SCIENTIFIC ARTICLE

Comparison of Postoperative Complications Associated With Anesthetic Choice for Surgery of the Hand

Joshua W. Hustedt, MD, MHS,* Andrew Chung, DO,* Daniel D. Bohl, MD, MPH,‡ Neil Olmschied, BA,* Scott G. Edwards, MD*†

Purpose There is a recent trend toward performing most hand surgery procedures under local and/or regional anesthesia without sedation. However, little evidence exists regarding the postoperative complications associated with local/regional anesthesia without sedation, especially compared with local/regional anesthesia with sedation or general anesthesia.

Methods Patients who underwent hand procedures as part of the American College of Surgeons National Surgical Quality Improvement Program were identified. Thirty-day postoperative complications were compared among patients who received local/regional anesthesia without sedation, local/regional anesthesia with sedation, and general anesthesia with adjustment for patient and procedural factors.

Results We identified 27,041 patients as having undergone hand surgery from 2005 to 2013. A total of 4,614 underwent local/regional anesthesia without sedation (17.1%), 3,527 underwent local/regional anesthesia with sedation (13.0%), and 18,900 underwent general anesthesia (69.9%). Overall, both local/regional anesthesia with and without sedation were associated with fewer postoperative complications compared with general anesthesia. In patients aged over 65 years, there was an additional benefit of avoiding all forms of sedation; these data showed that treatment with local/regional anesthesia without sedation decreased the odds of sustaining a postoperative complication compared with sedation and general anesthesia.

Conclusions Although the overall risk of postoperative complications remains small in hand surgery, these data suggest that avoiding general anesthesia may decrease the overall risk of sustaining postoperative complications. In addition, for patients aged over 65 years, avoiding any form of sedation may decrease the risk of postoperative complications. *(J Hand Surg Am. 2016;■(■):■−■. Copyright © 2016 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Prognostic II.

Key words Hand surgery, postoperative complications, anesthesia, orthopedics.

Additional Material at jhandsurg.org

*From the *Department of Orthopedics, University of Arizona College of Medicine—Phoenix; and the †Center for Orthopedic Research and Education, Phoenix, AZ; and the ‡Department of Orthopedics, Rush University Medical Center, Chicago, IL.*

Received for publication April 29, 2016; accepted in revised form October 7, 2016.

No benefits in any form have been received or will be received related directly or indirectly to the subject of this article.

Corresponding author: Joshua W. Hustedt, MD, MHS, Department of Orthopedics, University of Arizona College of Medicine—Phoenix, 1320 N. 10th Street, Suite A, Phoenix, AZ 85006; e-mail: Joshuahustedt@email.arizona.edu.

0363-5023/16/■ ■-0001$36.00/0
http://dx.doi.org/10.1016/j.jhsa.2016.10.007

Local or regional anesthesia without sedation has gained considerable popularity in recent years for surgery of the hand.[1] Some proponents have suggested using local anesthesia without a tourniquet[2] whereas others have suggested employing regional anesthesia without sedation.[3] Both groups suggest that anesthesia without sedation can be used for a large percentage of hand surgery cases. Evidence suggests that administering local or regional anesthesia without sedation has the potential benefits of reducing overall health care spending while increasing perioperative efficiency.[2–6]

Despite the popularity of local and regional anesthesia, little evidence is available on the postoperative outcomes of anesthetic choice for hand surgery. Several reports found a reduction in postoperative complications associated with avoiding general anesthesia, by using either local[7] or regional anesthesia.[3,8] Yet, many of these studies failed to differentiate between patients who did or did not receive sedation in addition to local or regional anesthesia. Because sedation has been associated with increased complications in some studies, this distinction is an important factor that is not clearly defined in the current hand surgery literature.[3,8] Furthermore, the available evidence is from small studies lacking the power to determine a significant difference between anesthesia choices.

The purpose of this study was to compare the risk of sustaining postoperative complications among patients treated with local/regional anesthesia without sedation, local/regional anesthesia with sedation, and general anesthesia for hand surgery.

MATERIALS AND METHODS

Patients who underwent hand surgery between 2005 and 2013 were identified as part of the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP). The ACS-NSQIP is a surgical registry that samples patients from community and academic centers nationwide.[9] The program identifies patients undergoing surgical procedures and tracks them for 30 days for the development of postoperative complications. Trained ACS-NSQIP data specialists compile a broad range of patient demographic characteristics and outcomes data from individual medical record review. Previous authors identified a subset of 208 hand-specific Current Procedural Terminology (CPT) codes that are representative of hand surgery in ACS-NSQIP.[10] Inclusion in the study was based on the presence of one or more of these 208 hand-specific CPT codes during the study period. Exclusion criteria included any additional CPT coding outside these 208 hand-specific CPT codes, which often represented hand-specific procedures being done in conjunction with other procedures such as a ganglion cyst excision at the same time as total knee arthroplasty. Finally, patients without a recorded anesthesia type were excluded.

A total of 27,173 patients were initially identified from the ACS-NSQIP database for inclusion in the study. Seventy-eight were excluded for having additional procedures outside hand surgery (0.2%) and 53 were excluded for not having a recorded anesthetic (0.2%). This left 27,041 for inclusion in the study. This study sample represents patients identified by a random sampling selection of all hand surgery procedures conducted at ACS-NSQIP centers.

The primary outcome measure of the study was the presence or absence of postoperative complications within 30 days of surgery. Postoperative complications of interest to hand surgeons have been previously outlined by authors using the ACS-NSQIP database; these outcomes were used in this study.[11] Patients were considered to have had a serious complication if any of the following occurred during the first 30 postoperative days: organ space infection, sepsis, septic shock, deep surgical site infection, wound dehiscence, pulmonary embolism, ventilation greater than 48 hours, unplanned intubation, acute renal failure, cardiac arrest requiring cardiopulmonary resuscitation, myocardial infarction, stroke, coma more than 24 hours, graft/prosthesis/flap failure, or peripheral nerve injury. Patients were considered to have had a complication if any of the following occurred during the first 30 postoperative days: any of the serious complications, deep vein thrombosis, superficial surgical site infection, bleeding transfusions, progressive renal insufficiency, urinary tract infection, or pneumonia.

The primary independent variable of interest in the study was anesthetic choice. Anesthetic choice was grouped as local/regional anesthesia without sedation, local/regional anesthesia with sedation, and general anesthesia. These categories were determined based on individual review from the medical records performed by ACS-NSQIP study personnel. In addition to anesthetic choice, a variety of baseline demographic data and comorbidities collected by ACS-NSQIP were used to adjust for patient-specific factors in statistical modeling. Demographic data included age and sex. Comorbidity data included body mass index (BMI), diabetes mellitus, congestive heart failure, functional health status (defined by ACS-NSQIP as independent or dependent based on whether the patient required assistance with activities of daily living), hypertension,