

# Comparison of General, Neuraxial/Regional Anesthesia in Total Knee Arthroplasty

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## ABSTRACT

**Background:** Total knee arthroplasty is an important procedure requiring accuracy and skill. The choice of anesthesia for better outcomes is a mandatory requirement in this procedure.

**Objective:** To compare the outcomes of general verses neuraxial/regional anesthesia for total knee arthroplasty.

**Study Design:** Comparative analytical study

**Place and Duration of Study:** Department of Orthopaedics, Sahara Medical College, Narowal from 1<sup>st</sup> April 2019 to 31<sup>st</sup> March 2021.

**Methodology:** Ninety nine patients within the age group >45 years were divided into three groups according to the anaesthetic technique applied (general, spinal or epidural). They were divided in three groups and each group had 33 patients. Patient's informed consent was taken. Clinical history and information regarding to their physical health were recorded prior to operation.

**Results:** The mean age of the patients was 50.6±7.16 years. There were 53.5% male and 46.5% females in total. The BMI among three groups had no significant variance. Blood loss during surgery and duration of surgery were lower in general anaesthesia group. Post-operative pain within six hours and transfusion rate was less in neuraxial/regional groups.

**Conclusion:** Neuraxial anesthesia is related with improved and effective outcomes in total knee arthroplasty with patients having less complains of pain especially in epidural and spinal anesthesia respectively. Blood loss was slightly and insignificantly lower in general anesthesia than epidural or spinal anesthesia types.

**Key words:** Anesthesia, General anesthesia, Spinal anesthesia, Epidural

## INTRODUCTION

Spinal anesthesia is actually a neuraxial technique requiring local- anesthesia being administered in subarachnoid region. This required accuracy in positioning for injecting anesthesia in the intrathecal space. Spinal/neuraxial anesthesia is only given in lumbar section (mid-low lumbar). This is to avoid hazards related with spinal, cervical damage.<sup>1</sup> Regional anesthesia includes neuraxial inhibitor anesthesia as spinal, caudal or epidural. In various surgical techniques regional/neuraxial anesthesia has better advantage the general anesthesia techniques. Other benefits as pain management, improved cardiac as well as pulmonary functioning, reduction in blood loss and side effects allows short recovery period with regional/neuraxial anesthesia. In knee arthroplasty decreased spinal anesthetic doses and analgesics gives high efficiency in relieving pain and increasing patient's satisfaction. Epidural anesthesia is a type of regional anesthetics providing multi-modal pain relief in post-operative care.<sup>2</sup>

With advancement in science and technology the frequency of surgeries related with hip and knee are forecasted to ascend in coming decade.<sup>3</sup> The related option of best suited anesthesia for this purpose have also advanced but are also becoming expensive.<sup>4</sup> The cardiac surgeries only rely on general anesthesia; however, knee arthroplasty can have extended option such as neuraxial or regional anesthesia. The significant factor involved in

selecting anesthetic technique aims on decreasing mortality or morbidity rate.<sup>5,6</sup> A good anesthetic technique requires satisfying health outcomes and should be cost effective.<sup>7-12</sup> An observation mega study confirmed neuraxial anesthesia in arthroplasty as an anesthetic procedure which significantly reduces morbidity among patients.<sup>6</sup>

The present study was designed to compare the outcomes related with general anesthesia and neuraxial/regional anesthesia various techniques for better patient care who undergo complete knee arthroplasty.

## MATERIALS AND METHODS

It was a comparative analytical study conducted at Department of Orthopaedics, Sahara Medical College, Narowal from 1<sup>st</sup> April 2019 to 31<sup>st</sup> March 2021. There were 99 patients within the age group of > 45 years who were enrolled as study participant. The sample size was calculated by the frequency of patients coming for knee arthroplasty in clinical setting. The confidence interval of 95% and 5% margin of error were used for calculating this sample size. The study included ASA I-III score. Those patients having previous history of surgery of the same knee and also having BMI>35 were excluded from the study. After approval from hospital ethical board each patient was asked for their written permission for being a participant of this study and consent for the anesthetic technique on random selection. A preoperative assessment

including medical, clinical history, laboratory tests, anesthesia directed examination which included air way evaluation and physical site examination was conducted. Co-morbidities as advanced obesity, spinal stenosis, ankylosing spondylitis, rheumatoid or osteo-arthritis were common in knee arthroplasty patients. X-ray in antero-posterior, mechanical and sagittal axis view were taken and evaluation was done by using 15D questionnaire, Weight and height assessment of each patient was conducted. Patients were divided into three groups. Each group had 33 patients in it. Group A, B and C were administered general, spinal and epidural anesthesia respectively. All of the three techniques were according to the standard operating procedure already documented for knee arthroplasty with specific anesthesia.<sup>13</sup> Post-operative patients were taken to recovery and their blood pressure, pulse as well as breathing was continuously monitored. Patients were hospitalized until complete recovery.

Data was analyzed by using statistical analysis package SPSS-24. The quantitative and qualitative variables were analyzed by using 't' test and chi square.  $P < 0.05$  was considered significant.

## RESULTS

The mean age of the patients was  $50.6 \pm 7.16$  years. The gender distribution among groups was insignificant. However, within total there were 53.5% male and 46.5% females. The mean BMI had no significant difference among three groups (Table 1).

The present study also determined the duration of surgery which was least in case of general anesthesia technique than in spinal anesthesia patients. The blood lost during surgery was insignificant among three groups with decreased trend in general anesthesia group in comparison with other groups. The need of blood transfusion was very low in neuraxial/regional anesthesia groups (Table 2).

Table 1: Distribution of Age, gender and BMI among three anesthetic groups

Variable	General anesthesia	Spinal anesthesia	Epidural anesthesia
Age (years)	51±7	52±6.5	49±8
Male/Female	18/15	16/17	19/14
BMI (kg/m <sup>2</sup> )	27.7±2.2	28.7±2.5	26±2.1

Table 2: ASA status, surgery duration and operative blood loss within groups

ASA physical status	General anesthesia	Spinal anesthesia	Epidural anesthesia
I	10	5	6
II	17	19	18
III	6	9	9
Surgery duration (min)	44±11	49±7	48±8
Operative Blood loss (ml)	208±55	218±25	220±32

$P < 0.05$

Table 3: Pain score (within first 6 hours) and discharge among groups

Group	Pain score*	Discharge	
		Day 1	Day 2'
General anesthesia	85%	1	23
Spinal anesthesia	72%	1	25
Epidural anesthesia	71%	1	24

\*Post-operative,  $p = 0.06$

The post-operative pain score showed better outcomes in regional/neuraxial groups within first 6 hours than general anesthesia. Patients who underwent epidural and spinal anaesthesia complaint less if pain after

operation than those who undergo general anesthesia (Table 3).

## DISCUSSION

The current research showed equal number of distribution of male and female within various groups. There was a total majority of males than females. A review and a meta-analysis reported in the similar context showed no significant gender specificity in complete knee arthroplasty cases. In cases with end stage osteo-arthritis total knee arthroplasty is considered as an efficient treatment plan. In USA greater than 0.55 million total knee arthroplasties are conducted annually.<sup>14,15</sup>

The present study results demonstrated that general anesthesia was linked with less blood loss and shorter operative duration than regional anesthetic techniques. General anesthesia has evidently been reported for the above in various researches with less dizziness and better orthostatic outcomes than spinal anesthesia. The pain score after within first 6 hours has been reported to be lesser in neuraxial anesthesia. Although post six hours it improves in general anesthesia than regional/neuraxial techniques.<sup>16,17</sup>

General anesthesia technique has its own pros and cons with greater chances of complication in health compromised patients than spinal or epidural techniques. Cohort studied elaborated advantage of general anesthesia in shorter time in surgical procedure but overall time is much longer than regional anesthetic procedures. The neuraxial techniques have less post-operative blood loss and transfusion chances.<sup>17</sup>

The choice of any anesthesia procedure in terms of recovery period is greatly affected by age of patient, advanced ASA scoring. In cohort studies females might show poor long-term outcomes than males.<sup>18,19</sup> This might be due to the reason of extended house hold working hours and deprived knowledge about their health status which attribute in long term negative effect on their knee recovery.<sup>20</sup>

## CONCLUSION

Neuraxial anesthesia is related with improved perioperative outcomes in total knee arthroplasty. Epidural is most effective in terms of pain scoring, and surgery duration followed by spinal anaesthesia. Patients complained minimal post operative pain after spinal anaesthesia in comparison to general anesthesia group of patients. The blood loss had insignificant difference among three groups such as general, spinal and epidural anesthesia with a slightly decreased trend of blood loss in general anesthesia group.

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