

# Spinal anesthesia: the new gold standard for total joint arthroplasty?

Laura Matsen Ko, Antonia F. Chen

Rothman Institute, Philadelphia, PA 19107, USA

Correspondence to: Antonia F. Chen, MD, MBA. 925 Chestnut Street, Philadelphia, PA 19107, USA. Email: antonia.chen@rothmaninstitute.com.

Submitted Jun 08, 2015. Accepted for publication Jun 09, 2015.

doi: 10.3978/j.issn.2305-5839.2015.06.12

View this article at: <http://dx.doi.org/10.3978/j.issn.2305-5839.2015.06.12>

The study by Basques *et al.* (1) is one in a series of studies that have demonstrated that regional anesthesia is more advantageous than general anesthesia for total hip arthroplasty (THA) patients. Previous studies have shown a multitude of advantages including decreased cost, complications, infections and improved pain control. A randomized study comparing forty patients found that total costs per case were almost halved in the spinal group in comparison to the general anesthesia group. This was a result of both less cost for anesthesia and less cost for recovery. In the same study there was no relevant difference in anesthesia times. Patients in the general anesthesia group were admitted to the PACU with a higher pain score and needed more analgesics than patients in the spinal group (2). Spinal anesthesia has also demonstrated fewer complications in comparison to general anesthesia. A meta-analysis of ten independent trials found a significant decrease in DVT, PE, surgical time, blood transfusion (3). Another study similarly found a 25% decrease in intra-operative blood loss and 50% reduction of intraoperative transfusion and a 20% lower total transfusion requirements (4). General anesthesia has been associated with higher risk of surgical site infection as well as perioperative hyperglycemia in comparison to spinal anesthesia (5,6).

This study based out of the Yale University School of Medicine identified 20,936 patients from the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database, where 60.9% of the surgeries were done under general anesthesia and 39.1% of the THAs were performed under spinal anesthesia. When compared with spinal anesthesia, they found general anesthesia for THA had longer operative and postoperative recovery room time. More importantly, general anesthesia was associated with prolonged postoperative ventilator use (odds ratio: 5.81), cardiac arrest (odds ratio: 5.04), stroke (odds ratio: 2.51), unplanned

intubation (odds ratio: 2.17), and blood transfusion (odds ratio: 1.34). No difference was found in preoperative room time, postoperative length of stay or readmission. Given that the study was a retrospective review and not randomized, one would be concerned for potential selection bias of patients, however, the study was done with a propensity-adjusted multivariate analysis.

The ACS-NSQIP database collects data from more than 370 participating hospitals in the United States. It is a clinical database that is validated and has risk-adjusted methodology to compare observed to expected outcomes for a wide variety of surgeries. The ACS-NSQIP database was started in the Veterans Health Administration (VHA) in the mid-1980's when the VHA was criticized for their high operative mortality. Comparative validation studies have confirmed high reliability and comparability (7). The methodology is based on labor-intensive manual review with trained abstractors, but is not available to all hospitals. A trained nurse abstractor reviews clinical documentation for 150 variables including preoperative patient demographics, risk factors, procedure, and 30-day complications on a monthly, systematic, random sample of patients undergoing a particular operation.

Basques' report is one of the first large, multicenter studies comparing operating room times, length of stay, adverse events and readmission between elective THA patients who received general versus spinal anesthesia. Study results indicate that patients who receive spinal anesthesia had better outcomes, regardless of preoperative medical comorbidities. The most novel observation is the higher overall adverse event rate of 23.5% for patients undergoing general anesthesia compared to 19.7% for those undergoing spinal anesthesia (odds ratio: 1.31).

A shortcoming of this study is that it suggests that the cause of different outcomes is solely dependent on the type of anesthesia administered. While neuroaxial anesthesia is

associated with hypotension that may reduce blood loss and decrease operative time, it is not the only factor associated with reduced operative time and reduced adverse events. Unfortunately, the study does not assess the effect of surgeon and medical center case volumes. Higher volume arthroplasty surgeons and medical centers that perform a large volume of THAs often use spinal anesthesia. Could it be that more experienced surgeons, skilled anesthesiologists, well-trained assistants and experienced postoperative care accounted for the difference in outcomes? The published data on the 'volume' effect indicates that it is of at least the same magnitude as the 'anesthetic' effect (8-12). Of note, most surgeons doing hip and knee arthroplasty do less than ten such cases per year, which could affect the outcomes of the database study (8).

In order to conclude that the choice of anesthetic solely determines the outcomes listed in this study, it will be necessary to show a reduction in adverse outcomes in a prospective, randomized controlled study within a homogenous population of high volume medical centers and arthroplasty surgeons. However, this study gives credence to other studies in literature that support the use of spinal anesthesia over general anesthesia in elective THA cases.

## Acknowledgements

None.

## Footnote

*Conflicts of Interest:* L Matsen Ko: Nothing to disclose; AF Chen: Nothing to disclose related to the topic presented in this Editorial; Consultant—Joint Purification System; Research Support—3M and Myosience; Committees—American Academy of Orthopaedic Surgeons.

## References

- Basques BA, Toy JO, Bohl DD, et al. General compared with spinal anesthesia for total hip arthroplasty. *J Bone Joint Surg Am* 2015;97:455-61.
- Gonano C, Leitgeb U, Sitzwohl C, et al. Spinal versus general anesthesia for orthopedic surgery: anesthesia drug and supply costs. *Anesth Analg* 2006;102:524-9.
- Mauermann WJ, Shilling AM, Zuo Z. A comparison of neuraxial block versus general anesthesia for elective total hip replacement: a meta-analysis. *Anesth Analg* 2006;103:1018-25.
- Maurer SG, Chen AL, Hiebert R, et al. Comparison of outcomes of using spinal versus general anesthesia in total hip arthroplasty. *Am J Orthop (Belle Mead NJ)* 2007;36:E101-6.
- Chang CC, Lin HC, Lin HW, et al. Anesthetic management and surgical site infections in total hip or knee replacement: a population-based study. *Anesthesiology* 2010;113:279-84.
- Gottschalk A, Rink B, Smektala R, et al. Spinal anesthesia protects against perioperative hyperglycemia in patients undergoing hip arthroplasty. *J Clin Anesth* 2014;26:455-60.
- Cima RR, Lackore KA, Nehring SA, et al. How best to measure surgical quality? Comparison of the Agency for Healthcare Research and Quality Patient Safety Indicators (AHRQ-PSI) and the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) postoperative adverse events at a single institution. *Surgery* 2011;150:943-9.
- Katz JN, Losina E, Barrett J, et al. Association between hospital and surgeon procedure volume and outcomes of total hip replacement in the United States medicare population. *J Bone Joint Surg Am* 2001;83-A:1622-9.
- Ravi B, Jenkinson R, Austin PC, et al. Relation between surgeon volume and risk of complications after total hip arthroplasty: propensity score matched cohort study. *BMJ* 2014;348:g3284.
- Hasan SS, Leith JM, Smith KL, et al. The distribution of shoulder replacement among surgeons and hospitals is significantly different than that of hip or knee replacement. *J Shoulder Elbow Surg* 2003;12:164-9.
- Sharkey PF, Shastri S, Teloken MA, et al. Relationship between surgical volume and early outcomes of total hip arthroplasty: do results continue to get better? *J Arthroplasty* 2004;19:694-9.
- Kaneko T, Hirakawa K, Fushimi K. Relationship between peri-operative outcomes and hospital surgical volume of total hip arthroplasty in Japan. *Health Policy* 2014;117:48-53.

**Cite this article as:** Matsen Ko L, Chen AF. Spinal anesthesia: the new gold standard for total joint arthroplasty? *Ann Transl Med* 2015;3(12):162. doi: 10.3978/j.issn.2305-5839.2015.06.12