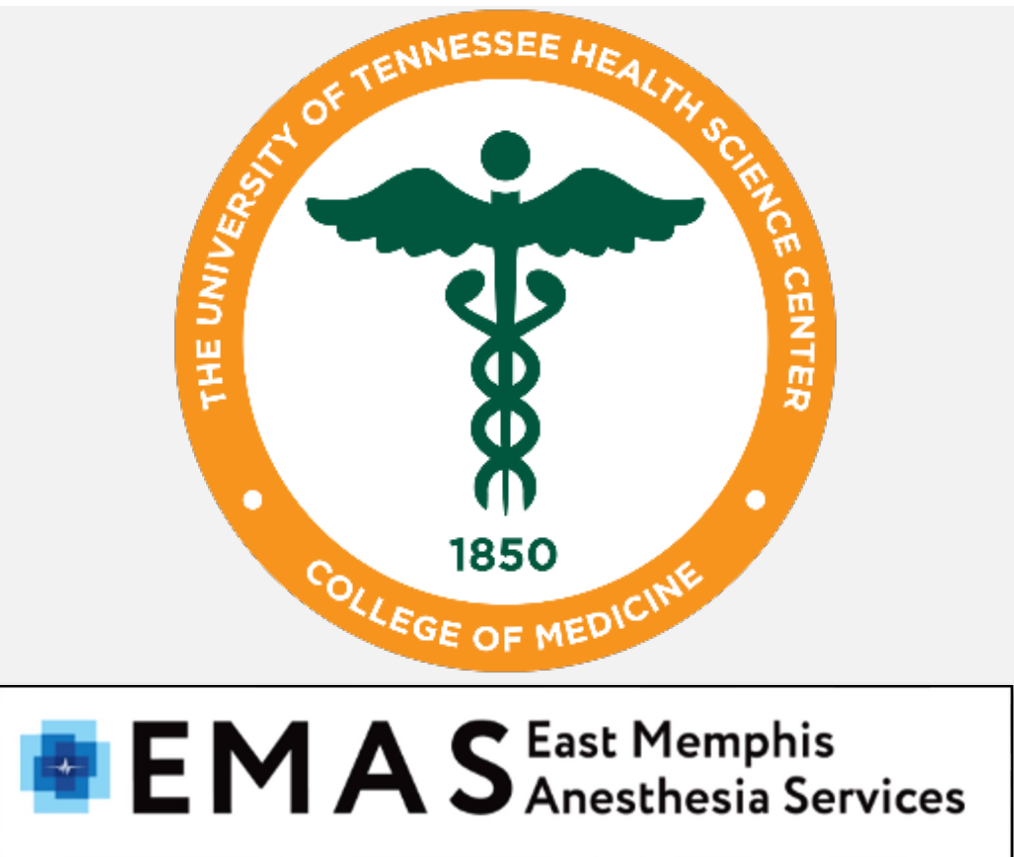




The Incidence & Impact of Conversion to Instrumented Airway in Ambulatory Upper Extremity Orthopedic Surgery

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Introduction

Elective outpatient orthopedic upper extremity cases are preferably performed in ambulatory settings to reduce costs and improve patient satisfaction [1]. Peripheral nerve blocks (PNB) can facilitate fast-track discharge, reduce opioid use, and avoid airway instrumentation [1]. Conversion to an instrumented airway may reduce efficiency and increase pain and opioid use perioperatively. Causes for conversion include inadequate PNB performance, inadequate time for proper PNB set up, perioperative patient anxiety, tourniquet-related pain, or airway obstruction. Supraclavicular PNB failure rate is low [2], but the incidence and clinical impact of various causes of conversion to an instrumented airway have not been thoroughly studied in ambulatory surgery.

Methods

We conducted a retrospective review of 200 outpatient upper extremity procedures planned PNBs with MAC (monitored anesthesia care) or GA (general anesthesia) with a natural airway. Approval for this study was obtained from UTHSC IRB Memphis (24-10106-XM). Patient data, including comorbidities were analyzed along with PNB performed, local anesthetic dose, tourniquet duration, and opioid administration. Conversion to an instrumented airway was the primary endpoint. Secondary measures included post anesthesia care unit (PACU) times, pain scores, opioid consumption, incidence of surgeon infiltration and provider variability. Charts were reviewed for notes or evidence to suggest causes for conversion.

Results

Conversion to general anesthesia with an instrumented airway occurred in 9.5% (19/200) of cases. These patients demonstrated:

- Longer PACU stays ($p=0.007$).
- Higher discharge pain scores ($p<0.001$).
- Greater incidence of PACU opioid use ($p=0.048$)
- Inadequate time for PNB (47%) onset as the most common cause, followed by perioperative patient anxiety (42%).

Supraclavicular PNB was performed in 89.5% of cases. 30ml of ropivacaine was utilized for 67% of cases. 13.5% of PNB utilized dexmedetomidine (25 to 100 mcg) (off-label). 20.5% of patients had an ICB block. Conversion cases were not associated with ASA physical status or any identified comorbidity. Provider-specific conversion rate variability ranged between 0%-22.2%.

Conversion occurred before surgery start time in 60% of cases, within 11 minutes of surgery start in 40% of cases, and none after 40 minutes. 15.8% of conversion cases involved the elbow, and 67% of these cases had an ICB performed. There were no identified incidences of local anesthetic systemic toxicity or postoperative respiratory compromise.

Table 1: Demographics

Characteristic	Data
Total Number of Patients	200
Gender	[Male]: 45.5% [Female]: 54.5%
Mean Age (Years)	[Overall]: 54.8 [Converters]: 53.5 [Non-converters]: 54.9
Comorbidities Evaluated (Overall population%)	OSA: 8% Anxiety/Depression: 26.5% COPD: 5% Obesity: 40% Fibromyalgia/Chronic Pain: 6%

Results Continued

BMI (kg/m²)	[Overall] Mean: 29.1 Range: 17.6–54.8 [Converters] Mean: 30.4 Range: 19.0–49.9 [Non-converters] Mean: 28.9 Range: 17.6–54.8
ASA Class	[Overall] 1: 15% 2: 54.5% 3: 30.5% [Converters] 1: 15.8% 2: 47.4% 3: 36.8% [Non-converters] 1: 14.9% 2: 55.2% 3: 29.8%
Conversion to General Anesthesia	[Yes]: 19 (9.5%) [No]: 181 (90.5%)
Procedure Type	[Overall]: Bone=49%, Tissue=51% [Converters]: Bone=52.6%, Tissue=47.4 [Non-Converters]: Bone=48.6%, Tissue=51.4%

Table 2: Results

Characteristic	Data
Block Types	[Supraclavicular (SC)]: 89.5% [Interscalene* (IS)]: 6% [Axillary]: 4%
Ropivacaine Dose (mL)	Mean: 28.7 mL, Range: 20–30 mL
ICB Performed	[Yes]: 20.5% [No]: 79.5%
Mean Tourniquet Time (minutes)	[Overall]: 22.16 [Converters]: 24.68 [Non-converters]: 21.89
Mean PACU Time (minutes) (p=0.007)	[Overall]: 30.47 [Converters]: 37.37 [Non-converters]: 29.75
PACU Opioid Use (PO & IV)	[Overall]: 12.5% [Converters]: 21.1% [Non-converters]: 11.6%
Discharged Pain Score (1-10 scale) (p<0.001)	[Overall]: 0.31 [Converters]: 1.21 [Non-converters]: 0.22
Surgeon Infiltration	[Overall]: 12% [Converters]: 15.8% [Non-converters]: 11.6%
Identified Causes of Conversion	[Anxiety/Depression]: 42% [Inadequate PNB Onset Time]: 47% [Suboptimal PNB Technique]: 21%

*US image indicates supraclavicular approach

Discussion

This study identifies a significant clinical impact of conversion to an instrumented airway during outpatient orthopedic upper extremity surgery. Early conversions were not primarily due to suboptimal PNB technique. Late conversions could reinforce the value of ICB blocks for managing tourniquet site or ischemic pain [3],

Discussion Continued

however, there were no late conversions to confirm the latter theory. The significant association between perioperative outcomes and conversions underscores the value of safely and reliably performed PNB.

Identifying provider variability, allowing an adequate PNB setup time of 40 minutes [4], and individualized anesthesia plans for patients with anxiety may further improve outcomes, enhance patient satisfaction, and streamline recovery in the ambulatory setting. Further study is needed to provide useful insight into guidelines for patient selection criteria utilizing PNB with MAC or GA with a natural airway for ambulatory orthopedic upper extremity surgery.

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