



Original Contribution

Factors associated with hospital admission after rotator cuff repair: the role of peripheral nerve blockade



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Abstract

Study objective: The objective was to analyze the impact of a peripheral nerve block in addition to general anesthesia on hospital admission after surgical rotator cuff repair.

Design: This was a population-based outcome study. The cost effectiveness of ambulatory rotator cuff repair relies on the discharge of patients on the day of surgery. As the impact of a peripheral nerve block in addition to general anesthesia on this outcome is unknown, we sought to elucidate this subject using population-based data.

Patients and methods: Information on patients undergoing rotator cuff surgery under general anesthesia with or without the addition of a peripheral nerve block (GN vs G) from a retrospective database provided by Premier Perspective, Inc, Charlotte, NC (<http://www.premierinc.com>), was analyzed. Using multilevel multivariable regressions, we evaluated the independent impact of the type of anesthesia on the outcomes hospital admission, combined major complications, and increased hospital costs.

Results: We identified 27,201 patients who underwent surgical rotator cuff repair. Approximately 89% (24,240) of patients were discharged on the day of surgery, whereas 11% (2961) were admitted to the hospital. The admission rates for the GN group were 9.1% and 11.2% for the G group ($P = .0001$). The multivariable regression models showed that patients with the addition of a peripheral nerve block had 18% less risk of being admitted to the hospital (relative risk [RR] = 0.82; 95% confidence interval [CI], 0.74–0.91; $P = .0003$) compared with those without this intervention. Differences in risk for combined major complications (RR = 1.00; 95% CI, 0.83–1.20; $P = .9751$) or increased hospital costs (RR = 0.97; 95% CI, 0.93–1.02; $P = .2538$) were nonsignificant.

Discussion: For patients undergoing surgical rotator cuff repair under general anesthesia, the addition of a peripheral nerve block may be associated with a reduction in the need for postoperative hospital admission after ambulatory surgery. Although the reason for this finding has to remain speculative, better pain control may play a role.

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1. Introduction

Surgical rotator cuff repair is one of the most frequent orthopedic surgical procedures performed in the United States [1] and is mostly performed on an ambulatory basis [2]. Medical advances including the evolution of arthroscopic techniques and the use of regional anesthetic techniques have been credited for the ability to discharge patients to their home on the same day [3]. This assumption seems feasible given that uncontrolled pain may be a major contributor of unexpected admissions associated with ambulatory surgery [4,5] and shoulder procedures may be more painful than many other ambulatory procedures [6].

Both general anesthesia in addition to peripheral nerve blocks and general anesthesia alone (GN and G) have been used for these cases [7,8]. Although G remains the most commonly used technique for many orthopedic ambulatory cases, the use of GN has been increasing [9]. The addition of peripheral nerve blocks may result in decreased perioperative pain and opioid consumption, and thus reduced incidence of adverse effects and concomitantly higher patient satisfaction [10].

Despite the potential benefits of GN, population-based information on the utilization of this technique and its association with hospital admission among surgical rotator cuff repairs remains largely unstudied. Using a large national database, we primarily hypothesized that the rate of GN use was small and that patients with this additional procedure had lower risk of being admitted to the hospital after rotator cuff repair procedures compared with those with G alone. Secondly, we determined if the GN group was associated with lower risk of major complications and hospital costs compared with the G group.

2. Material and methods

2.1. Data source, ethics approval

An administrative retrospective database provided by Premier Perspective, Inc, Charlotte, NC (<http://www.premierinc.com>), was used for this study. This database contains complete billing and coding information concerning a patient's visit from approximately 400 hospitals located throughout the United States from January 2007 and September 2011. Its billing data consist of hospital charge codes that were mapped by Premier to its standard charge codes. The hospital reviews, corrects, and agrees to this mapping before finalization. The Premier database also provides specific information about diagnoses and procedures carried out during inpatient and outpatient visits using *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM), codes and Current Procedural Terminology (CPT) codes. To assure data quality, an extensive process is followed before integration of entries into the database (verification, reconciliation, validation control). Furthermore, manual and data warehouse audits are performed [11]. This study was exempt from consent requirements by our Institutional Review Board

because data are deidentified and in accordance with the Health Insurance Portability and Accountability Act [12].

2.2. Study sample

Patients were included in the study sample if they had a rotator cuff repair procedure (ICD-9 code 86.63) and received either GN or G only. The type of anesthesia used was identified using billing data, CPT codes, and ICD-9 codes.

2.3. Demographic and healthcare related variables

Patient- and health care-related characteristics were compared among GN and G groups. Demographic variables included age, sex, race (white, black, Hispanic, other), admission status, and year of procedure. Health care-related variables included hospital teaching status, location (urban, rural), and hospital size (<300, 300-499, > 500 beds). The prevalence of individual comorbidities and overall comorbidity burden (Deyo comorbidity index categories 0, 1, 2, >3) was assessed using Deyo groups and the method described by Deyo et al [13]. Additional comorbidities evaluated were sleep apnea and obesity. The ICD-9 codes used to identify comorbidities are listed in Table 1.

2.4. Outcomes

The primary outcome of this study was hospital admission. Secondary outcomes were combined major complications and hospital costs. Combined major complications were indicated by having infections, acute renal failure, gastrointestinal complications, myocardial infarction (MI), cardiac complications (non-MI), pulmonary embolism, pneumonia, pulmonary compromise, cerebrovascular events, or mortality. Complications were defined by appropriate ICD-9 codes. In addition, *30-day mortality* was evaluated and defined as death within 30 days of any admission. Utilization of the intensive care unit (ICU), blood product transfusion, and mechanical ventilation were determined by using billing information. Respective billing and ICD-9 codes can be found in Table 1. Hospital costs represent the actual cost in US dollars to treat the patient during hospitalization. Because of its skewed distribution, it was dichotomized to create the outcome, increased hospital costs, as cost greater or less than the 75 percentile of the observed data. To assess the sensitivity of this definition, separate analyses were also performed where increased cost was defined with different cutoffs (50%-90%).

3. Statistical analysis

3.1. Univariable analyses

The type of anesthesia used (GN vs G) was characterized by demographic (age, sex, race) and outcome variables listed above. For categorical variables, frequencies were determined

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