Transcatheter Electrosurgical Septotomy (TES) in Chronic Aortic Dissections:

Indications, Technique and Results

Naveed U Saqib, MD FACS

Professor & Program Director

Department of Cardiothoracic and Vascular Surgery
UTHealth Houston / McGovern Medical School
The University of Texas Health Science Center at Houston

Department of Cardiothoracic & Vascular Surgery | UTHealth Houston McGovern Medical School | Memorial Hermann Heart & Vascular Institute Texas Medical Center

Background

Endovascular Repair for post dissection aneurysms

- Lower morbidity and mortality compared to open surgical repair

- Challenges
  - Inability to seal across dissected segments
  - Rigid lamella
  - Compressed true lumen
  - Vessel origin from false lumen
  - Multiple reentrances

- Partial false lumen thrombosis with persistent flow is associated with progressive aneurysm enlargement and decreased survival[1]

[1] ***Tsai*** *et al. N Eng J Med 2007*

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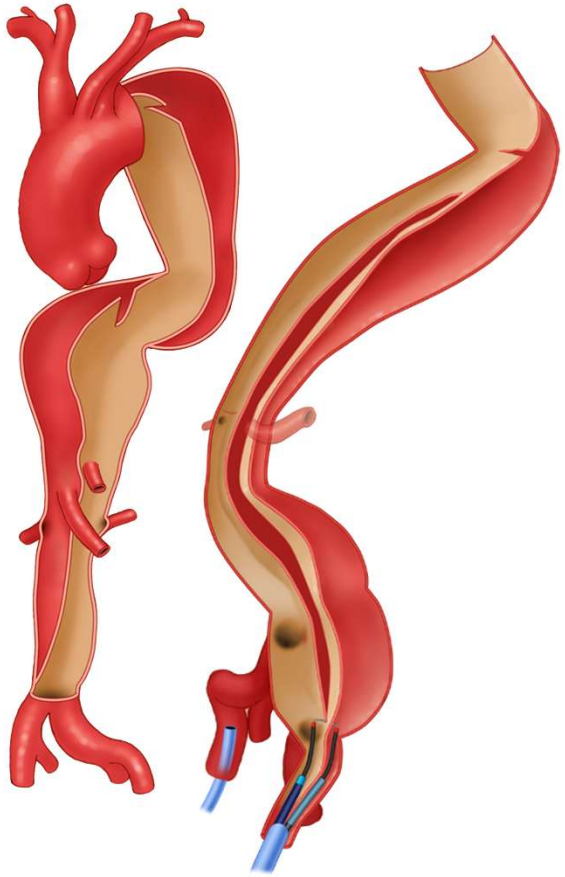
- Partial false lumen thrombosis with persistent flow is associated with progressive aneurysm enlargement and decreased survival

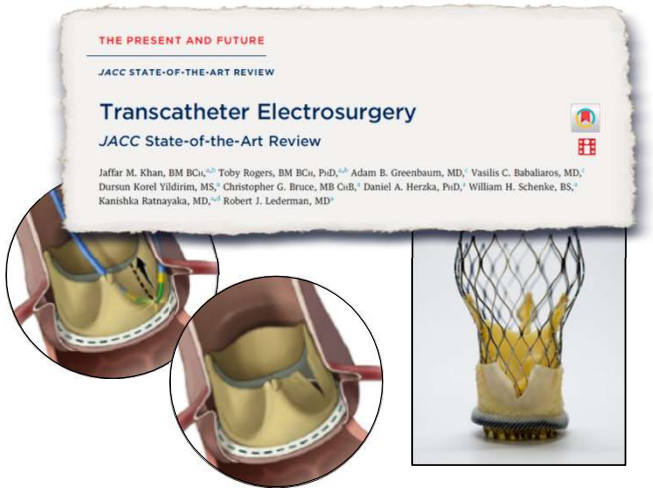
- TES is promising adjunct during endovascular repair of chronic aortic dissections



Transcatheter electrosurgery

2015

- Structural heart disease: **BASILICA** and **LAMPOON** techniques
  *(**Khan** et al. JACC 2018)*



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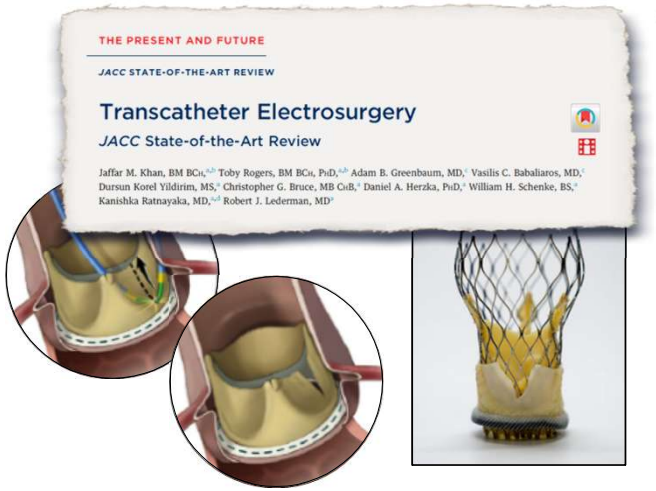
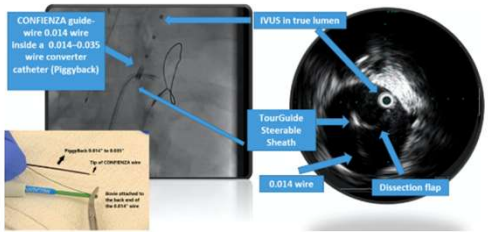


2019

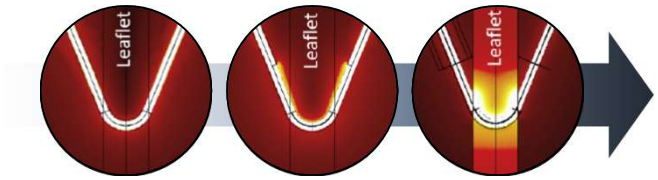
- Chronic dissection: **Transcatheter electrosurgical fenestration**
*(**Kabbani** L et al. JVSCI 2023)*



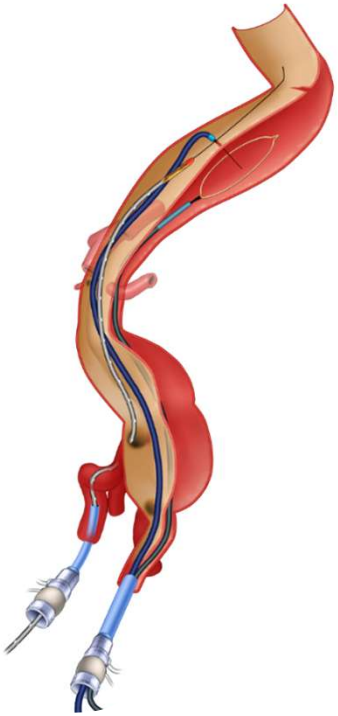
Transcatheter electrosurgical septotomy (TES)

Technique

- **PTFE coated wire** (0.014-18” Astato Xs)
- **Denuded wire surface**
- **Insulating catheter** (Navicross)
- **5% Dextrose infusion** (Non-ionic fluid)
- **Cutting mode** (Continuous radiofrequency)



*(**Baghbani-Oskouei** et al. JVSCI 2024)*

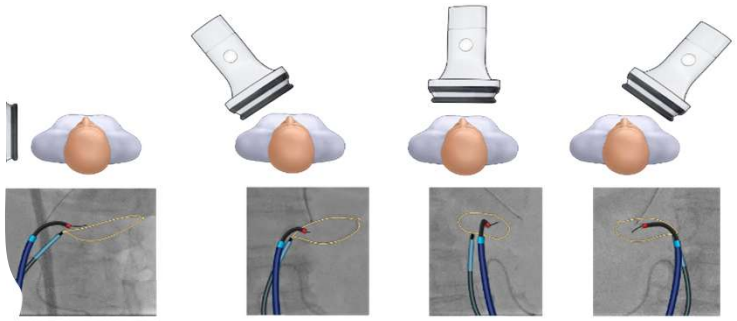


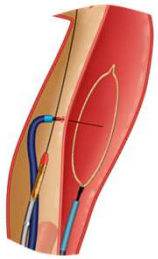
1

True and false lumen access

2

Confirm orientation

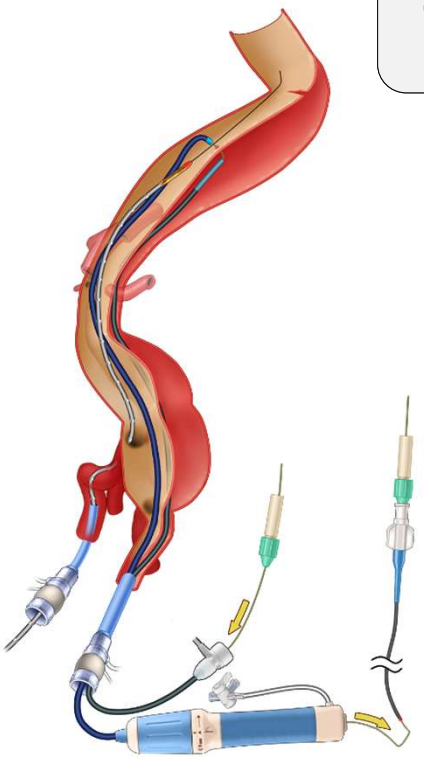




3

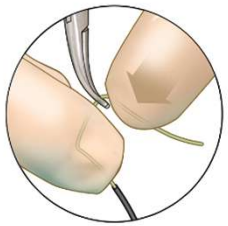
Lamella crossing

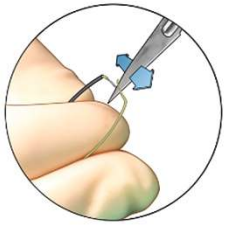
Technique



4

Prepare denuded trapeze or V-shaped wire





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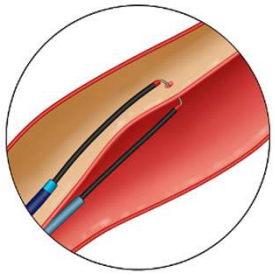
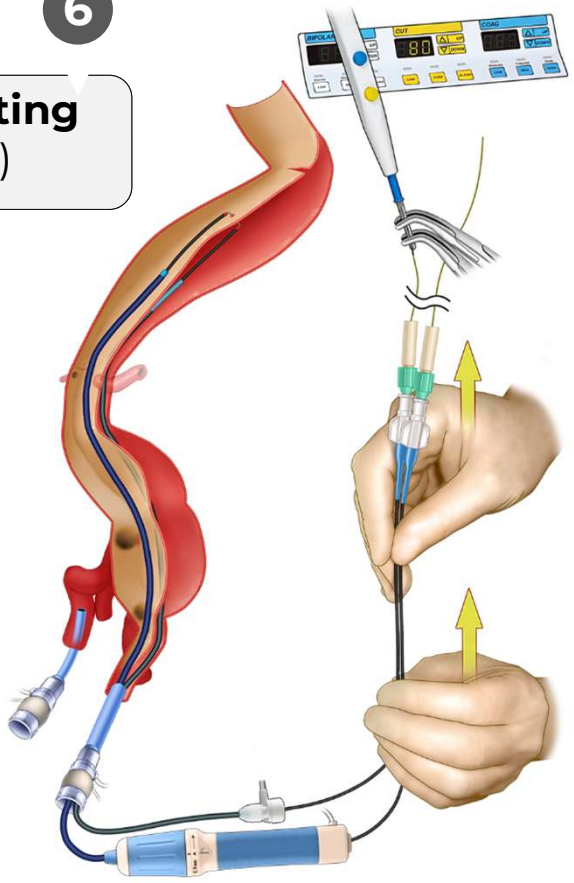


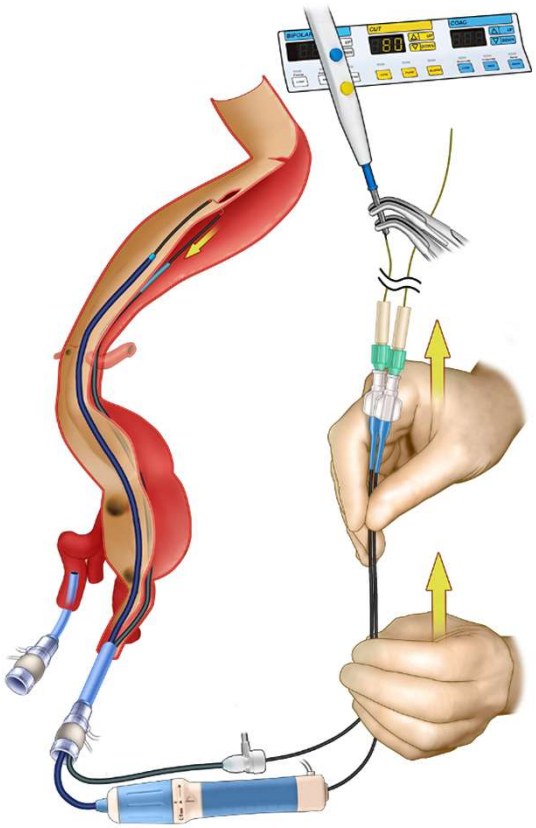
Insulate wire except for denuded segment

6

Connect to cutting mode (80 W)

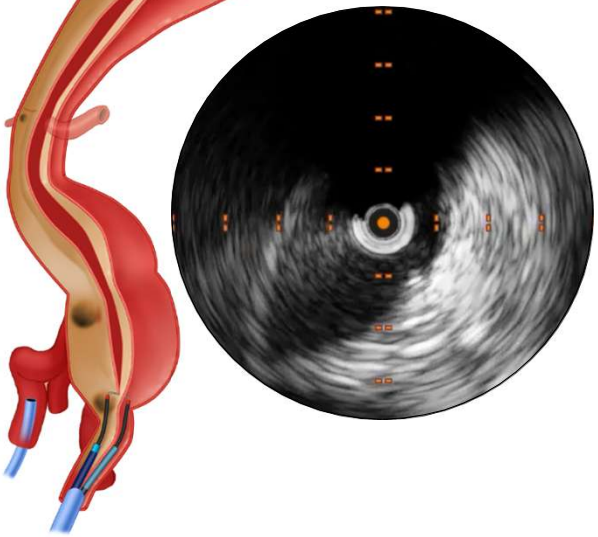


Technique



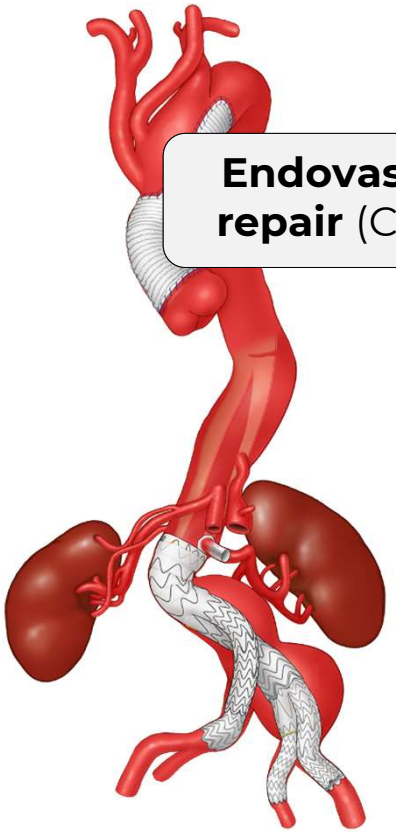
7

Septotomy of intended segments (IVUS control)



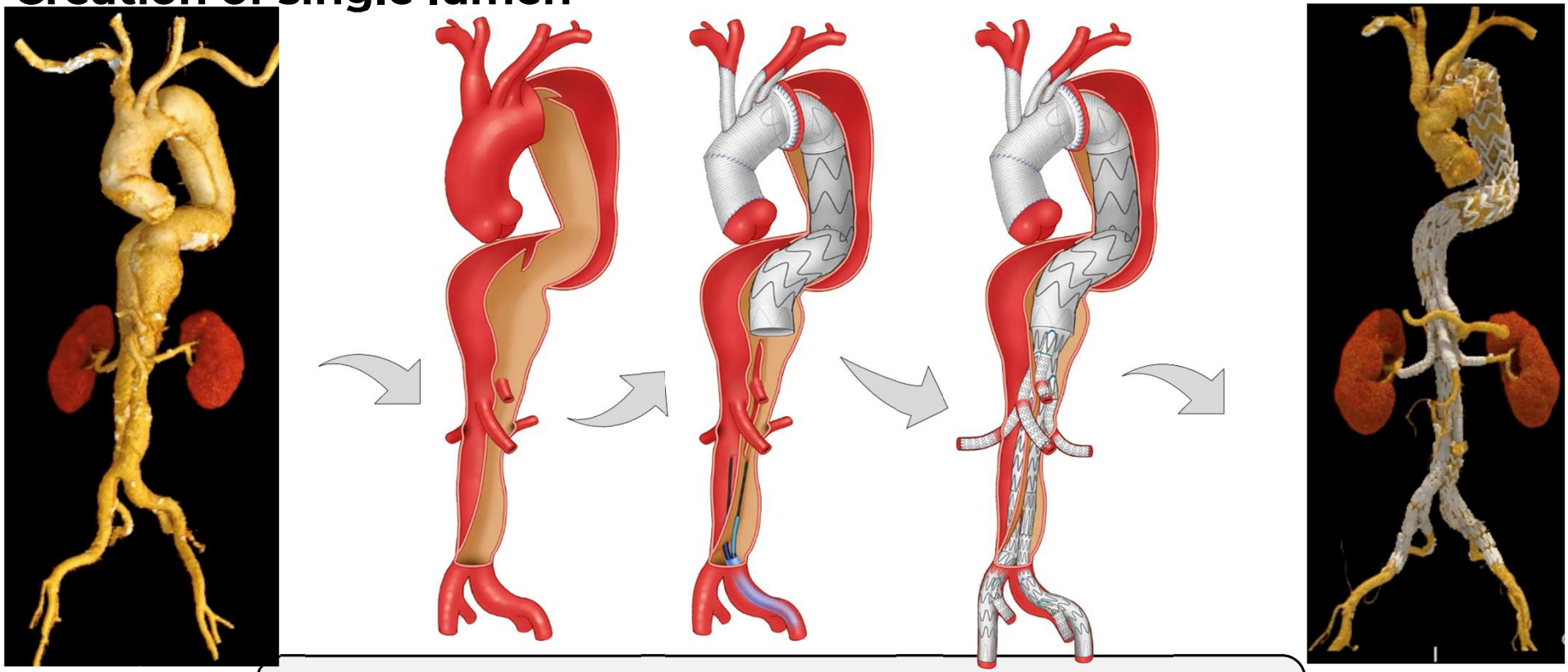
8

Endovascular aortic repair (CBCT control)



Indications

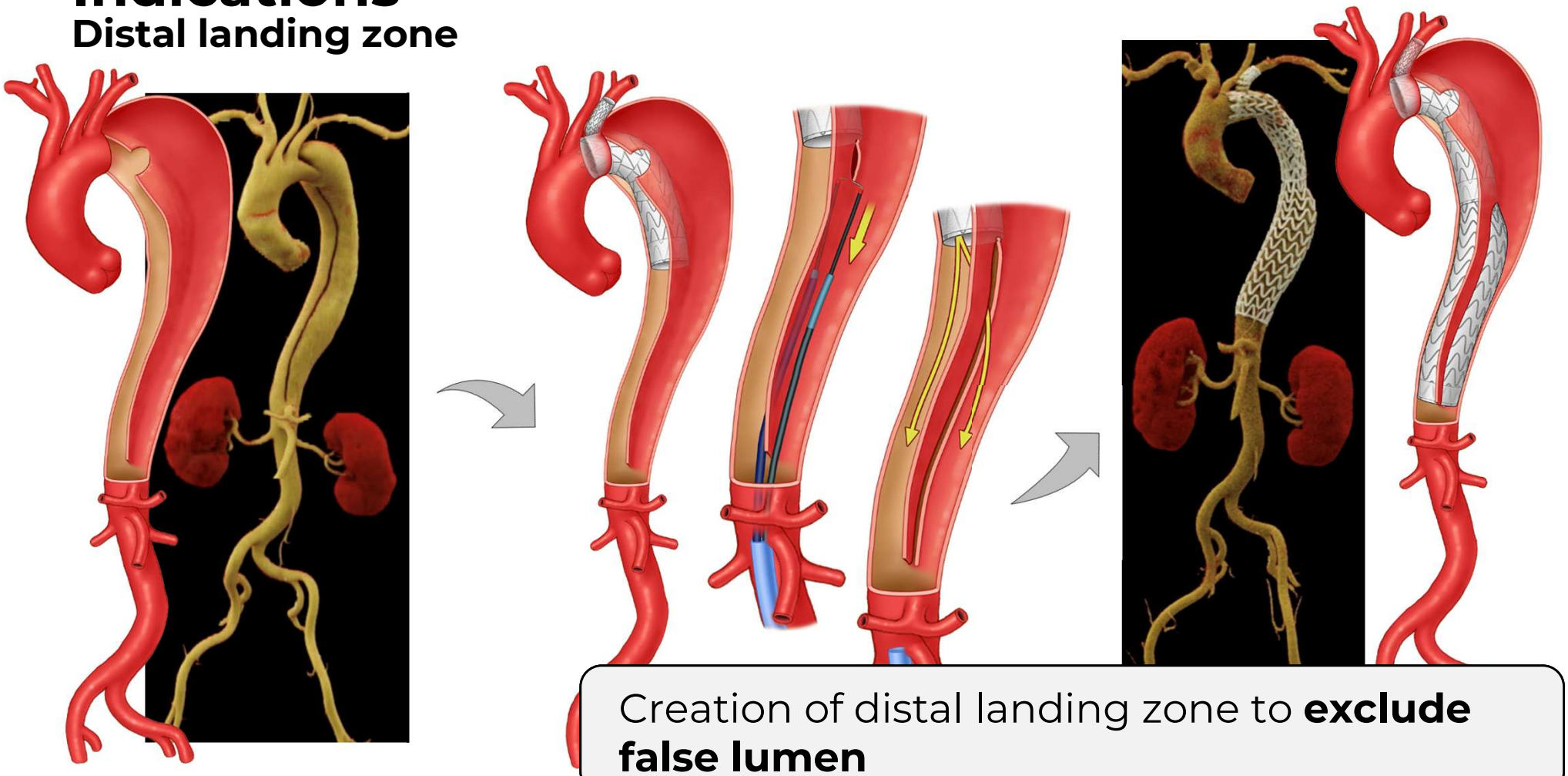
Creation of single lumen



Creation of single lumen to facilitate total transfemoral **multi-branch endo repair**

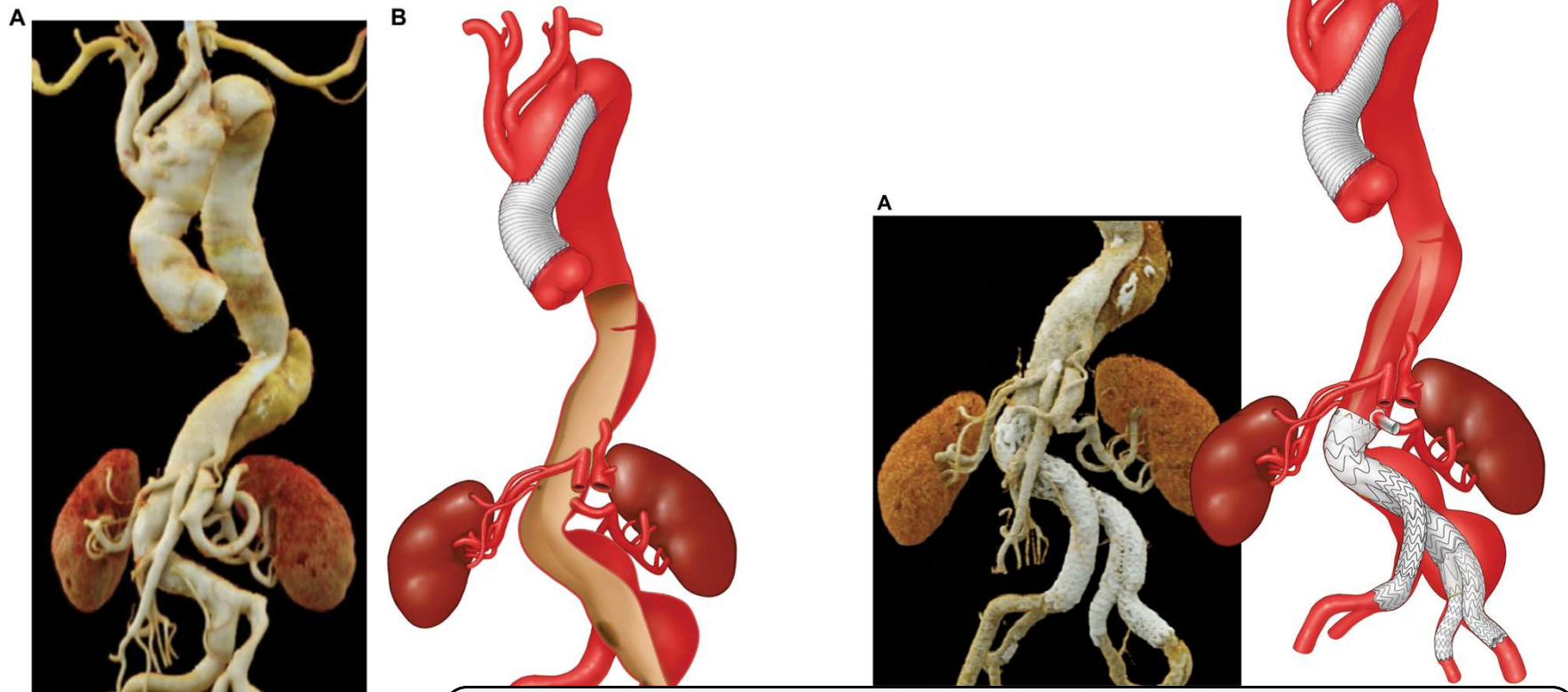
Indications

Distal landing zone



Creation of distal landing zone to **exclude false lumen**

Indications
Proximal landing Zone



Creation of **proximal landing zone** to treat infrarenal and iliac artery aneurysm

Indications, safety, and effectiveness of transcatheter electrosurgical septotomy during endovascular repair of aortic dissections

UTHealth Houston
McGovern Medical School

UTSouthwestern
Medical Center

Society for Clinical Vascular Surgery

51st ANNUAL SYMPOSIUM | MAR 16-20 2024
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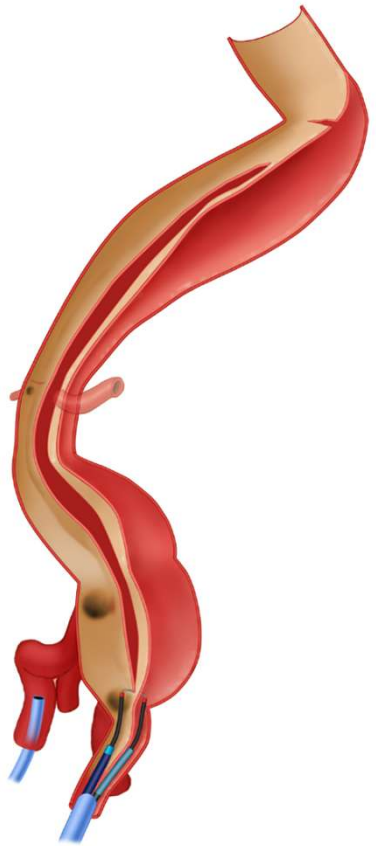
Purpose

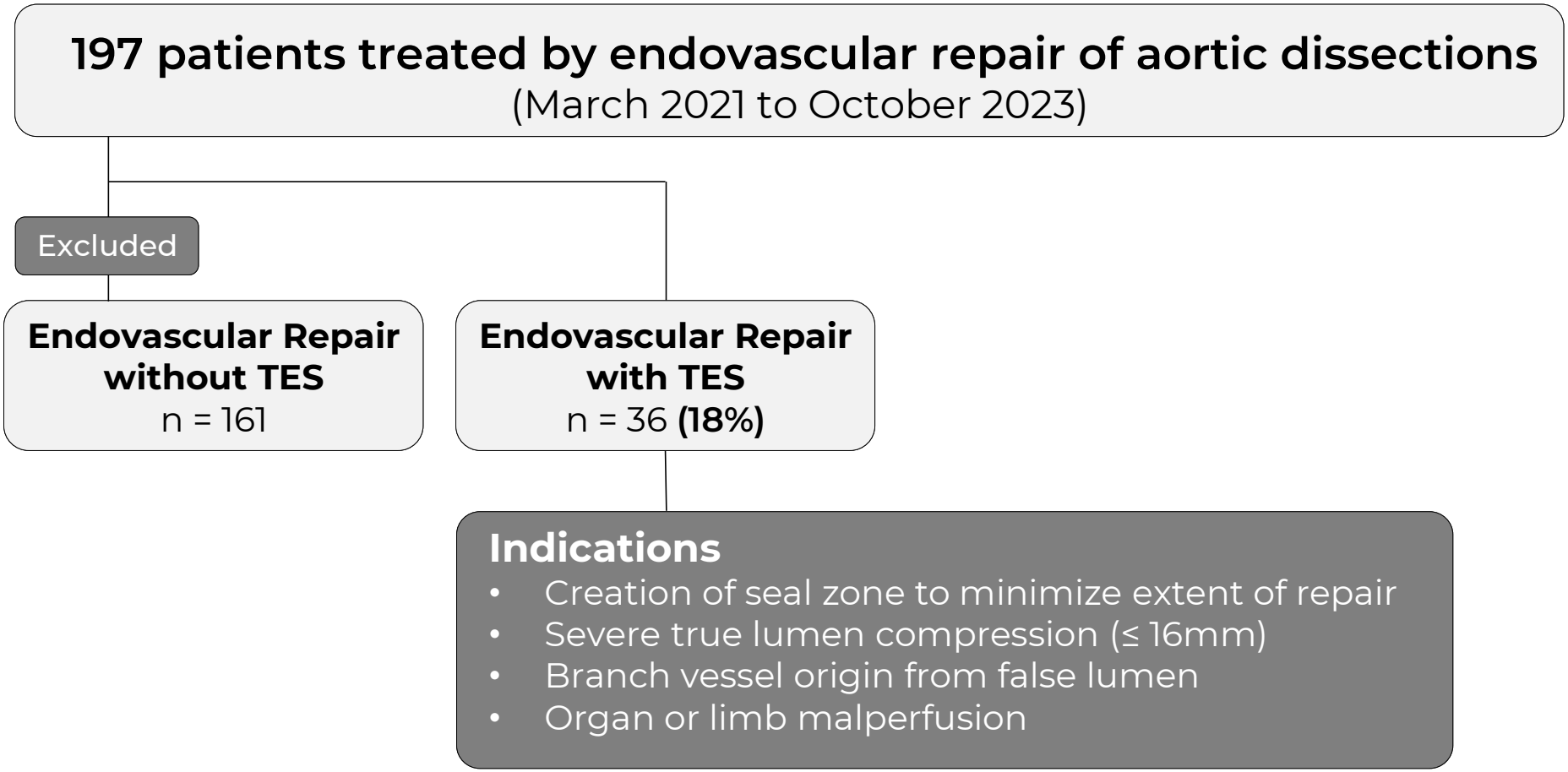
- To describe the indications, feasibility, safety and effectiveness of transcatheter electrosurgical septotomy (TES) as an adjunct during endovascular repair of aortic dissections



Methods

- Retrospective review of consecutive patients treated by endovascular repair of acute, subacute or chronic aortic dissections with adjunctive TES in two academic centers from March 2021 to October 2023
- SVS/STS reporting standards for management of aortic dissections[1] and aneurysms involving the renal-mesenteric arteries[2]
- End-points:
  - Technical success (controlled septotomy with no dislodgement of lamella, branch occlusion, arterial disruption)
  - Mortality, major adverse events and secondary interventions

[1] ***Lombardi*** *et al. J Vasc Surg 2020* and [2] ***Oderich*** *et al. J Vasc Surg 2020*


197 patients treated by endovascular repair of aortic dissections
(March 2021 to October 2023)
Excluded
Endovascular Repair without TES
n = 161
Endovascular Repair with TES
n = 36 (18%)
Indications
• Creation of seal zone to minimize extent of repair
• Severe true lumen compression (≤ 16mm)
• Branch vessel origin from false lumen
• Organ or limb malperfusion

Patient characteristics

	n = 36	Percent or IQR
Age (median, years)	61.5	55 – 72.5
Male sex	30	83
BMI (median, Kg/m^2)	31	27 - 34
Hypertension	33	92
Cigarette smoking history	17	47
Chronic Kidney Disease stage III-IV	10	28
Coronary artery disease	9	25
Congestive heart failure	7	19
Stroke/TIA	7	19
Chronic Pulmonary Disease	4	11
American Society of Anesthesiology ≥ III	36	100

Aortic history

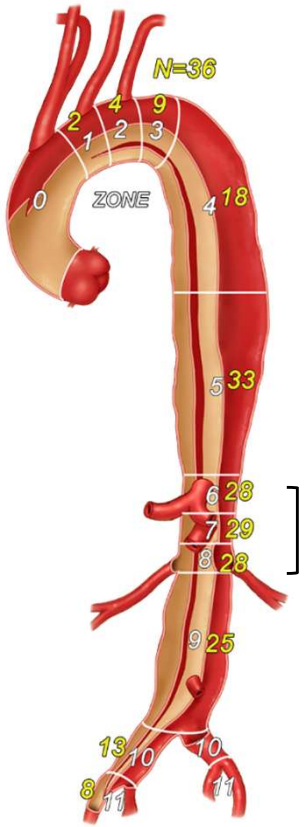
	n = 36	Percent or IQR
Acute complicated dissection	3	8
Chronic post-dissection aneurysm	32	89
Aortic arch (Zone 0-3)	7	19
Thoracic aorta (Zone 4-5)	7	19
Thoracoabdominal aorta (Zone 4-9)	19	53
Infrarenal aorta and iliacs (Zone 9-11)	3	8
Maximum aortic diameter (mm)	60	52 - 70
Prior aortic repair	27	75
Prior open surgical repair	23	64
Prior endovascular aortic repair	15	42
Symptomatic/ ruptured aneurysm	10	28
Family History of aortic disease	3	8

Extent of repair and procedural data

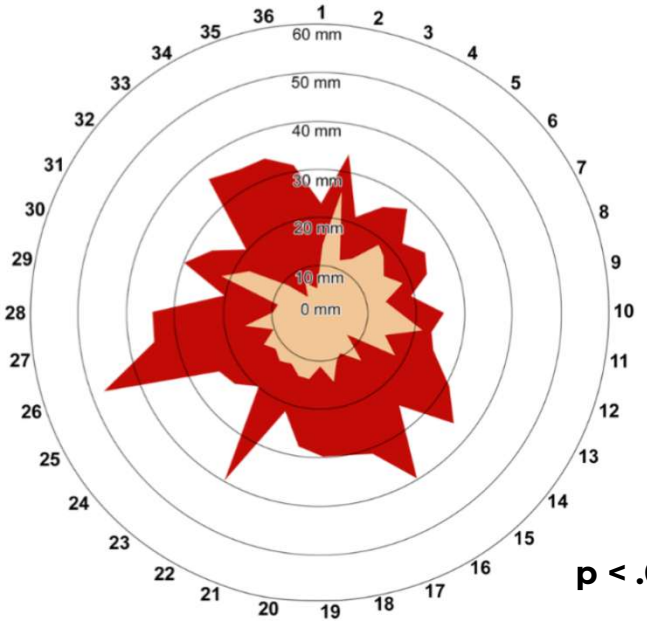
	n = 36	Percent or Mean
Arch branch stent graft	7	19
TEVAR (±Petticoat)	8	22
TAAA FB-EVAR	18	50
EVAR	3	8
Procedural data	11	31
Total operating time (min, mean ± SD)		335 ± 22
Total endovascular time (min, mean ± SD)		248 ± 162
Total fluoroscopy time (min, mean ± SD)		102 ± 67
Total contrast volume (ml, mean ± SD)		177 ± 56
Total Cumulative Air Kerma (Gy, mean ± SD)	36	2.0 ± 1.5

TES indication, extent and technical success

	n = 36	%
Indications		
True lumen compression (≤ 16mm)	28	78
Target artery from different lumen	19	53
Creation of proximal or distal landing zone	12	33
Organ or limb malperfusion	4	11
Technical success		
All patients (n = 36)	33	92
Chronic dissections (n = 33)	32	97
Acute dissections (n = 3)	1	33
Reasons for technical failure		
Dislodgement of dissection lamella, 2 (acute dissection)		
Inadvertent SMA dissection, 1 (chronic dissection)		
No arterial disruption or rupture		

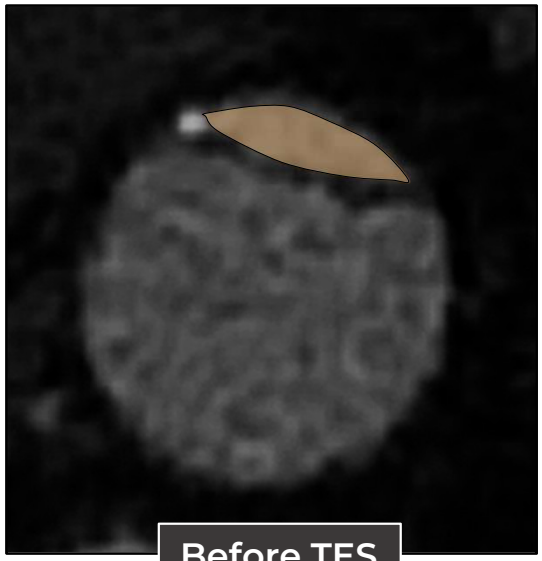


Aortic working lumen diameter

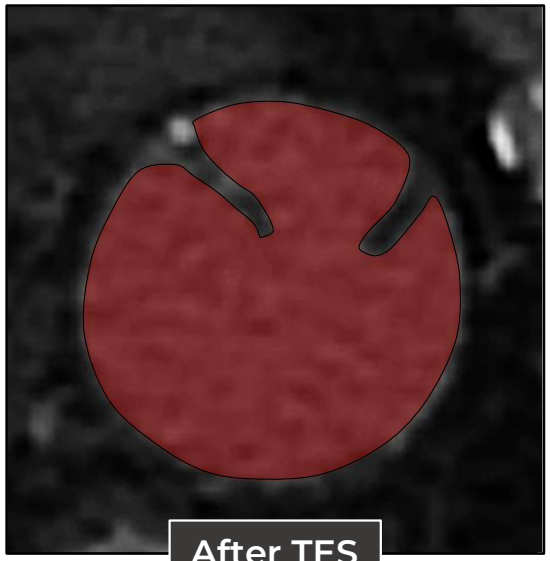


p < .001

	Mean ± SD (mm)
Before TES	13.2 ± 4.8
After TES	28.4 ± 6.8



Before TES

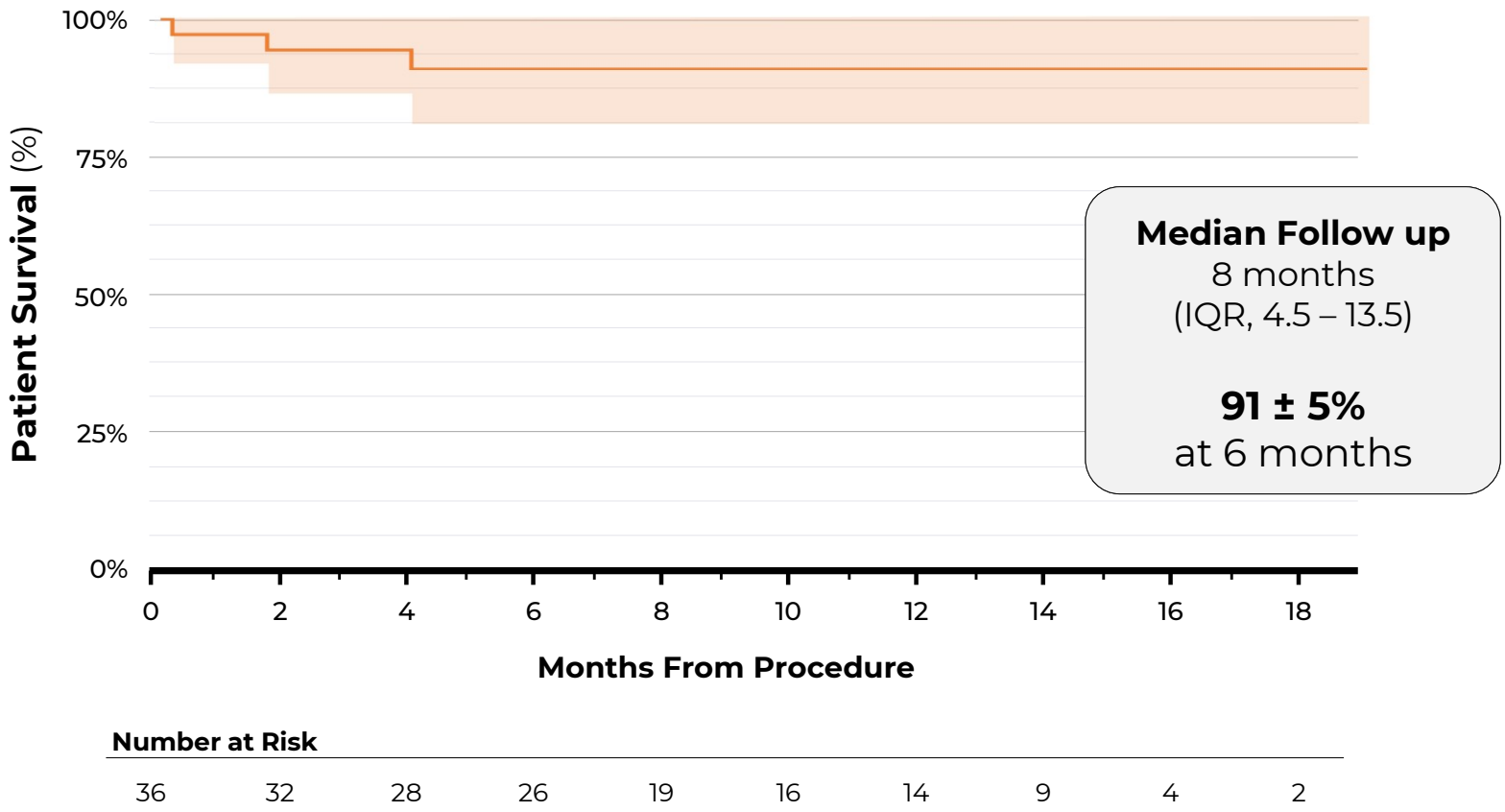


After TES

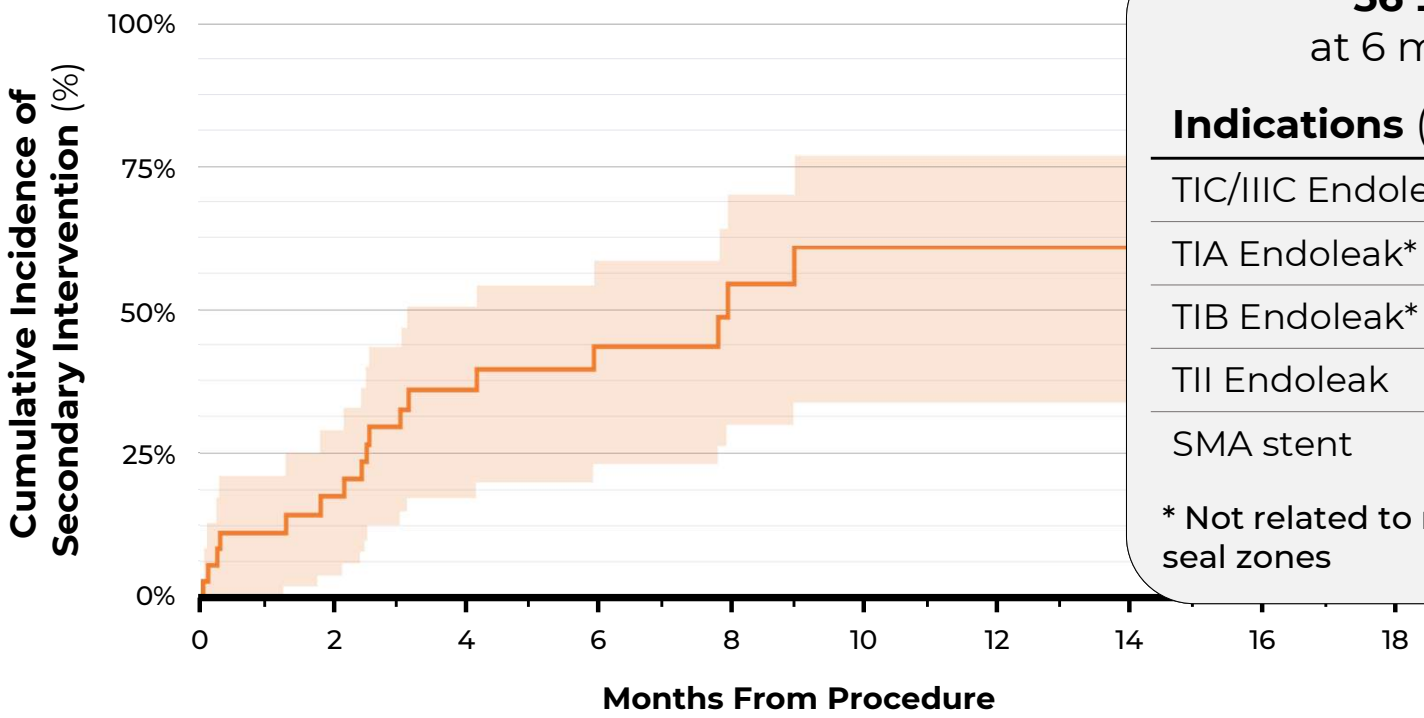
30 day outcomes

	n = 36	Percent or IQR
Mortality	1	**3**
Major adverse events	3	**8**
Acute Kidney Injury	1	3
Major stroke	1	3
Respiratory failure	1	3
Any spinal cord injury	3	**8**
Grade 1 (sensory only)	1	3
Grade 2 (paraparesis)	2	6
Grade 3 (paraplegia)	0	0

Patient survival



Secondary intervention



56 ± 9%
at 6 months

Indications (n = 15, 42%)	
TIC/IIIC Endoleak	7 (19%)
TIA Endoleak*	2 (6%)
TIB Endoleak*	1 (3%)
TII Endoleak	4 (11%)
SMA stent	1 (3%)

* Not related to new TES-created seal zones

Number at Risk

36	27	18	14	8	6	4	4	2	1

Conclusions

- TES should be considered in patients with chronic dissections
  - Severe true lumen compression
  - Suboptimal landing zones
  - Target vessels with origin from separate lumen

- Technique is safe and effective with no loss of target artery, arterial disruption or dislodgement of lamella in this preliminary experience

- Not recommended in acute dissections

- Longer follow up is needed to assess durability of newly created landing zones

Thank You!

Department of
Cardiothoracic &
Vascular Surgery

UTHealth Houston
McGovern Medical School

UTH_CVSurgery
info.ctvs@uth.tmc.edu
https://med.uth.edu/cvs/