

General versus spinal anesthesia in joint arthroplasties

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Over the last decades demographic changes and high success rates have continued to increase the utilization of total joint replacements with estimates of continued dramatic growth (1,2). It has become obvious that given this often elderly and comorbidity ridden patient population joint arthroplasties have exerted significant medical and economic stresses on the health care system. In this context, the identification of intervention with the goal to improving perioperative outcomes has become more important than ever.

In a recent population based study, Basques *et al.* conducted an analysis including nearly 21,000 total hip arthroplasty recipients who either had neuraxial or general anesthesia (3). The main goal of this investigation was to compare postoperative adverse events and utilization of hospital resources among the two anesthesia techniques. General anesthesia was utilized in about 61% of the cases. These patients, were younger, had less comorbidities but an increased BMI compared to the neuraxial cohort. The authors found that higher odds for complications were associated with the use of general anesthesia. Compared to neuraxial, general anesthesia was associated with higher odds for any adverse event in general [odds ratio, 1.31 (95% CI, 1.23-1.41); $P < 0.001$] as well as specific adversities such as prolonged postoperative ventilator use [odds ratio, 5.81 (95% CI, 1.35-25.06); $P = 0.018$] and unplanned intubation [odds ratio, 2.17 (95% CI, 1.11-4.29); $P = 0.024$], cardiac arrest [odds ratio, 5.04 (95% CI, 1.15-22.07); $P = 0.032$] and the need for blood transfusions [odds ratio, 1.34 (95% CI, 1.25-1.45); $P < 0.001$]. Further, the utilization of general compared to neuraxial anesthesia was associated with increased operative and postoperative room time, although no differences were found for length of hospital stay and

odds for readmission.

These results are in concordance with a significant number of recent population based studies which have shown that the choice of anesthesia technique might significantly contribute to the improvement of perioperative outcomes. Numerous studies strongly support the notion that choosing regional instead of general anesthesia may improve not only medical perioperative outcomes but positively affect resource utilization (4-7). Resulting benefits range from decrease of blood transfusion use and mechanical ventilation need to reduced mortality risk.

Given these findings, however, it is intriguing that among various data sets the utilization of neuraxial anesthesia has been found to be fairly low compared to the general anesthesia approach. In the study by Basques *et al.*, as in other publications on the topic, about 40% of the patients or less received neuraxial anesthesia (3,7). While the reasons for this underutilization remain largely unknown (8) an additional point for concern in light of the consistently better outcomes reported with neuraxial anesthesia are variations in care and disparities in anesthesia practice showing differences in its application among patient subgroups and hospitals (9-11).

The study by Basques *et al.* further deserves to be put in the context of the recent emergence of large database anesthesia related outcomes research (3). Although the subject of differential outcomes among anesthesia types has been the subject of numerous clinical studies, these have rarely reached sufficient power to allow for the reaching of meaningful conclusions and lacked external validity. Meta-analytical approaches allowed for pooling of data thus allowing for the examination of larger cohorts, but at the expense of including studies spanning over multiple decades

questioning relevance in today's practice. Further, these analyses only allowed for the study of limited outcomes as available in the individual investigations. Irrespectively, these publications also suggested improved outcomes with regional versus general anesthesia (7,12).

With the advent of large database research, many previous limitations regarding sample size and external validity could be overcome and data from real-world practice could be examined without the constraints of often unrealistic inclusion and exclusion criteria of randomized controlled trials. These advantages however come at the expense of the inability to determine causality. Thus, despite of the overwhelming number of studies supporting the use of neuraxial anesthesia, the lack of answers regarding causal relationships has been the reason why controversy still persists in this matter (13-15). In addition, comorbidities, surgical pathologies and complications are based on ICD-9 coding which can be burdened by coding bias despite all quality checks. Further, anesthesia technique represents only one of many perioperative interventions influencing overall outcomes and residual confounding certainly exists.

Therefore, the interpretation of results from database research and other studies favoring neuraxial anesthesia has to be made carefully. Taking prevalent disparities into account and differences in clinical practice of regional anesthesia, superiority of regional anesthesia could be subject to confounding. The question whether regional anesthesia might represent a surrogate marker for a "specific type of perioperative" clinical practice remains unknown. Furthermore, the issue whether the avoidance of general anesthesia or the implementation of neuraxial anesthesia itself confers a positive effect, remains debatable (12), although studies including cohorts that received a combination of both approaches have been suggested to fair better than general only patients.

In the face of these limitations only a large multicenter prospective pragmatic trial may offer the definitive answer to the remaining questions regarding causality and mechanisms. Until such studies are performed—which may be never given the enormous scope and cost—clinicians should take comfort in the fact that virtually no studies have found inferior outcomes associated with neuraxial when compared to general anesthesia.

In conclusion, assuming that the positive outcomes related to neuraxial anesthesia are causally related a wider utilization among the over 1 million patients undergoing joint arthroplasty annually in the United States alone might

produce a significant impact on the health care system as a whole (1).

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Footnote

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