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A comparison of payer costs for patients with and without revascularization in thoracic endovascular aortic repair stent grafting procedures

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Background

- Thoracic endovascular aortic repair (TEVAR) with stent grafting is a minimally invasive modality for treating thoracic aortic aneurysm, including dissection and rupture.
- Location of stent graft placement (i.e., "landing zone") in the thoracic aorta is an important anatomic consideration. **[Figure 1]**
- Little is known about payer costs for patients undergoing TEVAR stent graft procedures with revascularization in aortic landing zones 0, 1 or 2.

Objectives

Compare payer costs and short-term outcomes for patients who underwent TEVAR stent graft procedures with and without revascularization of aortic landing zones 0, 1 or 2.

Methods

Study design and data source

- This study was a retrospective observational cohort design using U.S. insurance claims data on 65 million patients within the MERATIVE® MARKETSCAN® Commercial and Medicare Supplemental Database accessed via MERATIVE® Treatment Pathways.[1]
  - MARKETSCAN® provides clinical and cost information on individuals covered by a variety of employer-sponsored private health insurance plans and employer-paid Medicare supplemental insurance.
  - All MARKETSCAN® patient data are deidentified and comply with the Health Insurance Portability and Accountability Act (HIPAA).

Patient identification/inclusion

- Patients were identified using International Classification of Diseases, Tenth Revision (ICD-10) diagnosis codes and Current Procedural Terminology (CPT®) codes pertaining to aortic aneurysm, dissection or rupture for patients who underwent an inpatient TEVAR procedure between 1/1/2016 and 1/31/2023.
- Continuous enrollment during the 90 days pre- and post-TEVAR was required to ensure complete capture of health care costs and utilization.
- Patients under age 18 and who had revascularization after TEVAR discharge were excluded.

TEVAR stent graft landing zone identification

- TEVAR stent graft landing zone identification was determined by use of TEVAR-associated supra-aortic vessel bypass/transposition/occlusion procedure codes and/or codes associated with revascularization involving the thoracic aorta itself.
- Patients were categorized into 1 of 3 groups based on codes present in the 90 days prior to and including the date of TEVAR: revascularization of Zone 0/1, revascularization of Zone 2 or no revascularization.

Outcomes

- Demographic data and distribution of payer costs were explored in the 90 days prior to and including TEVAR.
- Short-term clinical outcomes and payer costs were examined in the 90 days post-TEVAR discharge.

Results*

- Patients with Zone 0/1 revascularization tended to be younger, had a higher level of comorbidity and were more likely to be male compared to patients with revascularization of Zone 2 or no revascularization. **[Table 1]**
- Zone 0/1 patients had the highest average payer costs in the 90 days prior to and including TEVAR at $199,426 (median: $140,875), followed by patients with revascularization of Zone 2 at $163,296 (median: $123,736). Those with no revascularization had the lowest average payer costs at $149,370 (median: $100,623). **[Figure 2]**
- In the 90 days following TEVAR discharge, patients with Zone 2 revascularization had the lowest percentage of patients with any inpatient admission at 21% (N = 12), compared to 32% (N = 55) and 28% (N = 229) for patients with Zone 0/1 and no revascularization, respectively. Zone 2 patients also had the lowest average payer costs 90 days post-TEVAR discharge at $24,012. **[Table 2]**

* Due to changes made in included/excluded codes defining TEVAR and revascularization, results presented in this poster slightly differ from those in the published study abstract.

Figure 1: TEVAR stent graft proximal landing zones

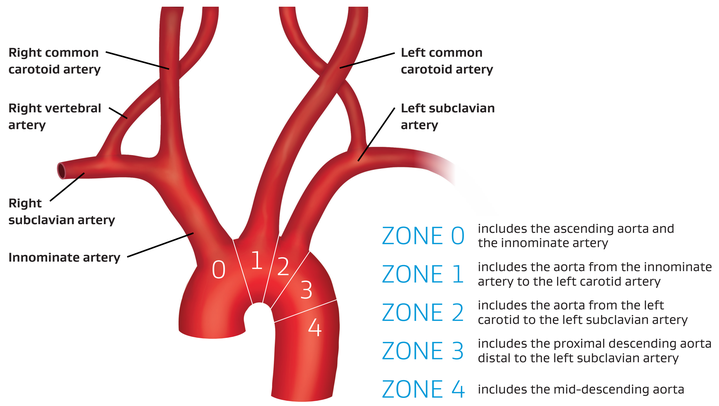

Figure 2: Mean and median payer costs in 90 days prior to and including TEVAR by cohort

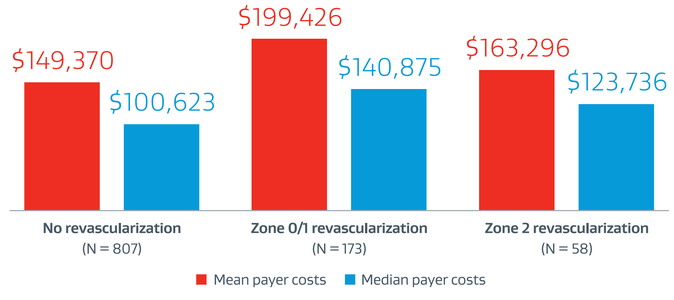

Table 1: Demographics summary by cohort

Demographics category	Cohort: No revascularization	Zone 0/1 revascularization	Zone 2 revascularization
Total N	**807**	**173**	**58**
Average age	61.1	58.5	61.3
Female	40%	32%	41%
Charlson comorbidity index proxy	5.3	5.6	5.2
Commercial insurance	59%	68%	62%
Medicare supp/ advantage	41%	32%	38%

Table 2: Utilization and payer costs 90 days post-TEVAR discharge

Utilization category	Cohort: No revascularization	Zone 0/1 revascularization	Zone 2 revascularization
Total N	**807**	**173**	**58**
Any Inpatient admission	28%	32%	21%
Average inpatient days among utilizing patients	15.5	10.1	13.0
Average ER visits per patient	0.52	0.46	0.34
Average office visits per patient	1.69	1.69	1.52
Payer costs post-TEVAR discharge (mean/median)	$34,150/$6,964	$37,263/$8,634	$24,012/$4,048

Conclusions

- These data suggest that patients undergoing TEVAR without revascularization may have lower payer costs in the 90 days prior to and including TEVAR admission compared to those with Zone 0-2 revascularization.
- However, post-TEVAR discharge, patients with Zone 2 revascularization may have lower inpatient utilization and payer costs.
- More information is needed to confirm cost and outcome differences between TEVAR patients with/without revascularization in Zone 0-2.

Study limitations

- Because we used insurance claims data to conduct this study, we could not corroborate accuracy of our estimates with the actual TEVAR landing zones present in patient medical records.
- Our analysis focused only on Zone 0/1/2 proximal landing zones, whereas many TEVAR patients have stent graft placement in Zones 3 and 4 without need for revascularization (approximately 60%, as reported in published literature).[2]
  - Because our methods rely on use of revascularization codes, patients with stent graft placement in Zone 3 or Zone 4 were not accounted for in the analysis.
- Our analysis focused exclusively on stent graft landing zones for patients who had TEVAR-associated revascularization.
  - Our results do not account for patients who had stent graft placement without revascularization, particularly Zone 2 patients who had parallel stent grafting of the LSA or patients with intentionally unrevascularized LSA occlusion. Therefore the volume of Zone 2 patients is likely underestimated.
  - Published literature suggests that only 38% to 42% of patients with LSA occlusion have LSA revascularization.[3,4]
  - Our estimates also likely exclude patients undergoing frozen elephant trunk (FET) procedures, where substantial revascularization work or total arch replacement takes place in Zones 0 and 1 and then structurally united with antegrade delivery of a descending aortic stent graft which itself functions as a proximal landing zone.
- To our knowledge, this is the first study attempting to identify TEVAR proximal stent graft landing zones using claims data.
  - We caution that the study was meant to be an exploratory approach for filling conspicuous gaps in the literature about revascularization associated with TEVAR.
  - We intend to replicate this study using other data sources and publish comparative findings in the future.

References

1. Real-World Evidence. Merative MarketScan. Published 2023. Accessed April 11, 2024. https://www.merative.com/real-world-evidence **2.** Feezor RJ, Martin TD, Hess PJ, *et al*. Risk factors for perioperative stroke during thoracic endovascular aortic repairs (TEVAR). *Journal of Endovascular Therapy* 2007(4):568-573. **3.** Hajibandeh S, Hajibandeh S, Antoniou SA, Torella F, Antoniou GA. Meta-analysis of left subclavian artery coverage with and without revascularization in thoracic endovascular aortic repair. *Journal of Endovascular Therapy* 2016;23(4):634-641. **4.** Huang Q, Chen XM, Yang H, Lin QN, Qin X. Effect of left subclavian artery revascularisation in thoracic endovascular aortic repair: a systematic review and meta-analysis. *European Journal of Vascular & Endovascular Surgery* 2018;56(5):644-651.

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