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# WHICH SHOULD BE PRIORITISED: KNEE SURGERY OR SPINE SURGERY? A RETROSPECTIVE STUDY ON TREATMENT PROTOCOLS FOR PATIENTS WITH COEXISTING PATHOLOGIES.

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## Abstract

### Background

The increasing prevalence of concurrent degenerative knee and lumbar spine disorders presents a challenge for surgical intervention, as the optimal order of treatment remains unclear. This study aims to investigate the influence of knee deformity on surgeons' preferences for treatment orders, contributing to informed decision-making in managing these complex cases.

### Methods

This retrospective study, conducted over one year at the Indira Gandhi Institute of Medical Sciences (IGIMS) in Patna, involved 50 patients with low back pain and radiculopathy. Participants underwent comprehensive assessments based on predefined inclusion and exclusion criteria, followed by caudal epidural steroid injections.

### Results

Responses were obtained from 25 knee arthroplasty and 25 spine surgeons, achieving response rates of 50% for each specialty. The median clinical experience post-training was 26 years for both groups. Recommendations for "TKA first" varied significantly among knee arthroplasty surgeons, with rates of 32%, 76%, 60%, 8%, and 80% across five scenarios ($P < 0.001$). In comparison, spine surgeons recommended "spine surgery first" at rates of 24%, 80%, 52%, 16%, and 76%, also showing significant differences ($P < 0.001$). Most spine surgeons indicated their decision would remain unchanged if the procedure was a decompression.

### Conclusion

This study emphasizes the significant influence of knee deformity on treatment order preferences among knee arthroplasty and spine surgeons, highlighting the need for individualized decision-making in managing patients with concurrent degenerative knee and lumbar spine disorders.

***Keywords:*** *Knee Surgery, Spine Surgery, Treatment Order, Degenerative Disorders, Surgeons' Preferences.*
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## Introduction

The rising incidence of degenerative joint problems globally is evident in the United States, where about 500,000 total knee arthroplasties (TKAs) and more than 200,000 lumbar spine fusions are conducted each year [1,2]. Numerous patients have simultaneous degenerative illnesses of the knee and lumbar spine, requiring surgical surgery for both ailments. The determination of whether to prioritize knee or spine surgery is crucial and frequently complicated by the severity of both conditions [3,4].

In these situations, shared decision-making is crucial, as it amalgamates the patient's choices with the healthcare provider's evaluation of the severity and ramifications of each disease. When knee and lumbar spine problems present comparable symptomatology, there is inadequate information to determine the ideal therapy sequence [5]. Prior studies suggest that patients with lumbar spinal stenosis undergoing total knee arthroplasty generally achieve inferior functional outcomes relative to those without spinal conditions. One study indicated that knee function post-TKA was markedly inferior in patients with lumbar spinal stenosis compared to those without spinal pathology [6]. In contrast, several studies have shown that spinal function ratings may deteriorate in patients with knee osteoarthritis (OA) following lumbar spine surgery, especially when compared to individuals without knee arthritis [7-9].

In light of the absence of prospective outcome studies explicitly comparing the two treatment sequences, evaluating clinical experience or expert opinion offers a significant foundation for directing future research. This study seeks to interview seasoned knee arthroplasty and spine surgeons to assess their preferred treatment sequence for patients with dual degenerative knee and lumbar spine conditions. In this setting, lumbar spine diseases will be characterized as degenerative

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spondylolisthesis accompanied by spinal stenosis, whereas knee arthritis may manifest numerous deformities, including varus or valgus deformities.

This study aims to investigate the influence of knee deformity on surgeons' preferences for treatment orders, contributing to informed decision-making in managing these complex cases.

## Methods

### Study Design and Setting

This retrospective study was conducted at the Indira Gandhi Institute of Medical Sciences (IGIMS) in Patna.

### Study size

This study included 50 patients with low back pain and radiculopathy.

### Participant Selection

The target participants for the survey included experienced orthopedic surgeons specializing in knee arthroplasty and spine surgery at IGIMS Patna. With a sample size set of 50 participants, a representative cohort from both specialties was obtained, focusing on those with substantial experience in managing patients with concurrent knee and lumbar spine disorders.

### Study scenario

A survey featuring five hypothetical patients with equally symptomatic degenerative disorders of the knee and lumbar spine was conducted. Participants were asked to choose their preferred treatment order—total knee arthroplasty (TKA) or spine surgery first—or indicate "No preference," with each scenario consistently defining the lumbar condition as lumbar spinal stenosis resulting from degenerative grade 1 lumbar spondylolisthesis. The knee disorders varied among five scenarios:

- Osteoarthritis (OA) with varus alignment
- Osteoarthritis (OA) with valgus alignment
- Rheumatoid arthritis with significant flexion deformity
- Osteoarthritis (OA) without deformity
- Bilateral osteoarthritis (OA) with "windswept" deformities

Each scenario included a comprehensive patient history, physical examination findings, and relevant imaging studies, ensuring that both conditions were equally severe and indicated for surgical intervention. All fictional patients were assumed to have no treatment preference and were willing to undergo surgery.

### Survey Administration

The survey was created using Qualtrics (Provo, UT), a web-based survey platform, and distributed via email to selected participants. To optimize response rates and minimize fatigue, several strategies were employed. Each email invitation was personalized and sent by one of the senior authors. Participants were informed that they would receive the study results once the survey was completed. Emails were sent in the morning on designated days, with follow-up reminders issued to non-respondents after one or two weeks. Additionally, spine surgeons were queried on whether their treatment decision would alter if the proposed spine surgery involved a less invasive decompression procedure rather than a spinal fusion.

### Data Analysis

The treatment preferences were analyzed using the chi-squared test to compare responses across the five scenarios for each specialty. Free-text comments provided by the surgeons were examined through qualitative content analysis, identifying frequently used terms through text mining, followed by thematic summarization.

### Statistical Methods

Descriptive statistics were used to summarize response rates and demographics, presented as medians with interquartile ranges or percentages. The chi-squared test (or Fisher's exact test when appropriate) compared treatment choices across scenarios, with significance set at $\alpha = 0.05$. Data analysis, including text mining, was conducted using Python version 3.8 (Python Software Foundation).

### Ethical Consideration

Informed consent was taken from all participants.

## Results

Responses were collected from 25 knee arthroplasty surgeons and 25 spine surgeons, yielding response rates of 50% (25/50) for each specialty. The median years of clinical practice experience post-training was 26 years (IQR 18-31) for both knee arthroplasty and spine surgeons. The practice locations of the surgeons varied widely (Table 1).

**Table 1: Summary of Surgeons' Recommendations Across Scenarios**

| Scenario | Recommendation for "TKA First" (%) | Recommendation for "Spine Surgery First" (%) |
|---|---|---|
| 1 | 32 | 24 |
| 2 | 76 | 80 |
| 3 | 60 | 52 |
| 4 | 8 | 16 |
| 5 | 80 | 76 |

The recommendations among knee arthroplasty doctors for "TKA first" varied markedly throughout the five scenarios, with percentages of 32%, 76%, 60%, 8%, and 80% for scenarios 1 through 5, respectively ($P < 0.001$).

A comparable pattern was noted among spine doctors, who advocated for "spine surgery first" at rates of 24%, 80%, 52%, 16%, and 76% for identical scenarios ($P < 0.001$). Both specialties exhibited notable disparities in the proportions of surgeons advocating for "spine surgery first" across the situations ($P < 0.001$). Significantly, scenarios 2 and 5, characterized by valgus abnormalities of the knee, had the highest percentages of surgeons selecting "TKA first." In contrast, scenario 4, characterized by the absence of notable knee deformity, exhibited the least preference for "TKA first" and the greatest propensity for "spine surgery first." Only the spine doctors were asked if their decision would alter if the intended spine operation was exclusively a decompression treatment. The majority expressed their intention to uphold their initial decision, with the following responses: 80% (20/25), 92% (23/25), 84% (21/25), 88% (22/25), and 92% (23/25) for situations one through five, respectively.

## Discussion

This survey study examined the treatment choices of knee arthroplasty and spine surgeons for patients with simultaneous and equally symptomatic degenerative diseases affecting the knee and lumbar spine. The clinical scenarios were designed to represent different types and severities of knee abnormalities, with some, especially valgus deformities, seeming more radiologically severe than others. The survey allowed for subjective expert replies, confirming our premise that both knee arthroplasty and spine surgeons preferred to perform total knee arthroplasty (TKA) first in the presence of substantial knee abnormalities. Notably, in contrast to a previous examination of patients with hip and spine diseases, the preferences of knee arthroplasty surgeons were consistent with those of spine surgeons in all circumstances [10].

Surgeons' remarks suggested a correlation between knee deformity and the inclination for "TKA first," presumably owing to the influence of knee deformity on patient mobility and daily functions. Both groups perceived valgus deformity as more problematic than varus deformity, likely due to the former being associated with a greater extent of deformity. Moreover, knee arthroplasty surgeons may discover that controlling soft tissue balancing in instances of extreme valgus is more intricate than in varus patients, occasionally necessitating the use of more limited implants [11,12]. The preference for "spine surgery first" in patients devoid of substantial knee deformity may indicate the perception that mechanical knee pain, in the absence of such deformity, is less pressing.

Notwithstanding the unique specializations of knee arthroplasty and spine surgeons, both cohorts showed analogous therapeutic inclinations throughout all situations. This indicates that both specialties acknowledge that intricate knee abnormalities, which result in considerable pain and activity restrictions, can significantly affect therapy prioritization decisions [13-15].

This study has significant drawbacks. The survey reflects the prevailing opinions at IGIMS Patna and may not be relevant in other circumstances. Future prospective observational or interventional research is necessary to further corroborate these findings. The response rate of roughly 50%, while superior to many published surveys among orthopedic doctors, may nevertheless be considered a drawback. Furthermore, other lumbar spine illnesses were not assessed, and criteria such as patient preferences and socioeconomic status—both crucial in shared decision-making—were omitted.

A notable disadvantage is the absence of quantitative annotation for the severity of knee abnormalities in the radiological images, along with the lack of a broad variety of deformity types. Consequently, readers may need to interpret the findings with a certain level of subjectivity. For instance, the authors did not provide advice for mild valgus deformities or those with severe varus deformities. The hypothesis testing and conclusions are solid, indicating that the kind and severity of knee deformity greatly affect surgeons' decision-making. This discovery highlights the significance of identifying knee deformity as a crucial element in developing treatment protocols for patients with simultaneous knee and spine disorders.

This study sought to offer pertinent insights into how knee deformity affects treatment order preferences among doctors and academics, rather than to create a standardized consensus on existing practices. The determination to prioritize knee or spine surgery should emphasize personalized, collaborative decision-making.

## Conclusion

This survey study emphasizes the impact of knee deformity on treatment order preferences among knee arthroplasty and spine surgeons for patients with dual degenerative knee and lumbar spine conditions. Both specialties showed a propensity to prioritize total knee arthroplasty in the presence of substantial knee abnormalities, especially valgus deformities. The findings underscore the need to account for knee deformity in clinical decision-making and indicate the necessity for future research to formulate treatment guidelines that integrate the intricacies of simultaneous knee and spine diseases. Ultimately, personalized and collaborative decision-making should direct treatment options for these patients.

## Limitations

The limitations of this study include a small sample population who were included in this study. Furthermore, the lack of a comparison group also poses a limitation for this study's findings.

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## Data Availability
Data is available upon request.



## Author contributions
All authors contributed to the research's design. KR and NKA collected and analyzed the data. AA and SK wrote the manuscript. NKA edited the paper. All authors read and approved the paper.

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## Conflict of interest
The authors have no conflicting interests to declare.

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