

COMPARATIVE EVALUATION OF EFFICACY OF SPINAL AND GENERAL ANESTHESIA FOR ORTHOPAEDIC SURGERIES AT A TERTIARY CARE HOSPITAL IN GUJARAT REGION

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Abstract

Background: Orthopedics surgery is a specialty of surgery dedicated to the prevention, diagnosis, and treatment of diseases and injuries of the musculoskeletal system in all age groups. This study was conducted to compare the efficacy of spinal and general anesthesia for orthopaedic surgery. **Materials and Methods:** In this study, 100 subjects who underwent TKA were enrolled. Of 100 subjects, 40 patients underwent bilateral staggered surgeries for the first time, while 60 patients underwent unilateral TKAs. Intravenous propofol (2-3 mg/kg) was used for induction in patients undergoing TKA under general anesthesia, either in combination with or without rocuronium (0.6–1.0 mg/kg). **Results:** In this study, there were 60 subjects in the GA group and 40 subjects in the SA group. In the general anaesthesia group, number of hospital stays was 5 days and in the spinal anaesthesia group, it was 3 days. Acute kidney injury was seen in 8 subjects of general anaesthesia group and 5 subjects of spinal anaesthesia group. 7 subjects and 2 subjects of general anaesthesia and spinal anaesthesia group, respectively showed cardiovascular complications. Pulmonary complications were seen in 6 subjects of GA group and 7 subjects of SA group. Neurologic complications were seen in 4 subjects of GA group and 2 subjects of SA group. Surgical site infections were seen in 3 subjects of GA group and 1 subject of SA group. Total 33 (55%) complications were seen in GA group and 20 (50%) complications were seen in SA group. Hence, lesser complications were seen in spinal anaesthesia group as compared to general anaesthesia group. The difference in the efficacy of both kind of anaesthesia was not significant. **Conclusion:** As per the results of this study, lesser complications were seen in spinal anaesthesia group as compared to general anaesthesia group. The difference in the efficacy of both kind of anaesthesia was not significant.

INTRODUCTION

Orthopedics surgery is a specialty of surgery dedicated to the prevention, diagnosis, and treatment of diseases and injuries of the musculoskeletal system in all age groups.^[1] Total knee arthroplasty (TKA) is the ultimate treatment option for patients with end-stage knee osteoarthritis. As both life expectancy and the prevalence of obesity have gradually increased, the burden of TKA has expanded and is expected to continue growing.^[2,3]

Although it was reported that postoperative morbidity and mortality have declined with improved surgical and anaesthetic management, there still exists the risk of morbidity after TKA, which depends on the age and comorbidities of the patient.^[4,5] Moreover, pneumatic tourniquets, commonly used in TKA, are already known to induce an enhanced inflammatory response.^[6] Excessive postoperative inflammation is associated with unfavourable consequences, although inflammation is a normal response to tissue damage and helps in injury recovery.^[7]

This study was conducted to compare spinal anaesthesia and general anaesthesia for Total Knee Arthroplasty (TKA).

MATERIALS AND METHODS

In this study, 100 subjects who underwent TKA were enrolled. The procedure was informed to the subjects and the subjects had been asked to give consent. The subjects who were not willing to participate in the study and who were not willing to give consent had been excluded from the subjects. Also, those subjects who required blood transfusion had been excluded from the study. Of 100 subjects, 40 patients underwent bilateral staggered surgeries for the first time, while 60 patients underwent unilateral TKAs. Intravenous propofol (2-3 mg/kg) was used for induction in patients undergoing TKA under general anaesthesia, either in combination with or without rocuronium (0.6–1.0 mg/kg). Sevoflurane or desflurane, inhalational anaesthetics, were used to ventilate the patients' lungs while maintaining an oxygen saturation of 80%. The airway and ventilation were then maintained by inserting an i-gel of the proper size. Both the minimum alveolar concentration of the inhalational substance (1-2.5) and the oxygen concentration (40–50%) were decreased. A constant flow rate of 1.5–2 L/min was maintained for new gas. The respiratory rate was calibrated at 10–12/min in relation to the end-tidal

carbon dioxide (EtCO₂), and the tidal volume was fixed at 6–8 mL/kg. Following the completion of the surgery, the lungs were ventilated with 80% oxygen and the inhalational agents were stopped. Statistical analysis was conducted using SPSS software.

RESULTS

There were 60 subjects in the general anaesthesia group and there were 40 subjects in the spinal anaesthesia group. In the general anaesthesia group, number of hospital stays was 5 days and in the spinal anaesthesia group, it was 3 days. Acute kidney injury was seen in 8 subjects of general anaesthesia group and 5 subjects of spinal anaesthesia group. 7 subjects and 2 subjects of general anaesthesia and spinal anaesthesia group, respectively showed cardiovascular complications. Pulmonary complications were seen in 6 subjects of GA group and 7 subjects of SA group. Neurologic complications were seen in 4 subjects of GA group and 2 subjects of SA group. Surgical site infections were seen in 3 subjects of GA group and 1 subject of SA group. Total 33 (55%) complications were seen in GA group and 20 (50%) complications were seen in SA group. Hence, lesser complications were seen in spinal anaesthesia group as compared to general anaesthesia group. The difference in the efficacy of both kinds of anaesthesia was not significant.

Table 1: Distribution of subjects in the two groups

Groups	Number of subjects	Percentage
Group 1 (General Anaesthesia)	60	60%
Group 2 (Spinal Anaesthesia)	40	40%
Total	100	100%

Table 2: Comparison between the two groups

Postoperative outcomes	GA group	SA group
Number of ICU stays (Days)	5	3
Acute kidney injury	8	5
Cardiovascular complication	7	2
Pulmonary complication	6	7
Neurologic complication	4	2
Surgical site infection	3	1

DISCUSSION

Most patients scheduled to undergo a TKA, a common but painful surgical procedure, are already at an inflammatory state, which is a part of the osteoarthritis pathophysiology.^[8] In TKA patients, preoperative inflammation is enhanced by the inflammatory response induced by the surgery.^[9] Surgery is an invasive procedure that is followed by a stress response. The extent of stress response to surgery is known to be associated with the type of surgery, and major joint arthroplasties can cause an extensive stress response.^[10] In addition, tourniquet use causes skeletal muscle ischemia-reperfusion injury and results in increased adhesiveness, trapping and activation of leukocytes, increased inflammatory response, coagulation

activity, and endothelial damage, thereby increasing the SIR to surgery.^[11] The degree of inflammation in TKA patients is considered “the predicting factor” for recovery after the surgery.^[12] Therefore, the identification of modifiable factors to reduce the SIR is vital in improving the clinical course after TKA.

This study was conducted to compare spinal anaesthesia and general anaesthesia for Total Knee Arthroplasty (TKA).

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anaesthesia group. 7 subjects and 2 subjects of general anaesthesia and spinal anaesthesia group, respectively showed cardiovascular complications. Pulmonary complications were seen in 6 subjects of GA group and 7 subjects of SA group. Neurologic complications were seen in 4 subjects of GA group and 2 subjects of SA group. Surgical site infections were seen in 3 subjects of GA group and 1 subject of SA group. Total 33 (55%) complications were seen in GA group and 20 (50%) complications were seen in SA group. Hence, lesser complications were seen in spinal anaesthesia group as compared to general anaesthesia group. The difference in the efficacy of both kind of anaesthesia was not significant. Kim HJ et al (2021),^[13] compared the effects of general and spinal anaesthesia on the SIR after total knee arthroplasty (TKA), based on C-reactive protein (CRP) levels, the platelet-lymphocyte ratio (PLR), and the neutrophil-lymphocyte ratio (NLR). Patients who underwent TKA between January 2014 and December 2018 were included. Electronic medical records of the patients were retrospectively reviewed and analysed. To reduce the impact of potential confounding factors, they performed propensity score matching according to the anaesthetic technique. A total of 1311 TKA cases were analysed. After propensity score matching, the maximal CRP value and changes in CRP levels in the general anaesthesia group were higher than those in the spinal anaesthesia group. However, the maximal NLR and PLR and the changes in NLR and PLR were not different between the two groups. There were no differences in postoperative clinical outcomes. Spinal anaesthesia tended to induce a lower inflammatory response than general anaesthesia when considering CRP levels in patients undergoing TKA. However, the effects of anaesthetic techniques on the overall outcomes were not significant. Chandler K et al (2021),^[14] determined the differences in time expenditure between spinal and general anesthesia for total knee arthroplasty to optimize OR efficiency and reduce costs. A retrospective analysis of 200 unilateral total knee arthroplasty procedures (CPT Code 27447) was performed from Jan 2017 - July 2019 at one institution. 100 of these received spinal anesthesia, and 100 received general anesthesia. Patient charts were reviewed to obtain demographic, surgical, and anesthetic data. Time to prepare the patient for surgery and total preoperative time was significantly decreased in the general anesthesia group (24.4 minutes vs. 18.5 minutes; $p < 0.0001$ and 25.4 minutes vs. 20.4 minutes; $p = 0.012$). After surgery, the time to remove the patient from the operating room was significantly decreased in the spinal group (4.8 minutes vs. 7.0 minutes; $p = < 0.0001$). Nonoperative total time was not significantly different between the two groups (49.3 minutes vs. 46.6 minutes; $p = 0.1127$). While there are significant

differences in certain operating room time periods between spinal and general anesthesia, these differences are effectively cancelled out when considering total operating room time.

CONCLUSION

As per the results of this study, lesser complications were seen in spinal anaesthesia group as compared to general anaesthesia group. The difference in the efficacy of both kind of anaesthesia was not significant.

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