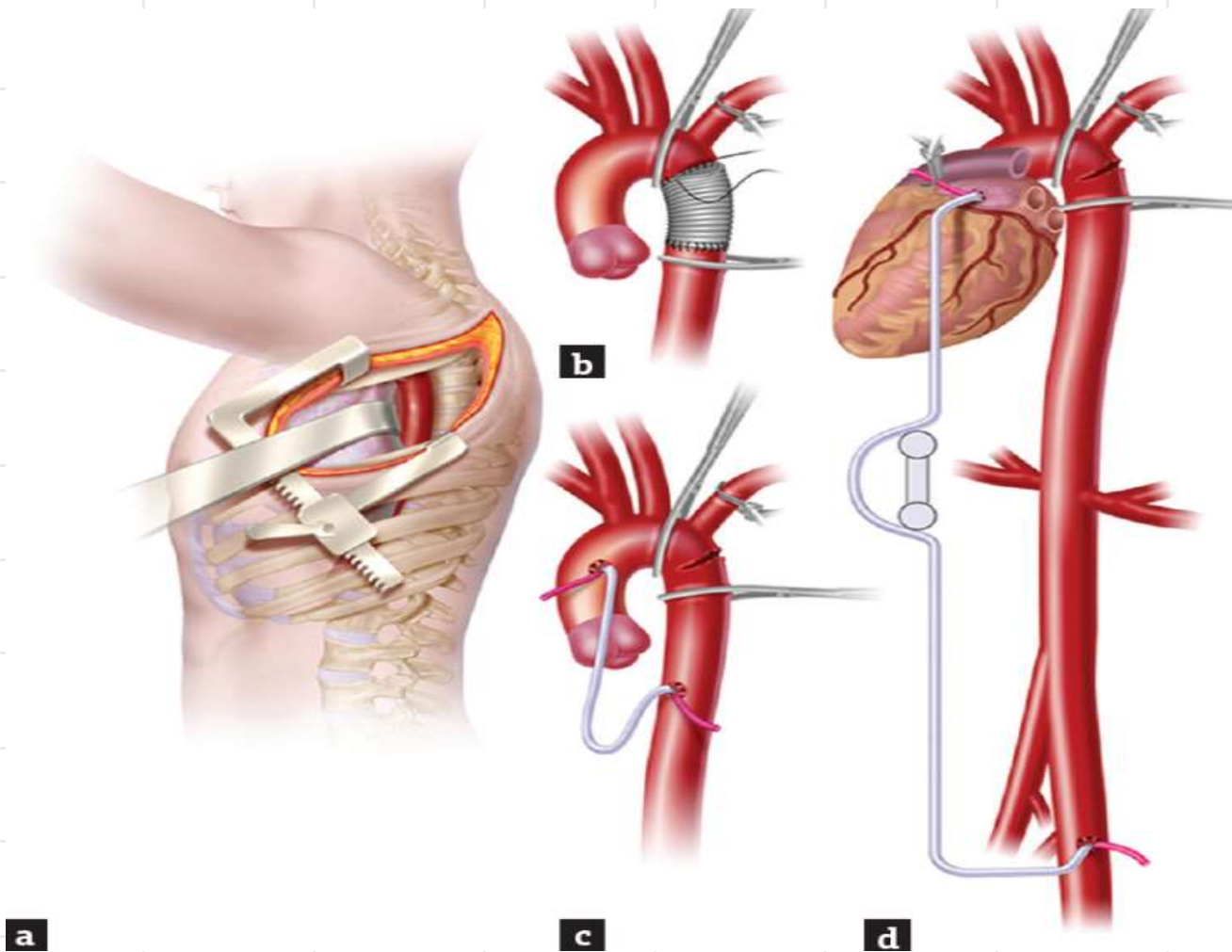




Traumatic aortic injury grade	Management therapy recommended
Grade I	Medical therapy
Grade II	Medical therapy / TEVAR
Grade III	TEVAR/Open surgery repair
Grade IV	TEVAR/Open surgery repair



Open repair :(a) Fifth interspace posterolateral thoracotomy. (b) "Clamp-and-sew" with interposition graft rapidly sutured between proximal and distal clamps. (c) "Passive" bypass with blood from the arch perfused into the distal aorta through a shunt. (d) "Active" bypass with blood from the left atrium is circulated through a roller pump and perfused into the femoral artery through a retrograde catheter





## Few words about open repair:

8 to 13% of death

90% of morbidity-mortality due to associated lesions

Heparin therapy, selective bronchial intubation

Interest for delayed surgery:

Management of associated lesions

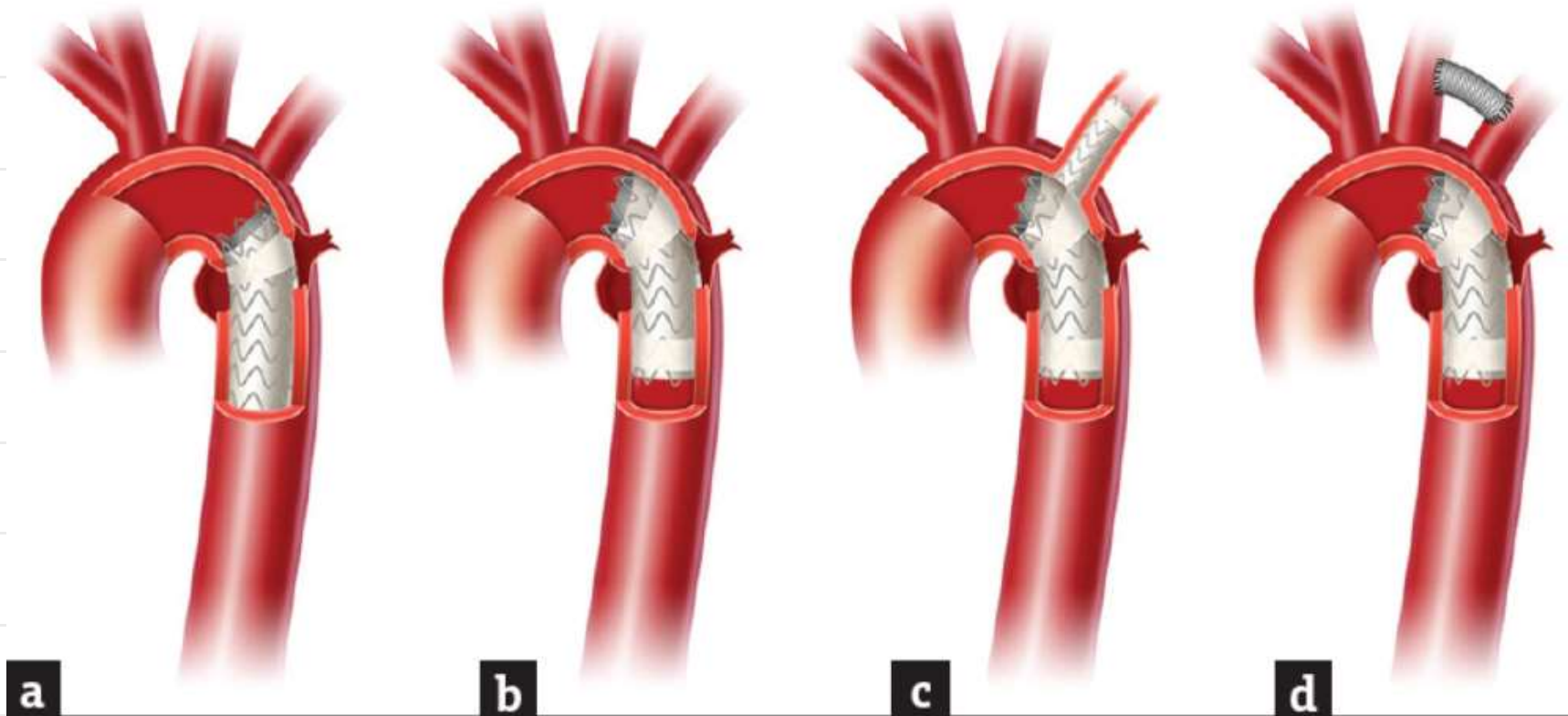
Controlled hypotension

CT follow up

Jonker FH, Giacobelli JK, Muhs BE, Sosa JA, Indes JE. Trends and outcomes of endovascular and open treatment for traumatic thoracic aortic injury. *J Vasc Surg.* 2010;51(3):565-71.

Tefera G. Traumatic thoracic aortic injury and ruptures. *J Vasc Surg.* 2010;52(4 Suppl):41S-4S  
Traumatic thoracic aortic injury and ruptures.

TEVAR : (a) Ideal configuration with a short stent-graft and left subclavian artery preserved. (b) Insufficient proximal "landing-zone," the stent-graft covers the left subclavian artery. (c) The left subclavian artery requires preservation, specialist branch grafts now exist (d) Carotid-subclavian bypass to revascularize the left subclavian artery





# Place for medical therapy

**Nonoperative management rather than endovascular repair may be safe for grade II blunt traumatic aortic injuries: An 11-year retrospective analysis.**

Spencer SM, Safcsak K, Smith CP, Cheatham ML, Bhullar IS.

*J Trauma Acute Care Surg.* 2018 Jan;84(1):133-8.

doi: 10.1097/TA.0000000000001630.

Orlando, 2004 to 2015

105 aortic injury with 30 grade 1 et 2

14 TEVAR and 16 NOM, no significative difference observed



# Place for medical therapy (2)

**Determinants and outcomes of nonoperative management for blunt traumatic aortic injuries.**

Sandhu HK, Leonard SD, Perlick A, Saqib NU, Miller CC, Charlton-Ouw KM, Safi HJ, Azizzadeh A.

*J Vasc Surg.* 2018 Feb;67(2):389-98.

doi: 10.1016/j.jvs.2017.07.111.

Houston, 1999 to 2015

67 aortic injuries: NOM: 54% I, 46% II et 4% III

19 excluded (2 grade III and 17 death)

Healing of the aorta occurring in 39 days grade I and in 62 days grade II





# Place for medical therapy (3)

## **Nonoperative management of grade III blunt thoracic aortic injuries.**

Gandhi SS, Blas JV, Lee S, Eidt JF, Carsten CG.

*J Vasc Surg.* 2016 Dec;64(6):1580-6.

doi: 10.1016/j.jvs.2016.05.070. Epub 2016 Jul 25.

### Abstract

#### OBJECTIVE:

Blunt thoracic aortic injuries (BTAIs) have historically been treated with open surgery; thoracic endovascular aortic repair (TEVAR), however, is rapidly becoming the standard of care for all grades of injury. Previous studies have shown successful, conservative management of low-grade (I and II) BTAI, but limited literature exists regarding nonoperative management (NOM) for high-grade BTAI. The purpose of this study was to evaluate NOM for grade III BTAI compared with TEVAR.

#### CONCLUSIONS:

The natural history of grade III BTAIs is not well described. This study suggests that observation and NOM of grade III BTAI may be a reasonable therapeutic option **in selected patients**. It also speaks to the need for further delineation of the natural history of this injury. Serial imaging and long-term follow-up are necessary to monitor the progression of the pseudoaneurysm



## Mortality and morbidity by procedure

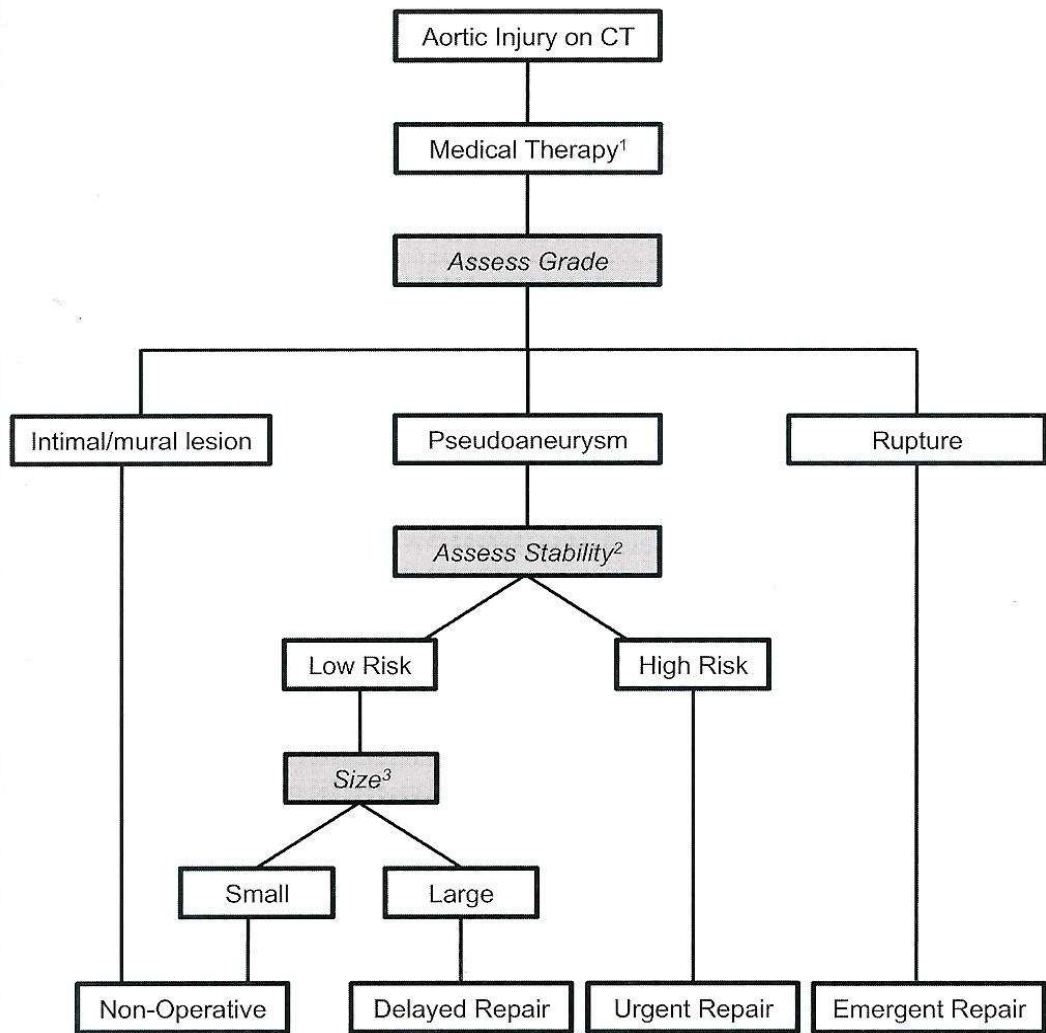
Total = 145	Open (AXC) N = 29	Open (DAP) N = 77	TEVAR N = 69	<u>P value</u>
<u>Paraplegia</u>	3 (10%)	0 (0%)	0 (0%)	NS
<u>Stroke</u>	1 (3%)	0 (0%)	2 (3%)	NS
<u>Mortality</u>	9 (31%)	11 (14%)	3 (4%)	NS

*J Thorac Cardiovasc Surg.* 2013 Mar;145(3 Suppl):S154-8. doi: 10.1016/j.jtcvs.2012.11.074.

Update on blunt thoracic aortic injury: fifteen-year single-institution experience.

Estrera AL, Miller CC, Guajardo-Salinas G, Coogan S, Charlton-Ouw K, Safi HJ, Azizzadeh A.





*Evolution of lesion-specific management of blunt thoracic aortic injury.*

*J Vasc Surg. 2016 Aug;64(2):500-505.*

*doi: 10.1016/j.jvs.2015.12.066.*

*Harris DG, Rabin J, Starnes BW, Khoynzhad A, Conway RG, Taylor BS, Toursavadkahi S, Crawford RS.*

Table II. Risk factors associated with traumatic aortic pseudoaneurysm instability

<i>Study</i>	<i>Risk factors</i>		
	<i>Admission physiology</i>	<i>Pseudoaneurysm size</i>	<i>Mediastinal hematoma</i>
Starnes et al <sup>17</sup>	SBP <90 mm Hg	N/A	>15 mm at the aortic arch
Rabin et al <sup>35</sup>	N/A	≥50% aortic circumference	Hematoma with mass effect, aortic pseudocoarctation, or left hemothorax
Harris et al <sup>39</sup>	Lactate >4 mM	>1.4 × normal aortic diameter	>10 mm at posterior descending aorta

N/A, Not applicable; SBP, systolic blood pressure.

### *Evolution of lesion-specific management of blunt thoracic aortic injury.*

*J Vasc Surg.* 2016 Aug;64(2):500-505.

doi: 10.1016/j.jvs.2015.12.066.

Harris DG, Rabin J, Starnes BW, Khoynezhad A, Conway RG, Taylor BS, Toursavadkahi S, Crawford RS.



**Traumatic thoracic aortic injury and ruptures.**

Tefera G.

*J Vasc Surg.* 2010 Oct;52(4 Suppl):41S-4S.

doi: 10.1016/j.jvs.2010.06.142.

„TEVAR is clearly becoming the treatment of choice in patients with descending thoracic aorta injury (DTAI)..... Those patients with DTAI have multiple other life threatening injuries or elderly trauma patients with an increased cardiovascular risk can benefit the most..... Long-term follow-up of those patients is critical to assess and treat failures.“



# Our experience at CHU of Liège

\*Patients admitted between 2002 - 2021 for aortic isthmus rupture due to blunt injury

\*Lesions categorized in four grades

\*All types of treatment were included in this study:

-Conservative attitude

-Open surgery

-Endovascular procedure.



# Our results:

62 patients :14 females - 48 males

Aortic isthmus lesion due to blunt injury

Mean age: 46,9 years.

Major cause : moto or car crash.

Grade 1 (19)

Grade 2 (23)

Grade 3(8)

Grade 4 (12)



# Associated injuries:

Type of <u>injury</u>	%
<u>thoracic</u>	80
<u>limb</u>	30
<u>pelvic</u>	26
<u>spine</u>	26
abdominal	21
<u>cranial</u>	9



	<u>Non operative management</u>	<u>Open repair surgery</u>	TEVAR
grade I	14	3	2
grade II	3	10	8
grade III	4	6	2
grade IV	5	1	4





\*5 patients died before management of the aortic lesion

\*21 ruptures were treated conservatively (without complication related to the aortic lesion)

\*36 were operated on:

-20=> open surgery

-9=>thoracic endovascular aortic repair

-7=>hybrid procedure combining carotido-subclavian bypass and thoracic endovascular aortic repair.



# Open surgery complications:

1 paraplegia (no distal perfusion during surgery) and 1 paraparesia


1 acute lower limb ischemia

2 recurrent nerve palsy

1 respiratory failure

1 acute kidney injury

1 critical illness polyneuropathy



2 patients treated conservatively died from other associated lesions.

Endovascular treatment was *not associated with mortality and spinal cord injury.*

Mean hospital stay was 47 days.

Median follow-up was 59 months.



## In conclusion:

In our experience, endovascular repair of aortic isthmus rupture is safer than surgical treatment.

It can be performed with delay.

If surgery is performed, it has to be done with distal perfusion to prevent spinal cord injury.

Long-term results of endovascular approach are not known



[www.escvs2022.com](http://www.escvs2022.com)

**70<sup>TH</sup> ESCVS  
CONGRESS & 7<sup>TH</sup>  
IMAD MEETING**  
REGISTER NOW

**20 | 23 JUNE 2022**

Liège | Théâtre de Liège | Belgium

**LOCAL ORGANIZING COMMITTEE**  
Natzi Sakalihan, CHU Liège, Belgium  
Jean-Olivier Defraigne, CHU Liège, Belgium  
ESCVS 2022 Congress Presidents

 **70th ESCVS**  
International Congress of the European Society  
for Cardiovascular and Endovascular Surgery

 **7<sup>TH</sup> IMAD meeting**

Thank you  
for your  
attention!