Impact of Transfer and Travel Distance on Operative Outcomes of Acute Ascending Aortic Dissection Repair: A Geospatial Analysis

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Background and Objectives

- Acute type A aortic dissection (ATAAD) is a surgical emergency mandating expedient surgical repair.
- An inverse volume outcome relationship has been described in which decreased operative mortality is observed after ATAAD repair at high volume centers.
- However, many dissections are repaired at low volume centers, possibly due to concerns of delay in care associated with transfer to experienced aortic centers.

Objective: The aim of this project is to evaluate the effect of interfacility transfer and distance travelled by the patient on outcomes after repair of ATAAD.



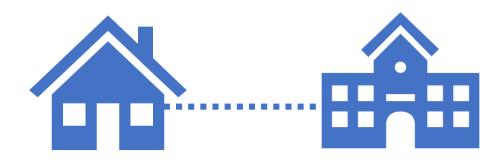
Methods

Patients



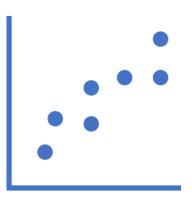
The Texas Inpatient
Database was queried for
patients undergoing repair
of ATAAD from 2018-2021

Geospatial Analysis



Distance travelled from home of record to hospital was determined by extracting latitude and longitude from patient and hospital zip codes.

Data Analysis



Patients and outcomes were stratified by transfer status and hospital ATAAD repair volume. Logistic regression models were used to assess effect of distance on outcomes.

Definitions and Outcomes

Definition of ATAAD

Thoracic or Thoracoabdominal Aortic Dissection Diagnosis Code [171.00, 171.01, & 171.03]



Open Surgery on Ascending Aorta
Procedure Code
[02QX0ZZ, 02UX07Z, 02UX08Z, 02UX0JZ,
02UX0KZ, 02VX0CZ, 02VX0DZ, 02VX0EZ,
02VX0FZ, 02VX0ZZ, 02BX0ZZ, 02RX07Z,
02RX08Z, 02RX0JZ, 02RX0KZ]

Primary Outcome

Operative Mortality

Secondary Outcome

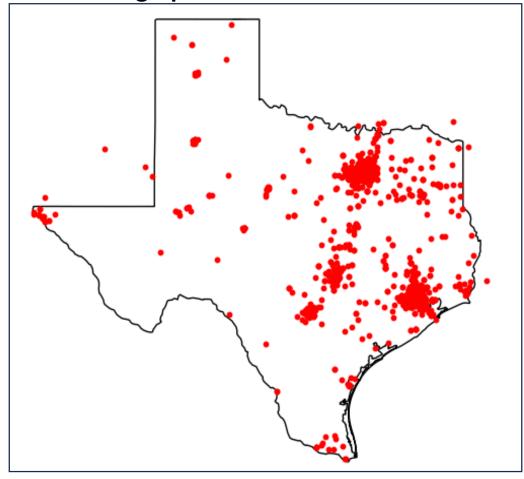
Major Morbidity:
Stroke
Renal Failure
Reoperation
Prolonged Ventilation
Deep Sternal Wound Infection

Geographic Distribution

A total of 1036 patients underwent repair of ATAAD at 69 Texas hospitals from 2018-2021.

Region	n (%)
North Texas	373 (36.0)
Upper Gulf Coast	313 (30.2)
Central Texas	132 (12.7)
East Texas	82 (7.9)
South Texas	79 (7.6)
West Texas	37 (3.6)
Panhandle	20 (1.9)

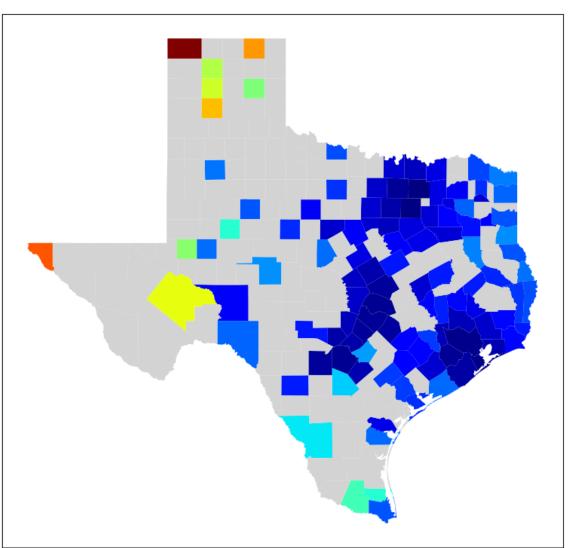
Geographic Distribution of ATAAD



Distance Travelled

- Median distance travelled was 18.4 miles [IQR 7.3- 49.5]
- Rural patients travelled greater distances compared to urban patients (78 [56.2-131.0] vs. 15.1[6.3-34.8]; p<0.001).
- Transfer status was associated with increase travel distances (26.0[12.1-78.6] vs 10.8 [4.7-26.7]; p<0.001)

Average Distance Travelled by County



- 600

- 500

- 400

- 300

- 200

100

Results: Short Term Outcomes

Repair of ATAAD associated with significant operative morbidity and mortality

Outcome	N (%)
Mortality (%)	17.9%
Major Morbidity (%)	40.7%
Stroke (%)	12%
Renal failure (%)	7.8%
Reoperation (%)	3.2%
Prolonged Ventilation (%)	32.8%
Sternal Wound Infection (%)	1.3%
LOS (days)	11.0 [7.0-18.0]
Non-Home Discharge (%)	47.6%

Results: Outcomes by Transfer Status

- A total of 580 (56.0%) patients were transferred prior to surgery.
- The majority of transferred patients (92%) underwent surgery at top quartile volume centers.
- Top quartile ATAAD volume centers performed a median of 7 [IQR 5.1-14.1] repairs/year, with the five highest volume centers performing 27 [16-38] repairs/year.
- Transfer status was not associated with increased mortality or major morbidity.

-	Transferred	Non-Transferred	P-value
	(n=580)	(n=456)	
Distance Travelled (miles)	26.0 [12.1-78.6]	10.8 [4.7-26.7]	< 0.001
Male sex (%)	69.1%	64.3%	0.111
Elixhauser Comorbidity Index	5.0 [4.0-7.0]	6.0 [4.0-7.0]	0.796
Rural (%)	11.0%	10.7%	0.962
Urban (%)	86.9%	88.8%	0.401
Mortality (%)	16.6%	19.5%	0.25
Major Morbidity (%)	41.7%	39.5%	0.39
Stroke (%)	12.4%	11.4%	0.689
Renal failure (%)	9.1%	6.1%	0.095
Reoperation (%)	4.3%	1.8%	0.032
Prolonged Ventilation (%)	33.1%	32.5%	0.878
Sternal Wound Infection (%)	1.4%	1.1%	0.901
LOS (days)	11.0 [7.0-19.0]	10.0[7.0-18.0]	0.108
Non-Home Discharge (%)	43.6%	52.6%	0.005

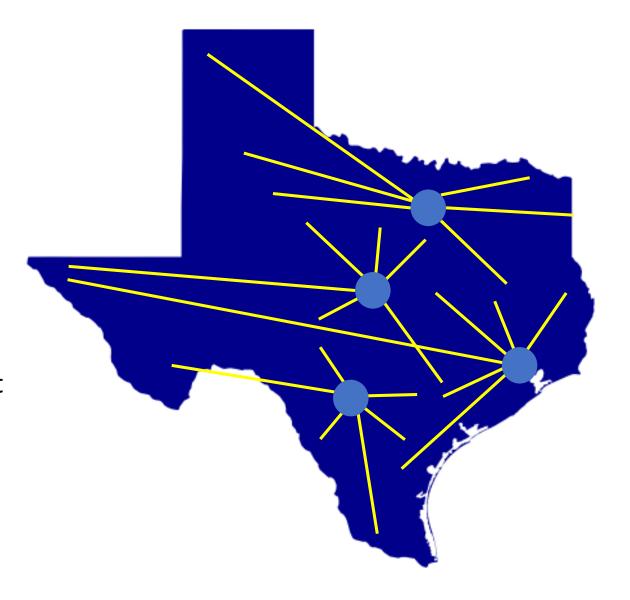
Risk Adjusted Outcomes

- Neither distance travelled nor transfer status were associated with increased operative mortality after multivariate risk adjustment.
- Undergoing surgery at high-volume centers demonstrated a protective effect.
- Pre-operative hemodynamic instability and previous cardiac surgery were associated with increased mortality.

Variable	Odds Ratio (95% CI)
Distance	0.998 [0.99-1.0004]
Transfer Status	0.78 [0.55-1.11]
Top Volume Quartile Hospital	0.41 [0.28-0.59]
Prior Cardiac Surgery	2.46 [1.43-4.20]
Pre-operative Hemodynamic Instability	2.10 [1.31-3.36]

Conclusion

- Interfacility transfer and distance travelled do not adversely impact outcomes after ATAAD repair.
- Travel distance alone should not preclude transfer of stable patients with ATAAD to experienced aortic centers.
- Regionalization of aortic dissection management is safe and has the potential to improve outcomes.



Thank you

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