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Dobutamine Stress Echocardiography for Preoperative Cardiac Risk Assessment in Patients Undergoing Non-Cardiac Surgery: Experience from a Tertiary Care Centre.

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Abstract

Background: Perioperative cardiac events remain a major cause of morbidity and mortality in patients undergoing non-cardiac surgery. Dobutamine Stress Echocardiography (DSE) is a well-established non-invasive modality for detecting inducible myocardial ischemia and assessing perioperative cardiac risk. ***Objective:*** To evaluate the diagnostic utility and prognostic value of DSE in preoperative cardiac risk stratification in patients undergoing non-cardiac surgery at a tertiary care centre. ***Methods:*** This retrospective observational study included patients referred for preoperative cardiac evaluation who underwent DSE. Baseline clinical data, DSE findings, and perioperative outcomes were analyzed. Patients were followed for perioperative and short-term cardiac events. ***Results:*** A total of 200 patients were included. DSE was negative in 193 patients (96.5%), positive in 3 (1.5%), and inconclusive in 5 (2.5%). Target heart rate was achieved in 98.5% of patients. Among those undergoing further evaluation, significant coronary artery disease (CAD) was identified in a minority. Perioperative cardiac events were rare, with only one fatal NSTEMI reported. The negative predictive value of DSE approached 99%. ***Conclusion:*** DSE is a safe and highly reliable modality for preoperative cardiac risk assessment. A negative DSE effectively predicts low perioperative cardiac risk, helping avoid unnecessary invasive procedures.

Keywords: Dobutamine stress echocardiography, preoperative evaluation, non-cardiac surgery, coronary artery disease, perioperative risk.

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INTRODUCTION

Perioperative cardiac complications account for a significant proportion of adverse outcomes following noncardiac surgery. Identifying patients at increased cardiovascular risk remains a cornerstone of preoperative evaluation.

Stress echocardiography is a well-established noninvasive imaging modality that detects inducible myocardial ischemia through assessment of regional wall motion abnormalities. It offers superior diagnostic accuracy compared to exercise electrocardiography by identifying early changes in the ischemic cascade before electrocardiographic alterations occur.

Dobutamine stress echocardiography (DSE) is particularly valuable in patients unable to perform exercise testing. Current guidelines recommend its use in patients with poor functional capacity (<4 metabolic equivalents) and intermediate or high clinical risk when results are expected to influence management decisions.

Despite strong evidence, DSE remains underutilized in many clinical settings. This study evaluates its role in preoperative cardiac risk assessment in a tertiary care population.

MATERIALS AND METHODS

Study Design and Population

This retrospective observational study included consecutive patients referred for preoperative cardiac risk assessment prior to noncardiac surgery who underwent DSE.

Clinical Evaluation
Baseline clinical data, including demographics, comorbidities, and surgical risk, were recorded. Risk stratification was performed using standard clinical criteria.

DSE Protocol
Dobutamine was administered in incremental doses (5–40 µg/kg/min) at 3-minute intervals. Atropine was administered when target heart rate was not achieved. Continuous electrocardiographic and blood pressure monitoring were performed. Target heart rate was defined as ≥85% of age-predicted maximum.

Image Acquisition and Interpretation
Standard echocardiographic views were obtained at baseline, intermediate, peak stress, and recovery phases. Studies were interpreted for inducible regional wall motion abnormalities.

Definitions
- Positive DSE: New or worsening regional wall motion abnormality
- Negative DSE: No inducible ischemia
- Inconclusive DSE: Failure to achieve target heart rate or suboptimal imaging

Outcome Measures
Primary outcomes:
- Perioperative myocardial infarction
- Arrhythmia
- Cardiac death

Secondary outcomes:
- Coronary angiography findings
- Need for revascularization

Statistical Analysis
Descriptive statistics were used to summarize data. Continuous variables are presented as mean ± standard deviation, and categorical variables as percentages. Diagnostic performance was assessed using negative predictive value.

RESULTS

Baseline Characteristics
A total of 200 patients were included:
- Male: 129 (64.5%)
- Female: 71 (35.5%)
- Approximately 50% aged >50 years
- Preserved left ventricular ejection fraction in 99.5%

DSE Findings
- Negative: 193 (96.5%)
- Positive: 3 (1.5%)
- Inconclusive: 5 (2.5%)
- Target heart rate achieved: 197 (98.5%)

Coronary Angiography
Six patients underwent coronary angiography:
- Significant CAD: 2
- Mild CAD: 2
- Normal coronaries: 2

Perioperative Outcomes
- Fatal myocardial infarction: 1
- Arrhythmia: 1 (medically managed)
- Noncardiac deaths: 2
- No cardiac events in majority of negative DSE patients

Diagnostic Performance
The negative predictive value of DSE was approximately 99%, indicating excellent prognostic utility.

DISCUSSION

This study demonstrates that DSE is a highly effective modality for preoperative cardiac risk stratification. The high negative predictive value observed confirms that a negative DSE reliably predicts low perioperative cardiac risk.

These findings are consistent with previous studies showing that patients with a negative stress echocardiogram have a very low incidence of cardiac events, typically less than 1% per year.

Clinical Implications
DSE is particularly useful in:
- Patients with poor functional capacity
- Intermediate-risk surgical candidates
- Patients with multiple cardiovascular risk factors

It allows:
- Safe surgical clearance
- Avoidance of unnecessary invasive procedures
- Identification of patients requiring further evaluation

Comparison With Existing Literature
Our findings align with published data demonstrating high negative predictive value and low complication rates associated with stress echocardiography.

Safety
DSE was well tolerated in this cohort, with minimal adverse events. Rare complications such as arrhythmias or stress-induced cardiomyopathy have been reported but were not significant in this study.

Limitations
- Retrospective design
- Single-center study
- Limited sample size
- Lack of long-term follow-up
- Not all patients underwent coronary angiography.

CONCLUSION

Dobutamine stress echocardiography is a safe, reliable, and clinically valuable tool for preoperative cardiac risk assessment in patients undergoing noncardiac surgery.

A negative DSE is strongly predictive of favorable perioperative outcomes and may reduce the need for invasive investigations.

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