

Introduction

Postoperative Delirium

- Common complication post hip/knee surgeries (9-28%)^{1,2}
- Associated with longer hospital stay, impaired recovery and rehab^{1,2}

Patent Foramen Ovale (PFO)

- Communication between left and right atria
- Risk of paradoxical embolization^{4,5}

Transthoracic Echocardiography (TTE)

- Convenient and minimally invasive
- Sensitivity 88%, specificity 97% compared to TEE³

Hypothesis

PFO is associated with an increased risk of postoperative delirium in patients undergoing elective hip or knee surgeries.

Methods

- Prospective cohort study
- Institutional Research Ethics Board approval obtained
- Registered at ClinicalTrials.gov NCT02400892

Inclusion Criteria

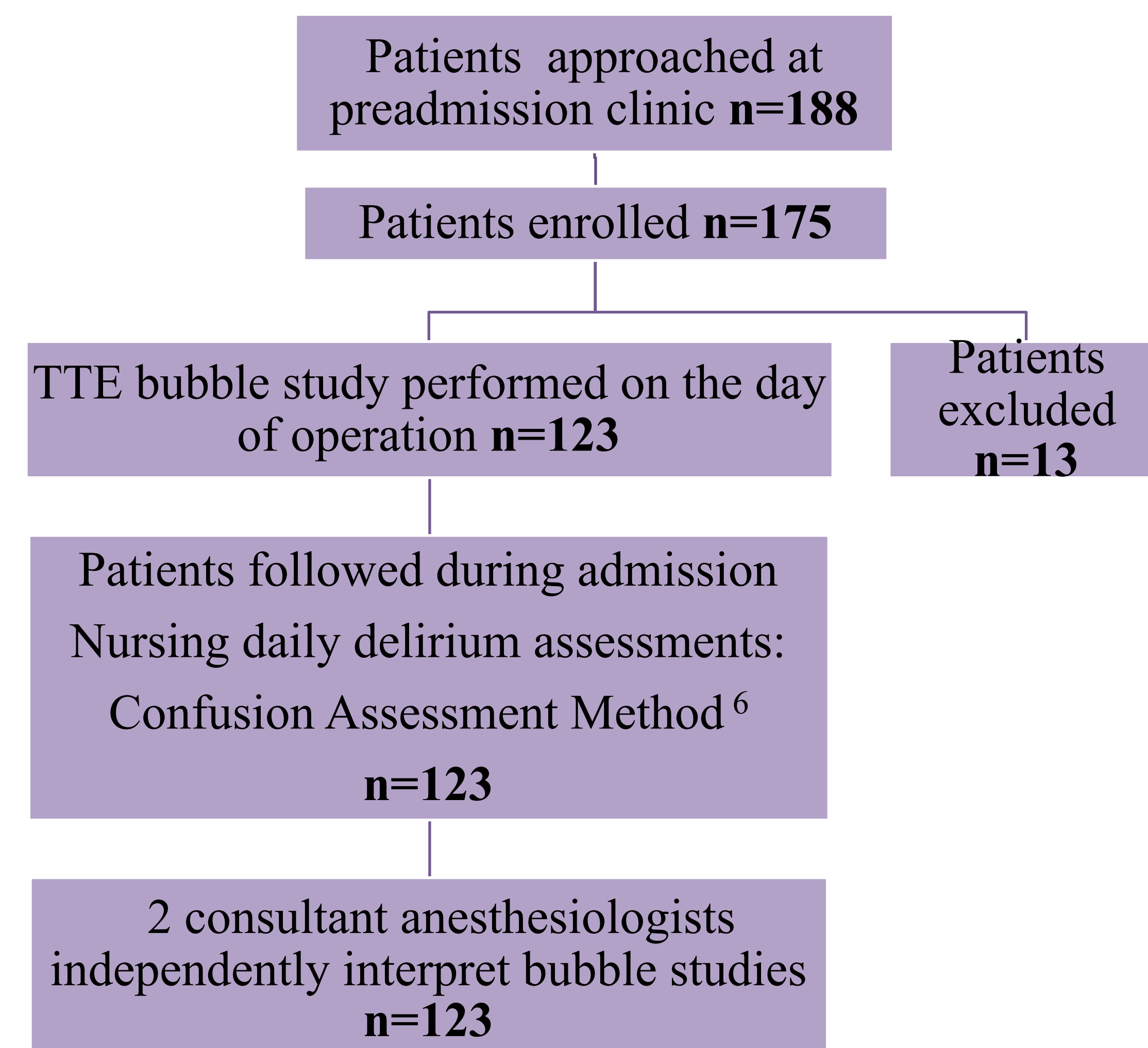
- Adults • Elective primary hip or knee replacement surgery
- Fluent in English • Informed consent obtained

Exclusion Criteria

- History of cardiac surgery or prosthetic heart valves • Other structural heart abnormalities • Neurological condition causing ongoing problems • Significant visual or hearing problems • Significant psychiatric problems • DVT/PE in the past year • Atrial Fibrillation in the past 3 months • Pacemaker or ICD • TIA or Stroke within the past year

Bubble Study Protocol

Peripheral IV insertion → Research team reviews patient → TTE 4 chamber view obtained (apical, subcostal or parasternal) → Patient performs Valsalva and 9cc normal saline agitated with 1cc air injected IV → Patient releases Valsalva → If bubbles seen in left atrium, positive study



Results

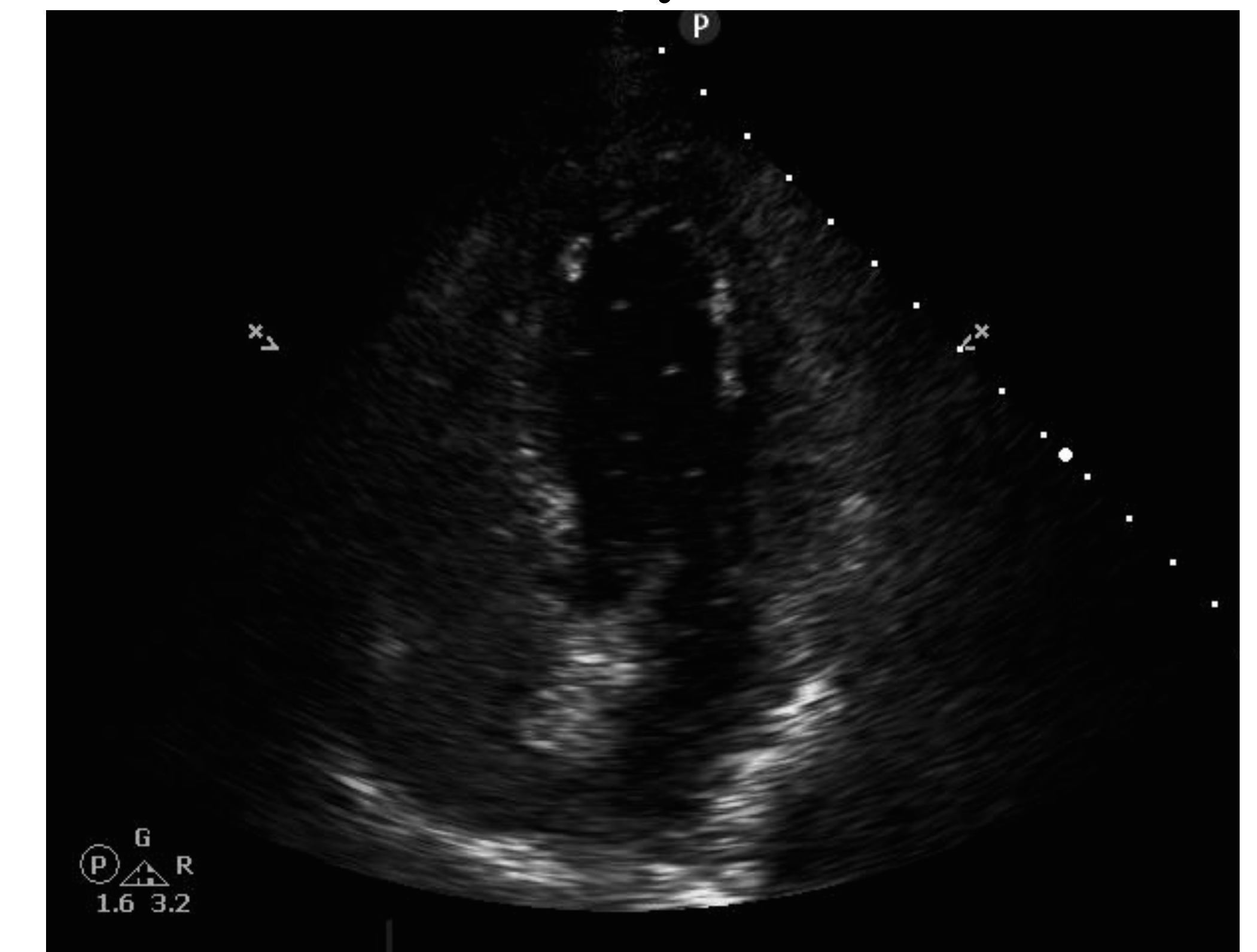
Table 1. Patient Characteristics

	PFO positive n=9 (7%)	PFO negative n=114
Mean Age (years)	62.9	63.5
Hip surgery	5 (56%)	55 (48%)
Knee surgery	4 (44%)	59 (52%)
BMI	30.0	32.8
Hypertension	4 (44%)	62 (54%)
Smoking	5 (56%)	43 (38%)
Diabetes	0	18 (16%)
CAD	0	2 (2%)

Table 2. Perioperative Data and Outcomes

	PFO positive n=9	PFO negative n=114
General Anesthesia	22 (22%)	13 (11%)
Spinal	7 (78%)	96 (84%)
Spinal and GA	0	5 (4%)
Post operative PCA	0	7 (6%)
Nerve Block	5 (56%)	29 (25%)
Spinal Narcotic	7 (78%)	96 (84%)
Surgery Duration (min)	60.4	70.1
Delirium Incidence	0	0
Hospital Stay (days)	2.1	2.3

Figure 1. Positive bubble study



Apical four-chamber view demonstrating opacification of the right atrium and ventricle with bubbles appearing in the left atrium and ventricle

Discussion

- In the population studied, delirium was not a common finding as suggested previously^{1,2}.
- The prevalence of a PFO in the specific population investigated was 7% (vs. 15-35%)³.
- No significant postoperative complication detected in any study patients. May reflect strict inclusion/exclusion criteria.
- TTE with a bubble study can be easily performed in the perioperative setting.
- Potentially, TTE may be of greater utility in non-elective cases such as for perioperative assessment of hip fracture patients.

Conclusions

PFO was not associated with postoperative delirium in patients going under primary hip or knee surgery.

References

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