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Cost and Resource Use Outcomes for Left Atrial Appendage Occlusion Patients Contraindicated to Transesophageal Echocardiography

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OBJECTIVES

Transesophageal echocardiography (TEE) 3D imaging is the standard of care imaging modality for performing left atrial appendage occlusion (LAAO) procedures. TEE contraindicated patients are at a higher risk of injury. This study examines the costs and resource utilization for patients with TEE absolute contraindications versus without and who underwent TEE imaging during their LAAO admission.

BACKGROUND

Atrial fibrillation patients undergo percutaneous LAAO procedures to reduce their stroke risk. The LAAO procedure is recommended in clinical guidelines for patients who are contraindicated to long-term anticoagulation[1]. It is performed through a venous puncture to guide a closure device to the heart (Figure 1).

The current standard of care imaging modality to guide LAAO procedures is 3D TEE. 3D TEE requires general anesthesia with fluoroscopy guidance, endotracheal intubation, and a dedicated operator.[2,3] A TEE catheter probe is placed through the esophagus for imaging of the heart (Figure 2).

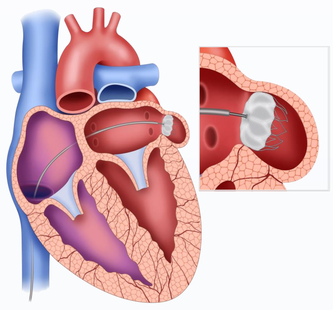


Fig 1. LAAO procedure

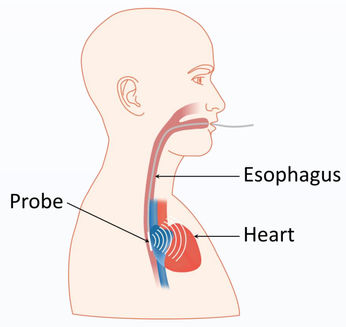


Fig 2. TEE imaging

Absolute contraindications to TEE include esophageal pathology or obstruction, perforated viscus, gastric volvulus, esophagectomy, and active upper gastrointestinal bleeding.[4,5,6] An absolute contraindication indicates a life-threatening risk of injury and should be avoided.

METHODS

The Premier PINC AI Healthcare Database (PHD) was used for the analysis. The PHD is a US hospital-based, all-payer database representing approximately 25% of all inpatient hospitalizations in the US.[7]

Inclusion and Exclusion Criteria

Inclusion Criteria
1. First LAAO procedure in the time frame from April 2016 through September 2022 as indicated by ICD-10-PCS procedure code 02L73DK or CPT code 33340.
2. Atrial fibrillation is listed as primary or secondary diagnosis.
Exclusion Criteria
1. Transfers from or to another facility where the patient continues their inpatient stay.
2. Providers do not continuously submit inpatient or outpatient data to Premier through 3-months post-index procedure.
3. Missing or unreasonable values for outcomes of interest (i.e., patient is missing key data for analysis).

TEE Absolute Contraindicated Patients

TEE Absolute Contraindication	ICD-10-CM Diagnosis Code
Esophageal pathology or obstruction (cancer, stricture, trauma, scleroderma, Mallory-Weiss tear, diverticulum)	C15.X D13.0 I85.00, I85.10, K22.X, K23, K57.X, M34.X, S27.81X, Q39.8, Q43.0, Z85.01
Perforated viscus	K63.1
Gastric volvulus	K56.2
Esophagectomy	Z90.49
Active upper gastrointestinal bleeding	I85.01, I85.11, I86.4 K25.0 K25.2 K25.4 K25.6 K26.0 K26.2 K26.4 K26.6 K27.0 K27.2 K27.4 K27.6 K28.0 K28.2 K28.4 K28.6 K29.X1 K92.1 K92.2

Outcomes

Index Admission Outcomes	Post-Discharge Outcomes at 3 Months
Length of hospital stay	All-cause readmissions at 3 months
Complications	Total post-discharge costs (inpatient + outpatient settings) at 3 months
Hospital cost per patient	
% of patients discharged home	

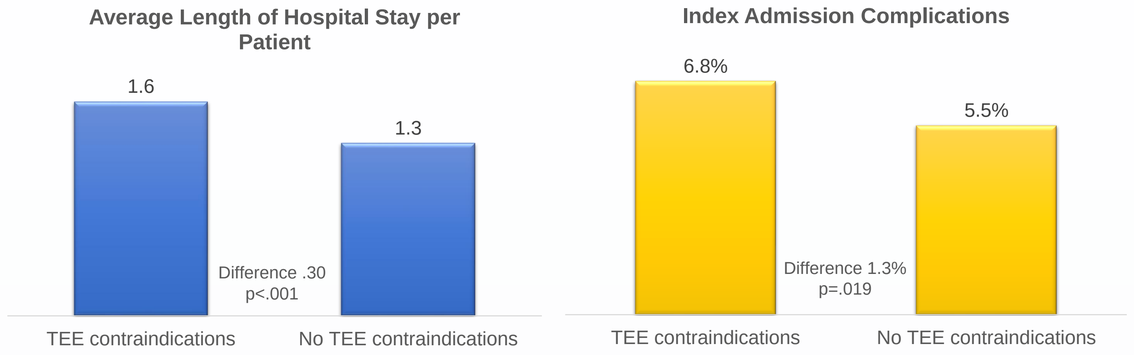
Statistical Methods

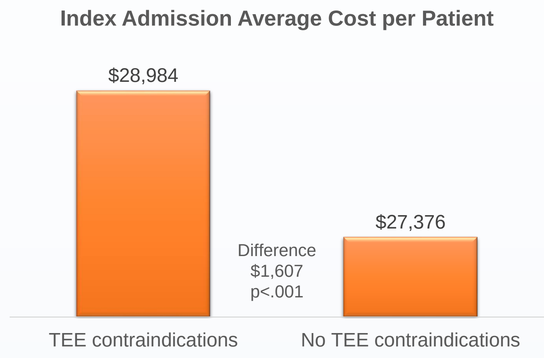
Multivariable generalized linear regression models were used to compare patients with and without TEE contraindications adjusted for patient, hospital, and admit characteristics. Dollars were converted to constant 2022 values using the Medical consumer price index.[8]

RESULTS

A total of 38,918 patients were identified who underwent TEE imaging, of which 1,626 (4.2%) had an absolute contraindication to TEE.

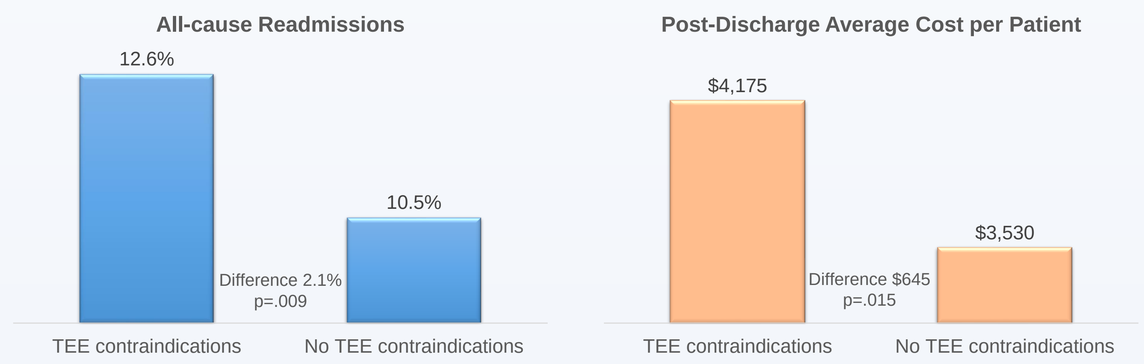
Index Admission Outcomes





- Patients with TEE contraindications were less frequently discharged home (92.5% vs 94.3%; p=.002) and had similar in-hospital mortality as those without TEE contraindications (0.12% vs 0.16%; p=0.639).

Post-Discharge Outcomes at 3 Months



CONCLUSIONS

LAAO patients who underwent TEE image guidance when contraindicated to TEE have significantly higher LOS, complications, costs, and 90-day readmits than those without contraindications.

Alternative imaging modalities that do not require endotracheal intubation should be considered to guide LAAO procedures for these patients. Intracardiac echocardiography is an alternative imaging modality to TEE and can also avoid general anesthesia.

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