Indications, Safety, and Effectiveness of Transcatheter Electrosurgical Septotomy During Endovascular Repair of Aortic Dissection

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Disclosures

- *Gustavo S. Oderich*
  - **Consulting, research grants, scientific advisory board**
    WL Gore, Cook Medical Inc., GE Healthcare and Centerline Biomedical
  - **Investigational use of devices**
    Cook Fenestrated and Branched Grafts
- *Carlos Timaran*
  - **Consulting, research grants, scientific advisory board**
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  - **Investigational use of devices**
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- *Remaining authors*
  - **No disclosures**

Background

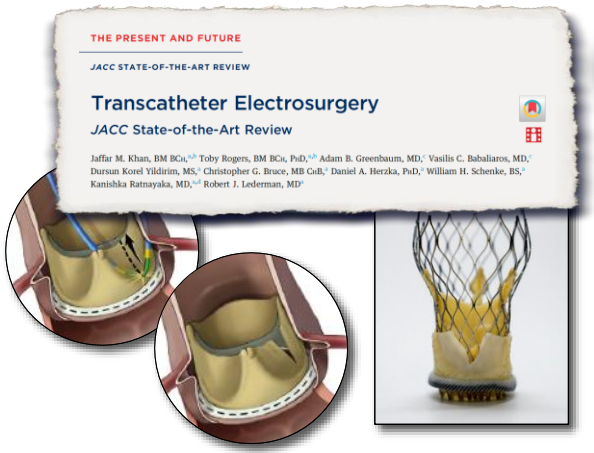
- Endovascular repair is the most frequently used treatment option for post-dissection aneurysms, with lower morbidity and mortality compared to open surgical repair
- Challenges include inability to seal across dissected segments, rigid lamella with compressed true lumen, vessel origin from false lumen and 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*

Transcatheter electrosurgery

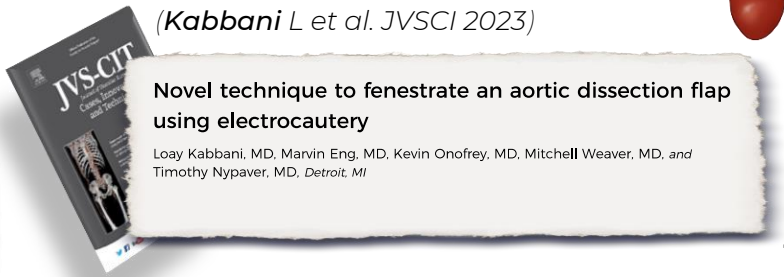
2015

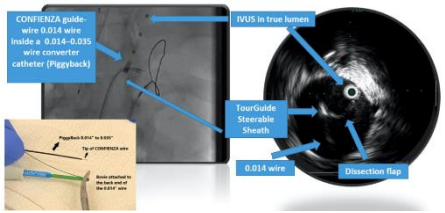
- Structural heart disease: **BASILICA** and **LAMPOON** techniques
  *(**Khan** et al. JACC 2018)*

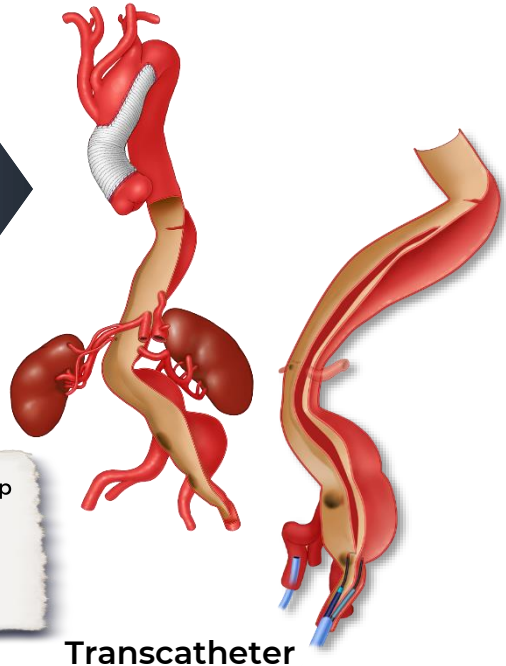


2019

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



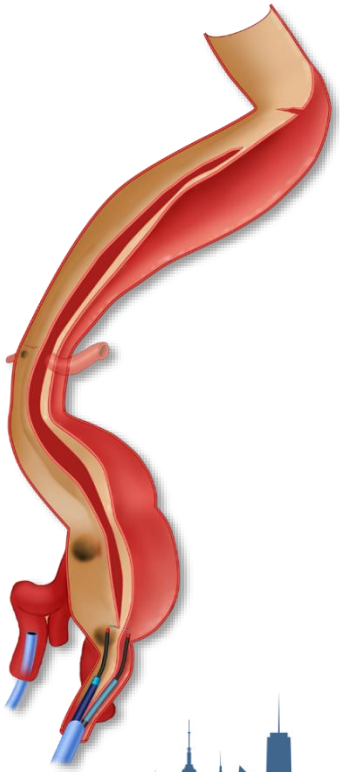




Transcatheter electrosurgical septotomy (TES)

Purpose

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



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

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%)**

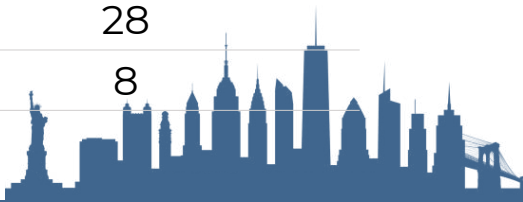
Indications
- Creation of seal zone to minimize extent of repair
- Severe true lumen compression (≤ 16mm)
- Branch vessel origin from false lumen
- Organ or limb malperfusion

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

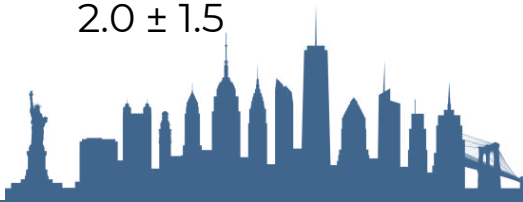
Aortic history

	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



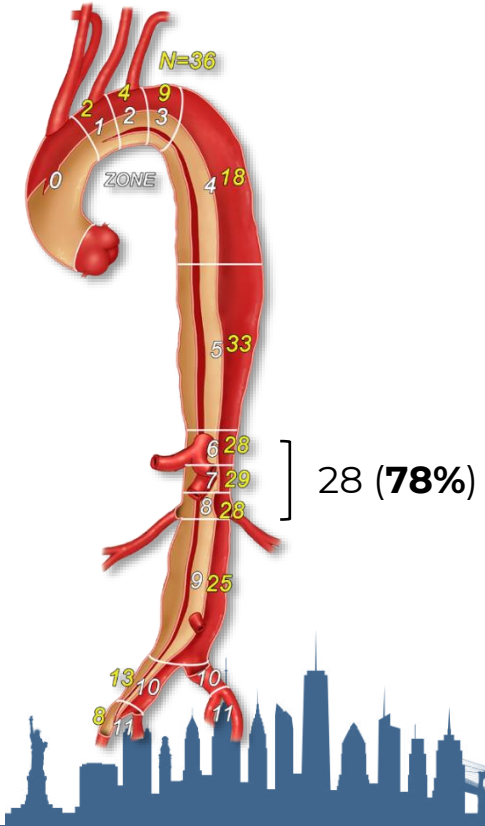
Extent of repair and procedural data

	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

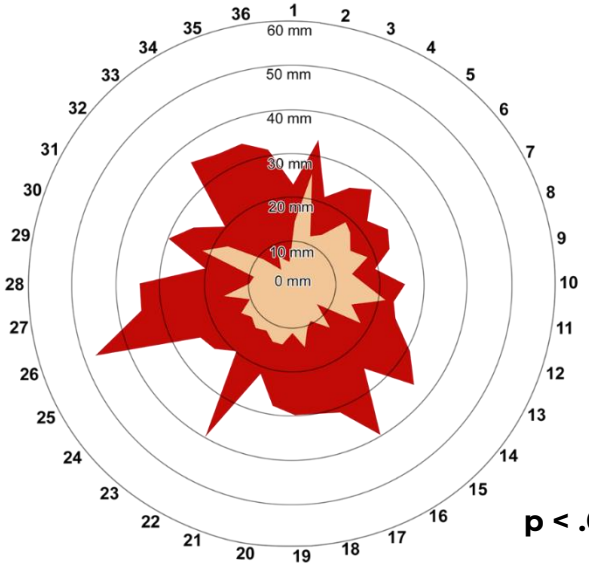


TES indication, extent and technical success

	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



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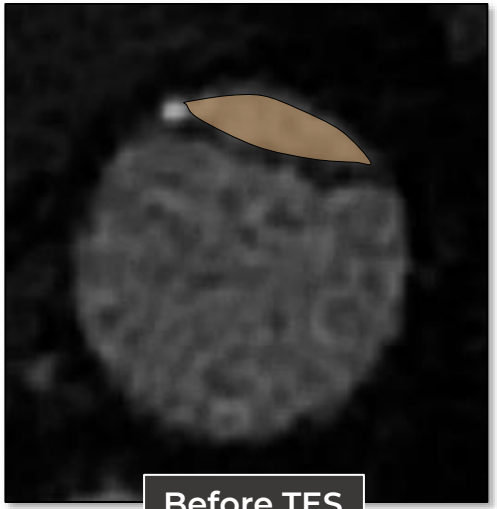
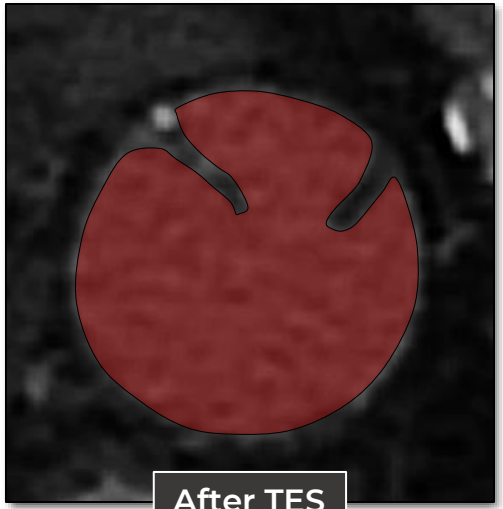


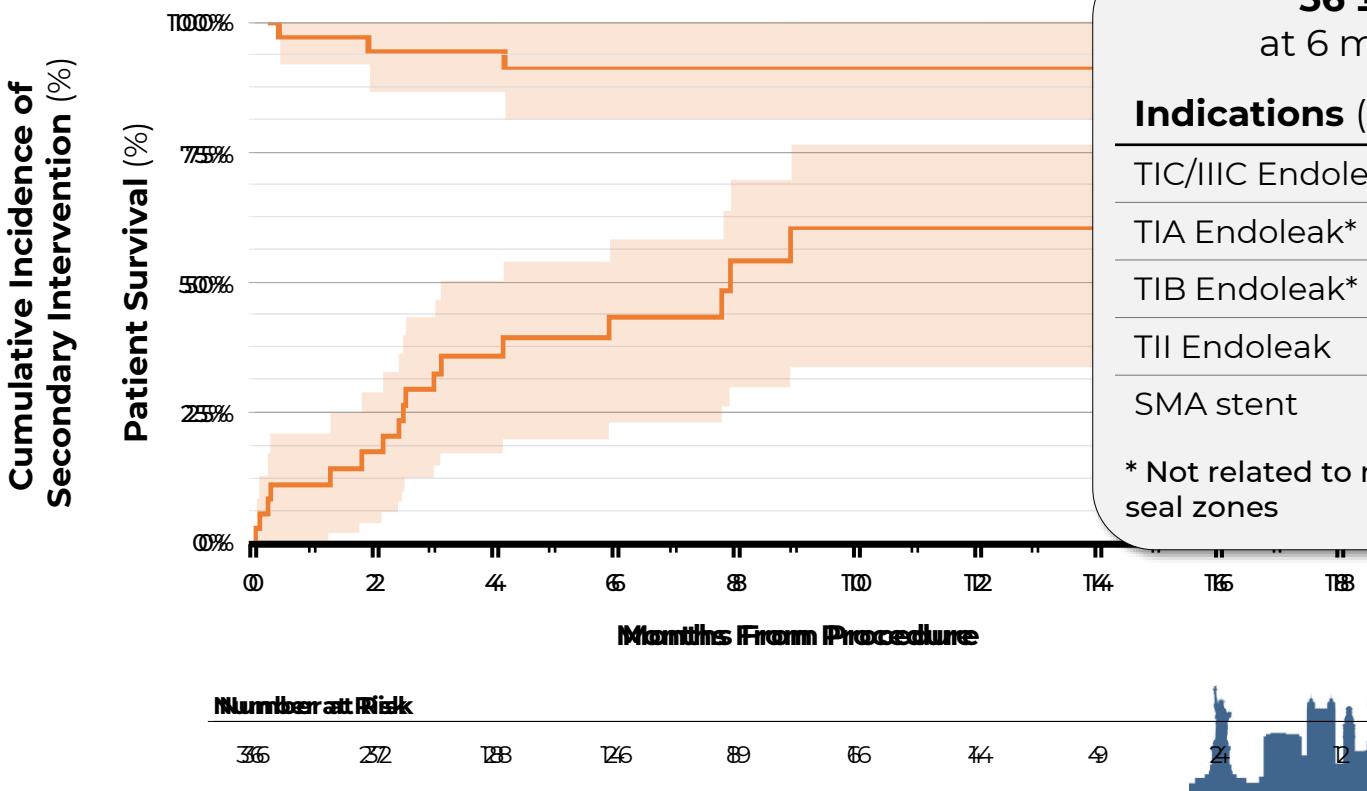


	Mean ± SD (mm)
Before TES	13.2 ± 4.8
After TES	28.4 ± 6.8

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

Secondary intervention
Patient survival



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

Conclusions

- TES should be considered in patients with chronic dissections and severe true lumen compression, suboptimal landing zones or target vessels with origin from separate lumen
- In this setting, the technique is safe and effective with no loss of target artery, arterial disruption or dislodgement of lamella in this preliminary experience
- We do not recommend its use in patients with acute dissections due to high risk of dislodgement of lamella
- There was a high reintervention rate, which underscores the high complexity of these cases
- Longer follow up is needed to assess durability of newly created landing zones