# Morphology of True Lumen & Outcomes After Central Repair for Type A Aortic Dissection


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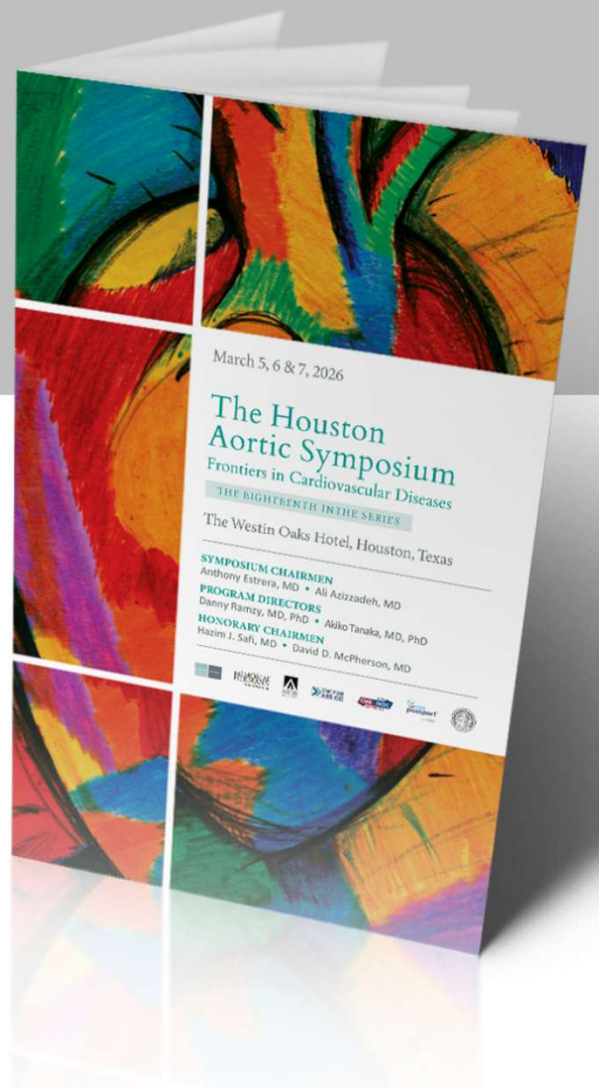


No Disclosures

# Type A Dissection with Malperfusion

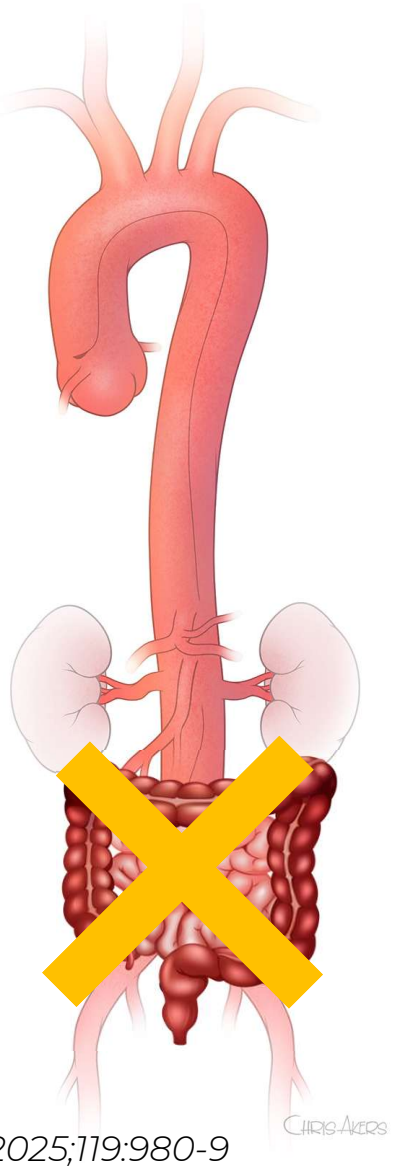
- STS database 2017-2020
- Malperfusion: 2748 of 9953 (27.7%)

  Limb>Renal>Cerebral>Visceral>Coronary
- Mortality

  With malperfusion 26.8%

  Coronary OR 2.28

  Mesenteric OR 1.82



*Goel NJ. Ann Thorac Surg 2025;119:980-9*

# Need for Limb Revascularization in Type A AD

Need for Limb Revascularization in Patients with Acute Aortic Dissection is Associated with Mesenteric Ischemia

UTHealth Experience (2000-2014)

- 68 limb malperfusion
- Need for limb revascularization was associated with mesenteric ischemia (OR 2.3)
- 14 (20%) required revascularization after central repair

*Charlton-Ouw KM. Ann Vasc Surg 2016; 36: 112–120*

# Does FET Reduce Need for Revascularization?

Preventza et al

Acquired Cardiovascular Disease

**Acute type I aortic dissection: Traditional versus hybrid repair with antegrade stent delivery to the descending thoracic aorta**

Ourania Preventza, MD,[a,b] Roberto Cervera, MD,[a,b] Denton A. Cooley, MD,[a] Faisal G. Bakaeen, MD,[b,c] Ahmed S. Mohamed, MD,[b] Benjamin Y. C. Cheong, MD,[d] Lorraine Cornwell, MD,[b,c] Katherine H. Simpson, MS,[b] and Joseph S. Coselli, MD[a,b]

**Objective:** We compared the short-term outcomes between patients who had undergone classic repair for type I aortic dissection and those who had undergone concomitant antegrade stenting in the descending thoracic aorta.

**Methods:** From January 2005 to December 2012, 112 patients were treated for acute type I aortic dissection. Eighty-seven patients (group A) underwent traditional operations on the ascending and proximal arch (n = 79, 90.8%), total arch (n = 7, 8.1%), or ascending aorta (n = 1, 1.2%). Twenty-five patients (group B) underwent ascending and proximal arch repair and antegrade stent grafting in the descending thoracic aorta. Various concomitant procedures were performed in both groups. The circulatory arrest times were similar between the 2 groups.

**Results:** The 30-day mortality was 13.8% (n = 12) in group A and 12% (n = 3) in group B. Nine patients in group A (10.3%) and 3 in group B (12%) experienced a postoperative stroke. In group A, 1 patients (1.5%) developed transient spinal cord ischemia, and in group B, 2 patients had transient paraparesis (8.0%). Preoperatively, 24 group A patients and 19 group B patients had malperfusion; this condition resolved postoperatively in 13 group A patients (54.2%) and 16 group B patients (84.2%; $P < .037$). Eight group A patients (10.8%) and 1 group B patient (4.5%) underwent additional postoperative procedures on the thoracoabdominal aorta a median of 776.5 days (range, 168.5-1102.0) and 54 days postoperatively, respectively.

**Conclusions:** Antegrade endovascular grafting of the descending thoracic aorta during repair of acute type I aortic dissection is technically safe, does not increase the circulatory arrest time, and could help patients with preoperative malperfusion. Long-term follow-up data are needed. (J Thorac Cardiovasc Surg 2014;148:119-25)

ACD

The traditional approach for treating acute type I aortic dissection consists of emergent ascending aortic replacement with open distal anastomosis with or without aortic valve or aortic root repair or replacement. Surgical treatment focuses on the ascending aorta, not the remaining dissection in the thoracoabdominal aorta. The remaining diseased portion of the aorta is managed medically. Patency of the false lumen, the extent of dissection, a more distally extended false lumen at the initial presentation, and a connective tissue disorder have been considered significant factors for aneurysmal dilatation of the descending aorta; these factors also affect the possible need for reoperation and the development of fatal rupture.[1-4] During the past decade, emerging endovascular technology has given physicians new options, including extending the traditional primary open repair of acute type I aortic dissection to include the proximal descending aorta.

In complicated acute type B or DeBakey acute type III aortic dissection, endovascular grafts are used to cover the proximal entry tear, reduce pressurization of the false lumen, treat malperfusion, and induce favorable aortic remodeling, with promising results.[5,6] Despite the availability of this treatment and others, predicting the course of thoracoabdominal aortic dissection in a given patient remains challenging. In an effort to address this issue, we evaluated antegrade stent grafting of the descending thoracic aorta (DTA) during the surgical repair of acute type I aortic dissection. We compared this hybrid procedure's intraoperative and short-term outcomes with those of traditional repair alone. Furthermore, we assessed the fate of the descending and abdominal aorta and the fate of their false lumen.

## METHODS

Data were obtained from a prospectively maintained database and verified from the hospital records. The institutional review board approved the present study.

From the Departments of Cardiovascular Surgery[a] and Radiology,[d] Texas Heart Institute; Division of Cardiothoracic Surgery,[b] Michael E. DeBakey Department of Surgery, Baylor College of Medicine; and Michael E. DeBakey Veterans Affairs Medical Center,[c] Houston, Tex.

Disclosures: W. L. Gore & Associates, Inc. has provided travel expenses for Dr Preventza in the past. Dr Coselli was provided program support by, and was a clinical trial consultant for, W. L. Gore & Associates, Inc. All other authors have nothing to disclose with regard to commercial support.

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Baylor 2005-2012

- Conventional (Group A) vs. antegrade stent grafting (Group B)
- Malperfusion resolution

Group A (13 of 24) 54.3%

Group B (16 of 19) 84.2%

p=0.037

*Preventza. JTCVS 2014; 148: 119–25*

# Does FET Reduce Need for Revascularization?

Adult: Aorta

Nissen et al

Acute type A dissection with iliofemoral or renal malperfusion: Is frozen elephant trunk necessary?

Alexander P. Nissen, MD,[a] Ross Michael Reul, MD,[a] Muhammad Naeem, MD,[b] Jonathan R. Zurcher, MD,[a] Woodrow J. Farrington, MD,[a] William Brent Keeling, MD,[a] and Bradley G. Leshnower, MD[a]

ABSTRACT

**Background:** Frozen elephant trunk (FET) is being increasingly used for acute type A aortic dissection (ATAAD) with distal malperfusion. The efficacy of adding a stent graft remains unclear, however. This study investigated the efficacy of adding FET to conventional arch repair when treating ATAAD with iliofemoral or renal malperfusion.

**Methods:** A review of the Emory Aortic Database identified 969 patients with acute DeBakey 1 dissection from 2004 to February 2025. One hundred fifty-three patients with iliofemoral and/or renal malperfusion underwent emergent central aortic repair alone (conventional group; n = 102) or central repair plus FET (FET group; n = 51). Univariate statistics were used to compare the 2 groups. Multivariable logistic regression was used to examine factors associated with post-operative limb revascularization and new renal failure. Selection bias was addressed through inverse-probability treatment weighting adjustment.

**Results:** Age and preoperative comorbidities were equivalent in the 2 groups. Limb ischemia requiring revascularization (17.6% for conventional vs 15.7% for FET; $P = .856$), or new dialysis (21.6% for conventional vs 17.6% for FET; $P = .547$) also was similar between the groups. Multivariable regression did not identify FET as independently associated with a reduced need for limb revascularization in iliofemoral malperfusion patients (odds ratio [OR], 1.334; 95% confidence interval [CI], 0.434-4.098; $P = .614$) or with avoiding dialysis in renal malperfusion patients (OR, 1.166; 95% CI, 0.252-5.382; $P = .844$). Mid-term survival (71.1% vs 75.5% for FET; log-rank $P = .753$) and distal reintervention-free survival (64.9% for conventional vs 69.4% for FET; log-rank $P = .902$) were equivalent.

**Conclusions:** The addition of FET to conventional repair did not impact limb revascularization, new dialysis, or mid-term reintervention or improve mid-term survival in ATAAD with iliofemoral or renal malperfusion. (J Thorac Cardiovasc Surg 2026;171:366-73)

Equivalent postoperative limb revascularization and new renal failure after FET.

CENTRAL MESSAGE
The use of frozen elephant trunk during acute type A dissection repair with iliofemoral or renal malperfusion does not reduce the need for limb revascularization or new dialysis.

PERSPECTIVE
We find similar rates of malperfusion resolution, overall and reintervention-free survival when treating acute type A dissection with iliofemoral or renal malperfusion using conventional repair versus frozen elephant trunk.

Acute type A aortic dissection (ATAAD) with malperfusion remains a lethal diagnosis.[1] Malperfusion results in reported mortality rates of 30% to 43%.[2-4] The most common vascular territories affected are iliofemoral and renal, and survivors may suffer consequences of limb and/or renal ischemia despite resolution of the malperfusion, with an attendant reduction in long-term survival.[5] In an effort to resolve distal malperfusion, reduce reintervention rates, and improve survival, hybrid arch procedures have been developed that combine hemiarch, subtotal arch, or total arch replacement with antegrade deployment of a stent graft into the descending aorta at the time of circulatory arrest via the open aortic arch as a frozen elephant trunk (FET).[6-8] Over the past decade, these procedures have

Scanning this QR code will take you to the table of contents to access supplementary information.

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Emory Aortic Databse (2004-2025)

- 153 iliofemoral/renal malperfusion
- Central aortic repair +/- FET
- Need for revascularization

FET- (N=102) 17.6%

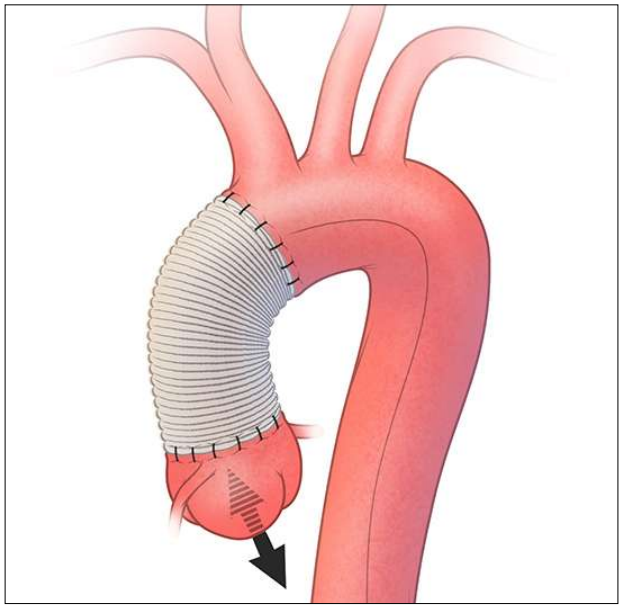
FET+ (N=51) 15.7%

p=0.856

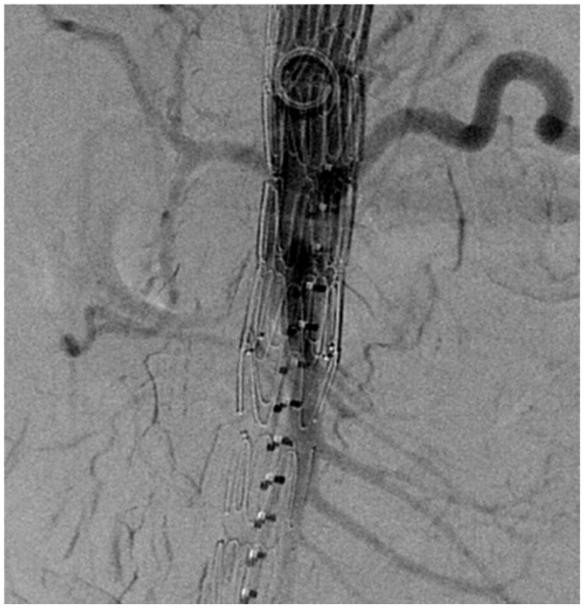
*Nissen AP. JTCVS 2026; 171: 366–73*

# Strategies for Malperfusion

**Central Repair**



**Peripheral Repair**



***When can central repair alone fix the malperfusion?***

# EACTS/STS Guidelines for diagnosing and treating acute and chronic syndromes of the aortic organ

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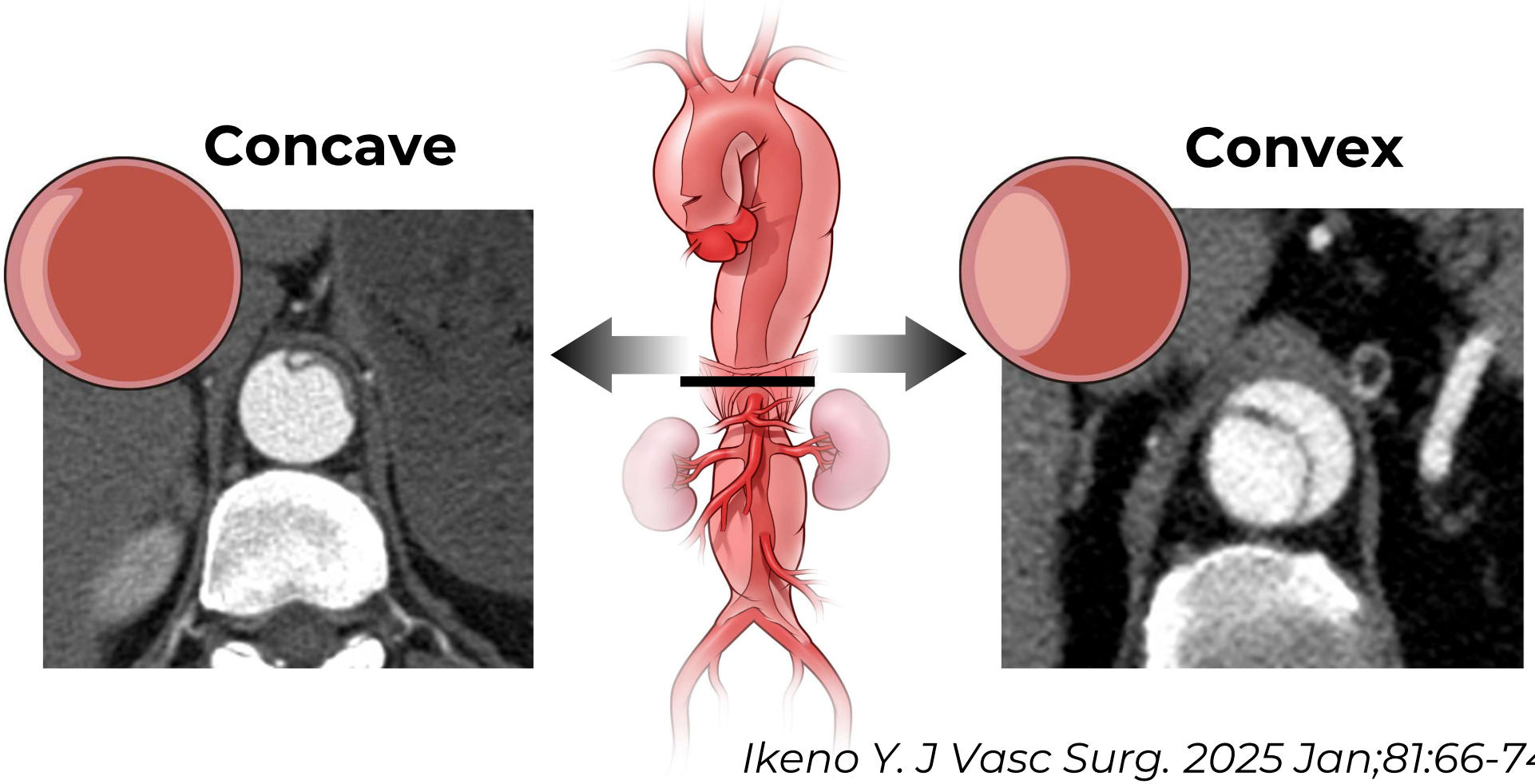
| | | |
|---|---|---|
| **In case of clinical and imaging evidence of visceral malperfusion, revascularization may be considered prior to aortic repair** | **IIb** | **C** |

# Morphological Classification




*Ikeno Y. J Vasc Surg. 2025 Jan;81:66-74*

# Patients and Methods

(2008 - 2023)

Acute type A repair

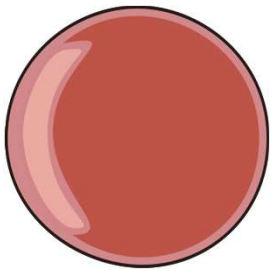
**543** pts

**263** pts

**Inclusion Criteria:**

- Central repair first
- Dissection extending beyond zone 7 (SMA)
- Available CT images

**Concave**

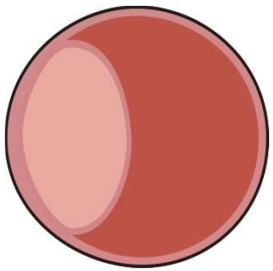


**78** pts

(30%)

<

**Convex**

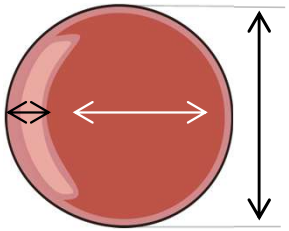


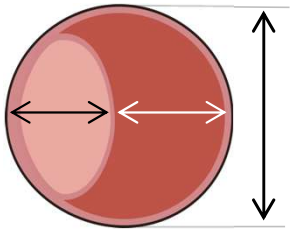
**185** pts

(70%)

# Aortic Diameter

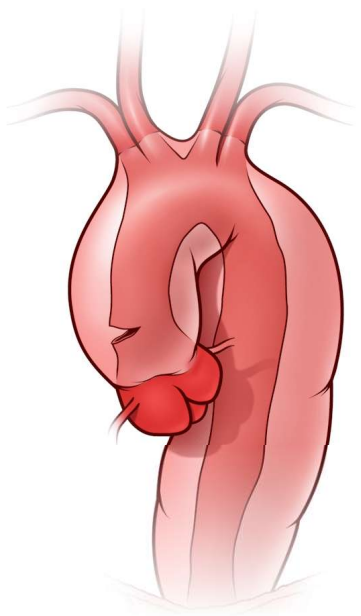
**Concave** shape showed smaller aortic diameter and less thrombosed FL

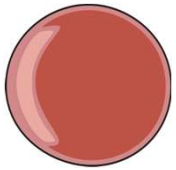
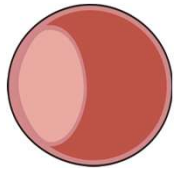




| | | | P Value |
|---|---|---|---|
| **TL diameter (mm)** | **6.0** ±4.2 | **15.6** ±6.2 | <0.001 |
| **FL diameter (mm)** | **22.8** ±4.6 | **15.3** ±5.8 | <0.001 |
| **Diameter (mm)** | **28.1** ±3.6 | **30.0** ±4.6 | 0.002 |
| **Thrombosed FL** | 5 % | 29 % | <0.001 |

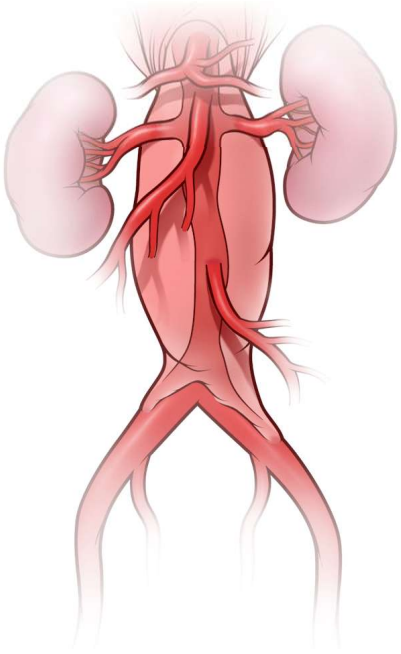
# Incidence of Upper Body Malperfusion

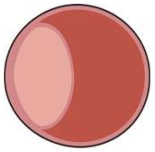


| |  |  | P Value |
|---|---|---|---|
| **Cerebral malperfusion** | 23 % | 18 % | 0.387 |
| **Coronary malperfusion** | 9 % | 4 % | 0.153 |

Morphologies did **not** affect upper body malperfusion

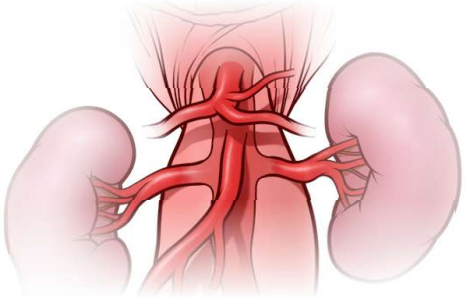
# Incidence of Malperfusion



| |  |  | P Value |
|---|---|---|---|
| **Visceral** | 41 % | 5 % | <0.001 |
| **Renal** | 53 % | 18 % | <0.001 |
| **Lower extremity** | 51 % | 16 % | <0.001 |
| **Any malperfusion** | 78 % | 39 % | <0.001 |
| **Lactic acid** | 3.3 ±2.5 | 2.5 ±2.1 | 0.035 |

Concave pattern was associated with **lower body** malperfusion

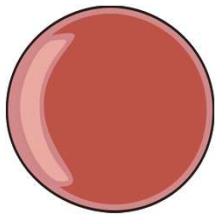
# Subgroup Analysis - SMA



## SMA Malperfusion

**42** pts

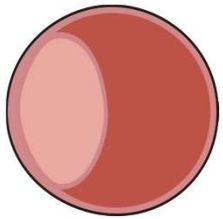
(42 / 263, **16%**)



### Concave

**32** pts

(32 / 78, **41%**)



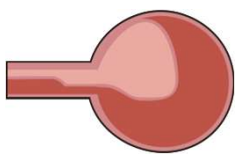
### Convex

**10** pts

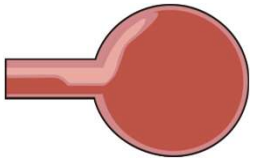
(10 / 185, **5%**)

# Mode of SMA Malperfusion

## Static obstruction

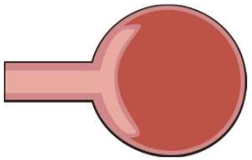


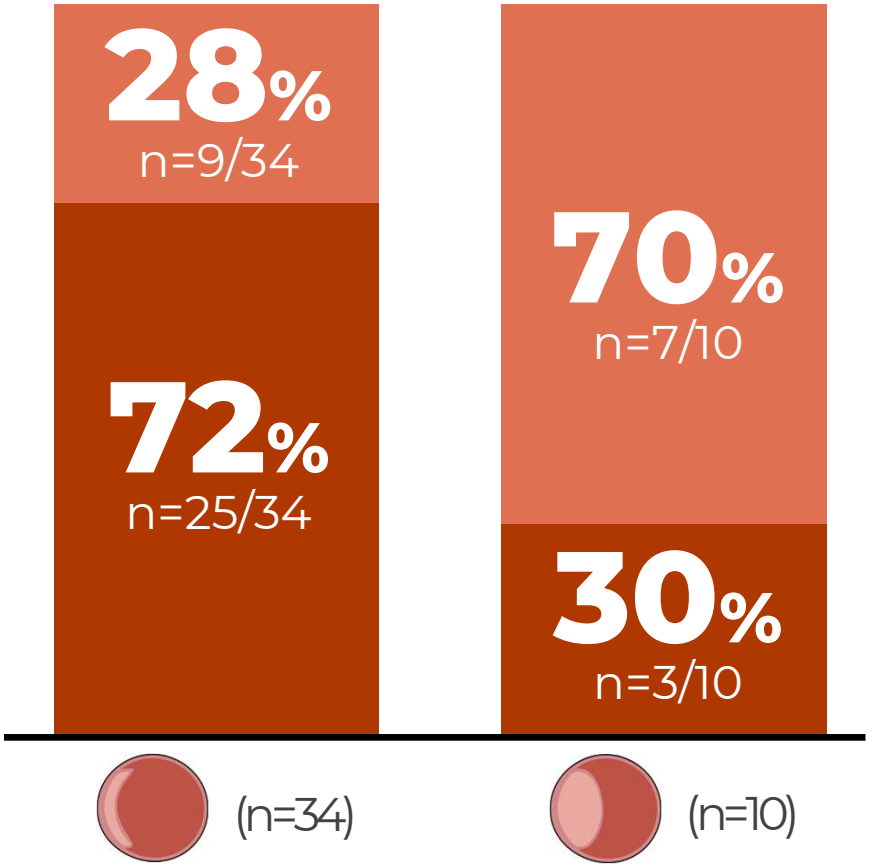
Static



Static + Dynamic

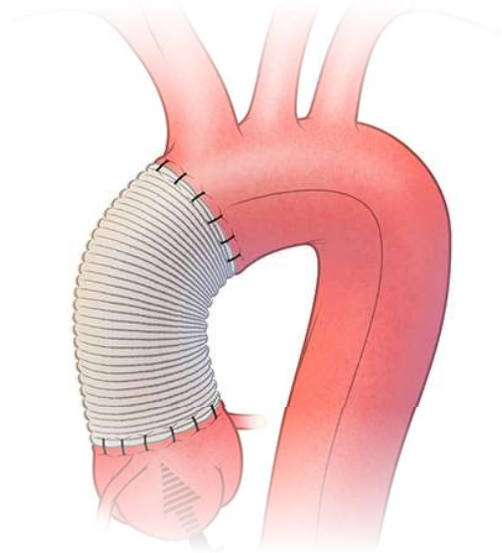
## Dynamic obstruction

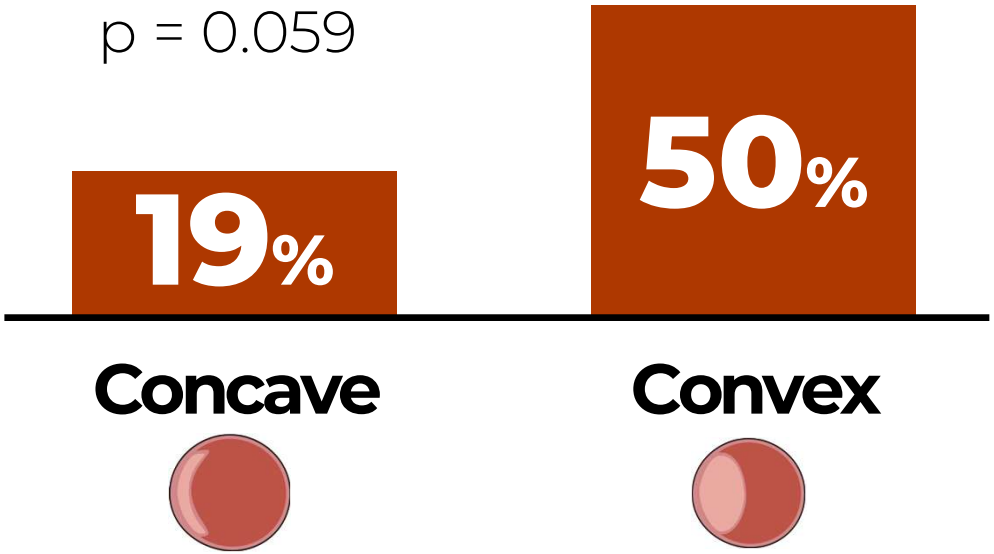




# Operative Mortality in SMA Malperfusion

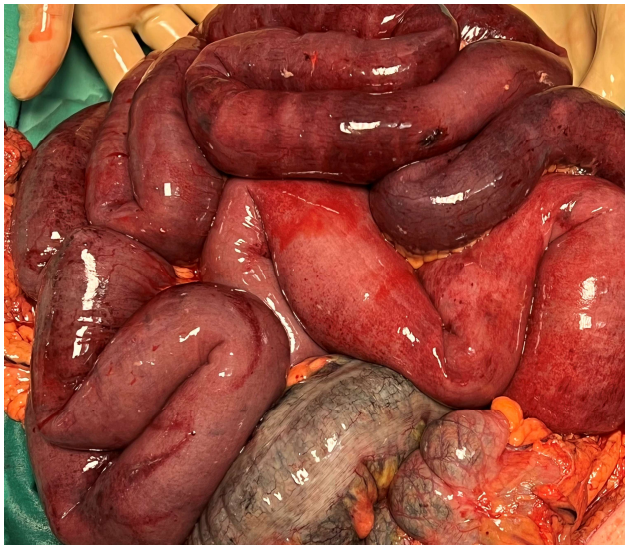
higher in the **convex** group

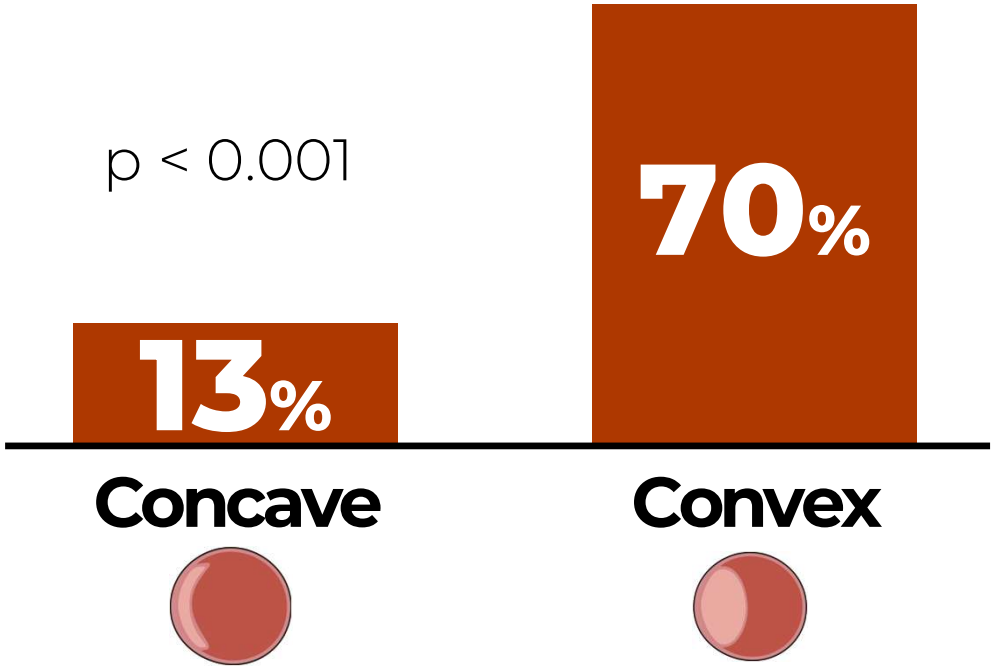




# Bowel Resection in SMA Malperfusion

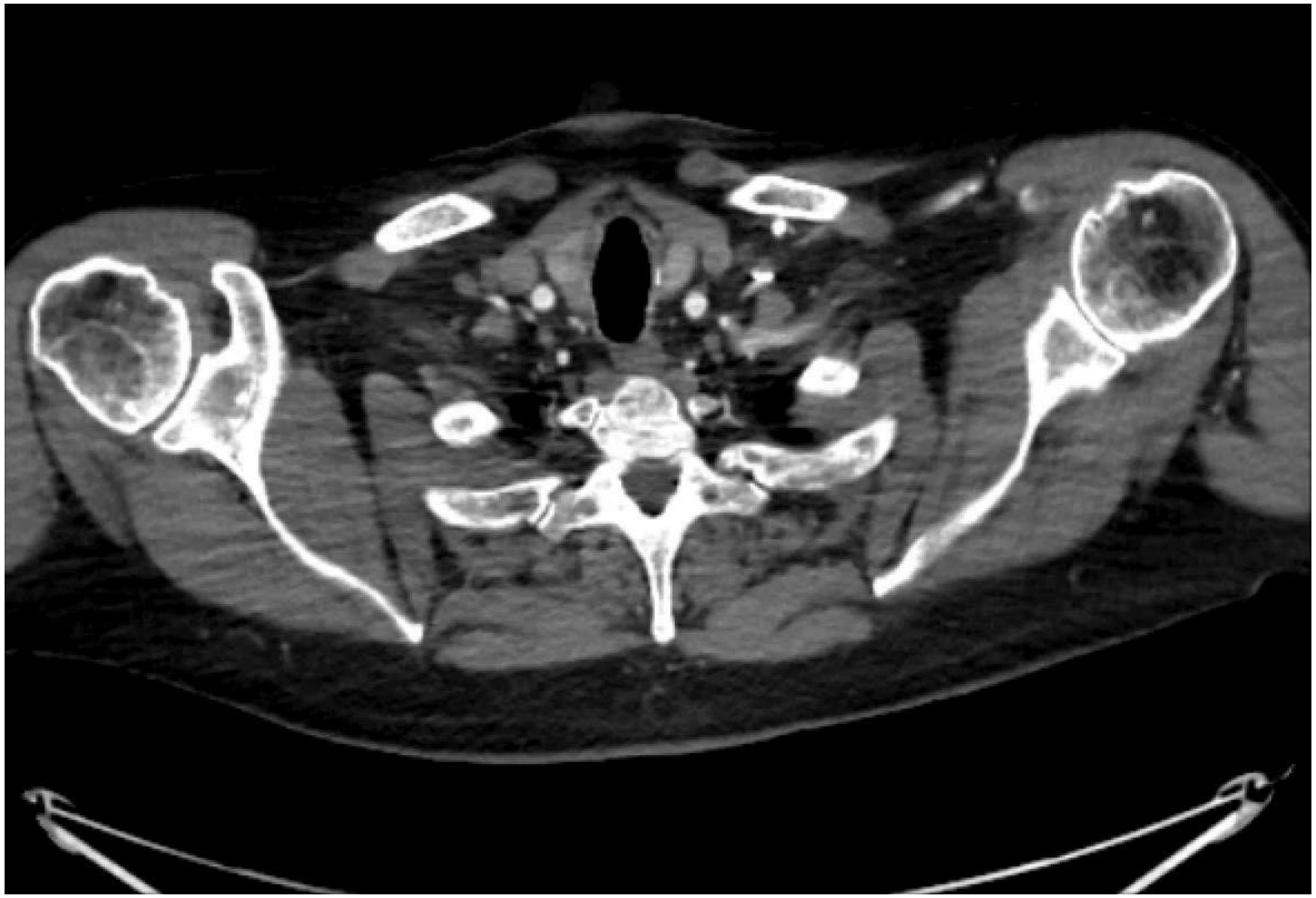
More frequent in the **convex** group





# CASE

# 48-year-old M, Acute onset chest pain



- Abdomen: tenderness+, no rebound
- Pulses: Absent left femoral, absent bilateral DP/PTs
- RLE motor+, sensory -; LLE motor decreased, sensory -
- WBC 10, Lactic acid 9
- TEE: Severe AI
- Bedside Ultrasound
  - Left CFA: no flow, compressible
  - Right CFA: + flow
  - Right SFA: no flow, noncompressible

# Procedures

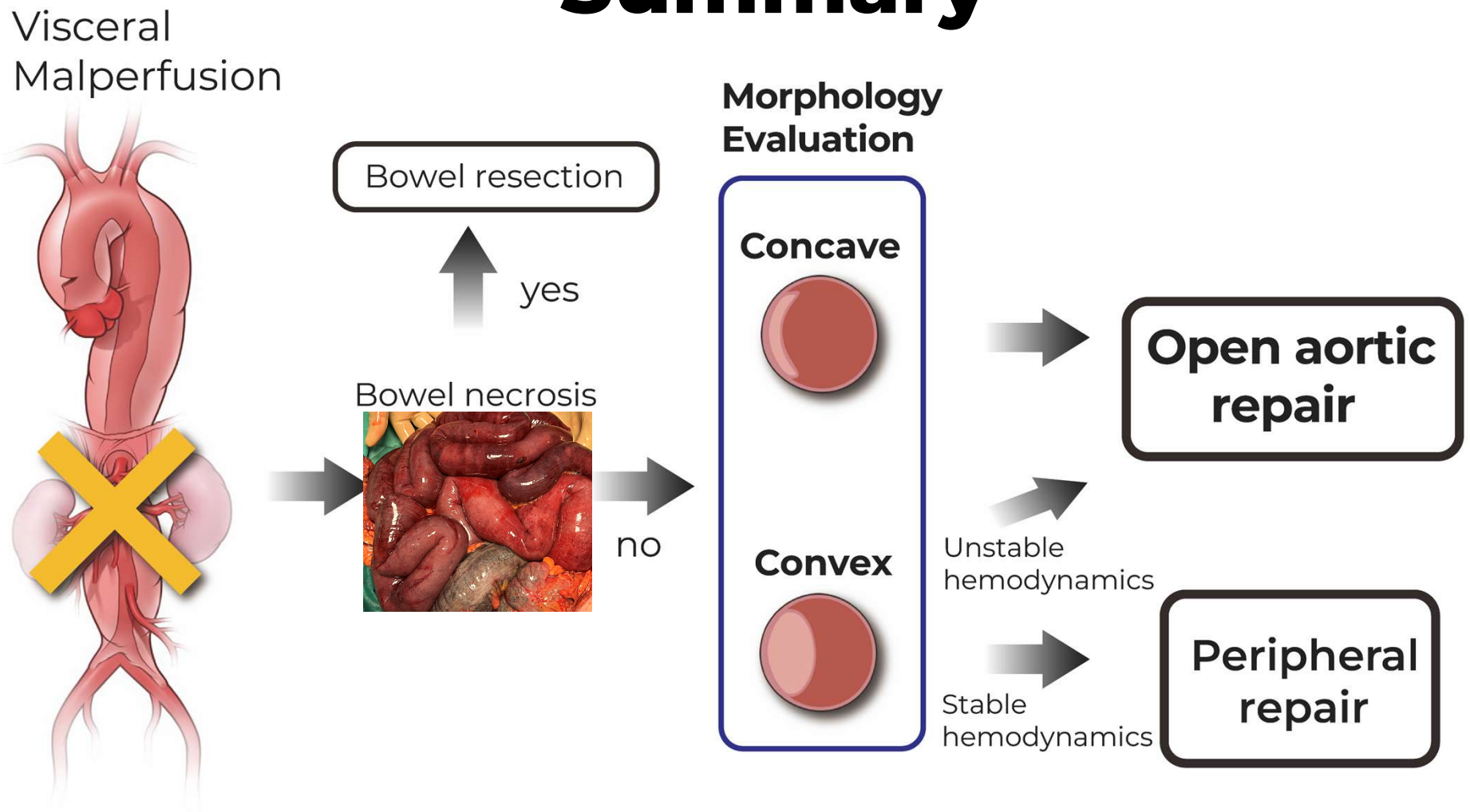
- Hemiarch + partial root replacement
- Open thrombectomy BLE
- Right to left femoro-femoral bypass
- Angiogram
  - RLE three vessel runoff, LLE AT+peroneal runoff
- Left lower extremity 4 compartment fasciotomies
  - Gastrocnemius muscle marginal viability
- Ex-lap, ABTHERA VAC closure
  - bowels all viable
- Intraoperative CRRT

# Postop Course

- POD#1 Second look + abdominal closure
- LLE fasciotomies closed after debridement
- POD#20 weaned off RRT
- POD#35 discharged to SNF

- POD#50 bilateral TMA

# Summary


Visceral Malperfusion
Bowel resection
yes
Bowel necrosis
no
Morphology Evaluation
Concave
Convex
Unstable hemodynamics
Stable hemodynamics
Open aortic repair
Peripheral repair

# Conclusions

The morphology evaluation of the true lumen at the diaphragm level may be beneficial for planning approach for acute type A dissection with visceral malperfusion.

# Thank You!


Department of
Cardiothoracic &
Vascular Surgery

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McGovern Medical School

UTH_CVSurgery
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https://med.uth.edu/cvs/