The Fate of the Ascending Aorta after Thoracic Endovascular Aortic Repair in Trauma Patients

Thomas Coleman MD

Miroslav Peev MD
Luka Pocivavsek MD, PhD
Section of Cardiac Surgery, Section of Vascular Surgery University of Chicago

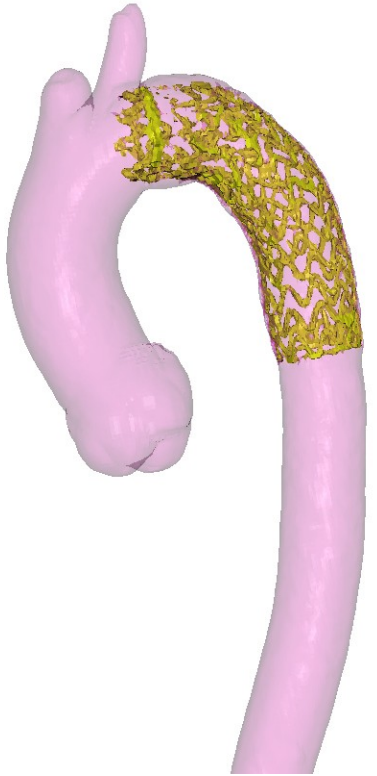
Clinical Question

Clinical Context

- TEVAR is gold standard for traumatic transection
- Effects on the unstented portions are incompletely understood

Diameter Limitations

- Surveillance is guided by maximum diameter
- **It does not quantify regional geometry**



Quantifying Aortic Shape

- δK quantifies deviation from a smooth surface
- **Objective measure of shape**
- Separates shape from size

1.Khabaz K et al. The geometric evolution of aortic dissections: Predicting surgical success using fluctuations in integrated Gaussian curvature.
2.Pugar JA et al. Thoracic Aortic Shape: A Data-Driven Scale Space Approach.

Study Design and Hypothesis

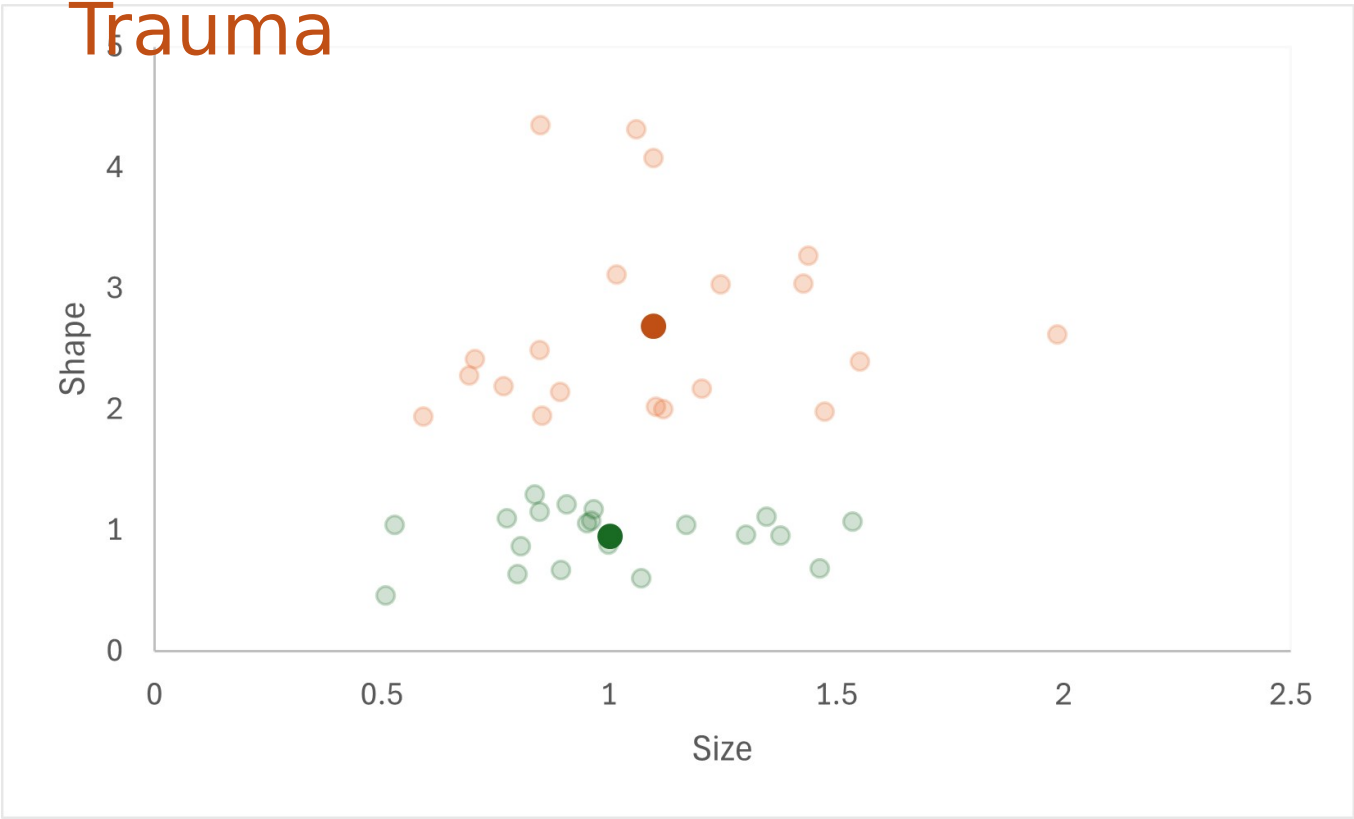
Cohort	Patients	CTAs	Average Time Between Pre/Post CTA (days)
Trauma	20	40 (20 pre-op)	1623.8 +/- 415
Normal	20	40	232.8 +/- 220

Hypothesis 1:
Trauma aortas should morphologically resemble normal aortas.

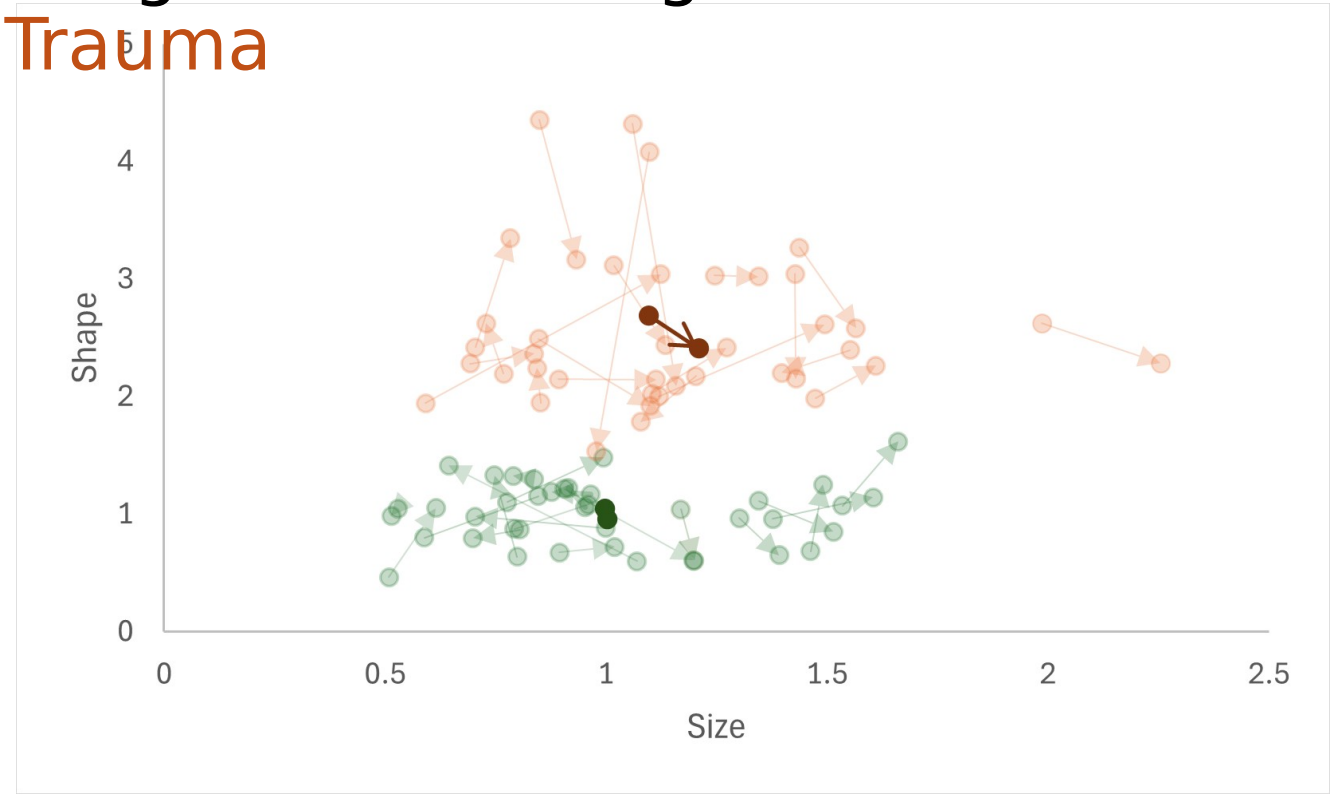
Hypothesis 2:
TEVAR influences unstented proximal portion of the aorta

Hiraoka T et al. Enlargement Rate of the Ascending Aorta After Thoracic Endovascular Aortic Repair.

Baseline Average - Normal vs Trauma

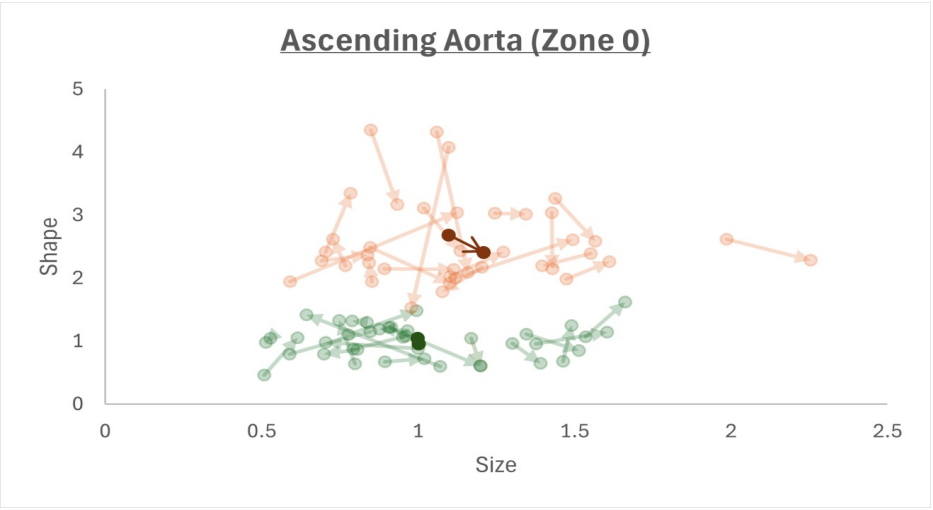


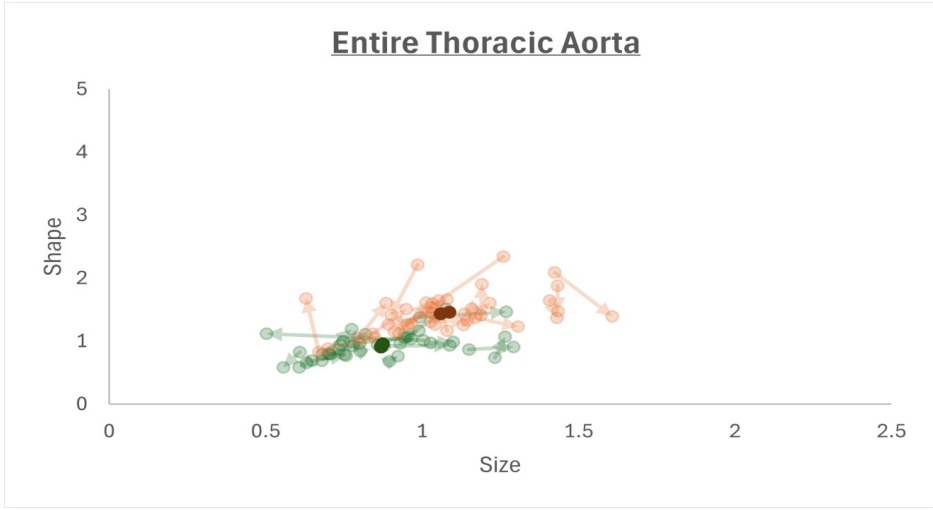
Longitudinal Change - Normal vs Trauma



Following TEVAR, the ascending aorta shows directional changes in shape and size

Longitudinal Change - Regional vs Global





Regional analysis detects differences not seen with global assessment

Conclusion

- **TEVAR is associated with measurable changes in aortic shape beyond diameter**
- Remodeling is observed in the unstented ascending aorta
- Regional and global analysis yield different geometric information

Thank You