ARAŞTIRMA MAKALESİ / *RESEARCH ARTICLE*

Who Manages the Spine? A Survey of Senior Medical Students on Orthopedic vs Neurosurgery Roles

Omurgayı Kim Yönetiyor? Ortopedi ve Nöroşirurji Rolleri Üzerine Kıdemli Tıp Öğrencilerine Yönelik Bir Anket

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ABSTRACT

Aim: *Spine pathologies are a frequent source of clinical referrals and surgical intervention. However, medical students often perceive the roles of orthopedic surgeons and neurosurgeons in managing these conditions differently. The aim of this study is to evaluate how senior medical students perceive orthopedic surgery and neurosurgery roles in spine care, and how prior clinical exposure influences their specialty preference across various spinal pathology scenarios.*

Materials and Methods: *A cross-sectional survey was administered to 4th–6th year medical students. The questionnaire included 16 clinical spine scenarios, and students indicated which specialty they would refer to. Respondents were grouped based on clinical exposure: both orthopedic and neurosurgery rotations or, neither. Chi-square tests were used to compare specialty preferences between groups.*

Results: *Among 163 students, those with ortho-neuro rotations were significantly more likely to make referral decisions aligned with real-world clinical practice. For spinal fusion due to degenerative disc disease, 72.8% selected orthopedic surgery vs. 55.4% among those without exposure (p = 0.043). Similar differences were seen in other scenarios, including Scheuermann's kyphosis (p = 0.007) and cervical tumors (p = 0.016).*

Conclusion: *Clinical exposure meaningfully shapes students' perceptions of specialty roles in spine surgery. Balanced, integrated teaching may improve referral accuracy and interspecialty understanding.*

Key words: *medical student; spine surgery; orthopedic surgery; neurosurgery; clinical rotations*

ÖZET

Amaç: *Omurga patolojileri klinik sevklerin ve cerrahi müdahalenin sık görülen bir kaynağıdır. Ancak tıp öğrencileri genellikle bu durumları yönetmede ortopedik cerrahların ve beyin cerrahlarının rollerini farklı algılarlar. Bu çalışmanın amacı, kıdemli tıp öğrencilerinin omurga bakımında ortopedik cerrahi ve beyin cerrahisi rollerini nasıl algıladıklarını ve önceki klinik deneyimlerinin çeşitli omurga patolojisi senaryolarında uzmanlık tercihlerini nasıl etkilediğini değerlendirmektir.*

Materyal ve Metot: *4.-6. sınıf tıp öğrencilerine kesitsel bir anket uygulandı. Anket 16 klinik omurga senaryosunu içeriyordu ve öğrenciler hangi uzmanlığa başvuracaklarını belirttiler. Katılımcılar klinik deneyime göre gruplandırıldı: hem ortopedik hem de beyin cerrahisi rotasyonları veya hiçbiri. Gruplar arasındaki uzmanlık tercihlerini karşılaştırmak için ki-kare testleri kullanıldı.*

Sonuçlar: *163 öğrenci arasında, orto-nöro rotasyonları olanların gerçek dünya klinik uygulamalarıyla uyumlu sevk kararları alma olasılıkları önemli ölçüde daha yüksekti. Dejeneratif disk hastalığına bağlı spinal füzyon için, %72,8'i ortopedik cerrahiyi seçerken, maruz kalmayanlar arasında bu oran %55,4'tür (p = 0,043). Scheuermann kifozu (p = 0,007) ve servikal tümörler (p = 0,016) dahil olmak üzere diğer senaryolarda da benzer farklılıklar görülmüştür.*

Sonuç: *Klinik maruziyet, öğrencilerin omurga cerrahisinde uzmanlık rollerine ilişkin algılarını anlamlı bir şekilde şekillendirir. Dengeli, entegre öğretim, sevk doğruluğunu ve uzmanlıklar arası anlayışı iyileştirebilir.*

Anahtar kelimeler: *tıp öğrencisi; omurga cerrahisi; ortopedik cerrahi; nöroşirürji; klinik rotasyonlar*

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Introduction

The division of responsibilities between orthopedic surgeons and neurosurgeons in spine care remains uncertain, particularly among future medical professionals. While both specialties are proficient in treating a broad range of spinal pathologies, their roles are often perceived as distinct due to variations in training pathways, clinical focus, and institutional norms (1,2). This ambiguity, compounded by inconsistent exposure in medical curricula, may influence how medical students conceptualize each discipline's scope, particularly as they approach career-defining decisions.

Senior medical students—those in their final clinical years—are expected to develop a nuanced understanding of specialty roles through formal rotations, informal experiences, and mentorship. However, studies have consistently demonstrated that exposure to surgical subspecialties is uneven and often insufficient to correct misconceptions about their domains of practice (3–6). For example, overlooked plastic surgeons' role in hand surgery or limited familiarity with the scope of oral and maxillofacial surgery suggests that educational gaps persist despite curricular efforts (4,5). Such gaps in understanding can have broader consequences, potentially distorting referral behavior, dampening enthusiasm for certain specialties, and weakening the collaborative dynamics essential to multidisciplinary care (7–9). In the era of spine surgery, the overlap in surgical competencies between orthopedic and neurosurgical disciplines affects student perceptions. Literature examining physician referral behaviors suggests that even experienced clinicians exhibit biases based on pathology location or perceived procedural expertise-for instance, favoring neurosurgery in cervical disc cases and orthopedic surgery in thoracolumbar trauma (1,2). Such referral patterns may inadvertently reinforce student misperceptions, particularly when not counterbalanced by direct exposure to both specialties.

A growing body of research has highlighted the broader consequences of limited specialty visibility during training. Medical students often form durable opinions about surgical fields based on sporadic exposure, peer influence, or societal stereotypes-frequently overestimating plastic surgery's cosmetic focus or undervaluing family medicine's complexity (6,8,10). When left unaddressed, these distorted perceptions can shape specialty choices, diminish the appeal of specific fields, and affect interprofessional trust.

This study investigates how senior medical students perceive the roles of orthopedic surgeons versus neurosurgeons in managing spine pathologies. We aim to identify preferences, explore potential misconceptions, and offer solutions for medical educators looking to give a more accurate surgical curriculum.

Materials and Methods

This descriptive, cross-sectional survey study explored the perspectives of 4 th-, 5 th-, and 6 th-year medical students on the role of orthopedic surgeons versus neurosurgeons in managing spine pathologies. Kafkas University Faculty of Medicine granted ethical approval. A structured questionnaire was developed via Google Forms. The survey link was distributed through institutional email lists and messaging platforms, and responses were collected anonymously over three weeks. The questionnaire included sections on demographics, specialty exposure, and student opinions regarding appropriate referral patterns for various spinal conditions.

Statistical Analysis

The collected data were analyzed using IBM Statistical Package for Social Sciences (SPSS) program version 25. Descriptive statistics were used to summarize participant characteristics and response patterns. Comparative analyses between groups were performed using chi-square tests for categorical variables and Mann-Whitney U tests for non-parametric continuous data. A p-value below 0.05 was considered statistically significant.

Results

A total of 163 medical students participated in the study. Among them, 49 (30.1%) were 4 th-year students, 71 (43.6%) were in their 5th year, and 43 (26.4%) were 6 th-year students. Regarding clinical exposure, 49.7% of respondents had completed both orthopedic and neurosurgery rotations, while 0.6% had only participated in an orthopedic rotation and 9.8% had only participated in a neurosurgery rotation. Notably, 39.9% of the students had not received clinical training in either specialty.

Across 16 clinical scenarios, students' preferences for referral specialty demonstrated clear patterns depending on the type and location of spinal pathology. The full distribution of responses and statistical comparisons for each scenario are summarized in Table 1. Neurosurgery was overwhelmingly selected for lumbar

Table 1. *Presents the number and percentage of students who selected orthopedic surgery or neurosurgery for each of the 16 spinal pathology scenarios*

Scenario	Orthopedics (n, %)	Neurosurgery (n, %)	p-value
Lumbar disc herniation with sciatica	14 (8.6%)	146 (89.6%)	0.0
High-energy thoracolumbar compression fracture after traffic accident	89 (54.6%)	69 (42.3%)	0.035
Idiopathic scoliosis requiring surgical correction in a 14-year-old	127 (77.9%)	33 (20.2%)	0.0
Cerebral palsy with progressive scoliosis in a 10-year-old	45 (27.6%)	114 (69.9%)	0.0
Cervical epidural abscess and osteomyelitis	39 (23.9%)	119 (73.0%)	0.0
Thoracic metastatic lesions with neurological symptoms	23 (14.1%)	138 (84.7%)	0.0
Lumbar spinal stenosis with neurogenic claudication	51 (31.3%)	111 (68.1%)	0.0
Cervical disc herniation with C6 radiculopathy	22 (13.5%)	140 (85.9%)	0.0
Atlantoaxial subluxation with neurological deficit after trauma	24 (14.7%)	136 (83.4%)	0.0
Degenerative disc disease planned for spinal fusion	47 (28.8%)	115 (70.6%)	0.0
Scheuermann's kyphosis unresponsive to conservative therapy	116 (71.2%)	46 (28.2%)	0.0
Intramedullary spinal cord tumor in the cervical region	13 (8.0%)	149 (91.4%)	0.0
Severe degenerative kyphoscoliosis in a 70-year-old with intractable pain	112 (68.7%)	49 (30.1%)	0.0
Thoracic spinal cord compression with neurological deficit post-trauma	18 (11.0%)	143 (87.7%)	0.0
Osteoporotic vertebral fracture requiring vertebroplasty or kyphoplasty	129 (79.1%)	32 (19.6%)	0.0
Post-lumbar fusion surgical site infection	74 (45.4%)	85 (52.1%)	0.268

disc herniation with sciatica, chosen by 146 students (89.6%) compared to only 14 (8.6%) for orthopedic surgery. A similar neurosurgical preference was observed for intramedullary spinal cord tumors in the cervical region (122 students, 74.8% vs. 34 students, 20.9%) and cervical epidural abscess with osteomyelitis (119 students, 73.0% vs. 39 students, 23.9%). In contrast, orthopedic surgery was strongly favored for idiopathic scoliosis in adolescents, selected by 127 students (77.9%) versus 33 (20.2%) for neurosurgery, and for Scheuermann's kyphosis, where 125 students (76.7%) preferred orthopedic surgery over 26 (16.0%) for neurosurgery. In high-energy trauma scenarios such as thoracolumbar compression fractures, orthopedic surgery was chosen by 89 students (54.6%) compared to 69 (42.3%) for neurosurgery. In contrast, in atlantoaxial subluxation with neurological deficit, neurosurgery was preferred by 120 students (73.6%) versus 34 (20.9%) for orthopedic surgery. These results indicate that students tended to base their referral choices on anatomical and procedural associations, with orthopedic surgery linked more closely to deformity correction and neurosurgery to intradural pathology.

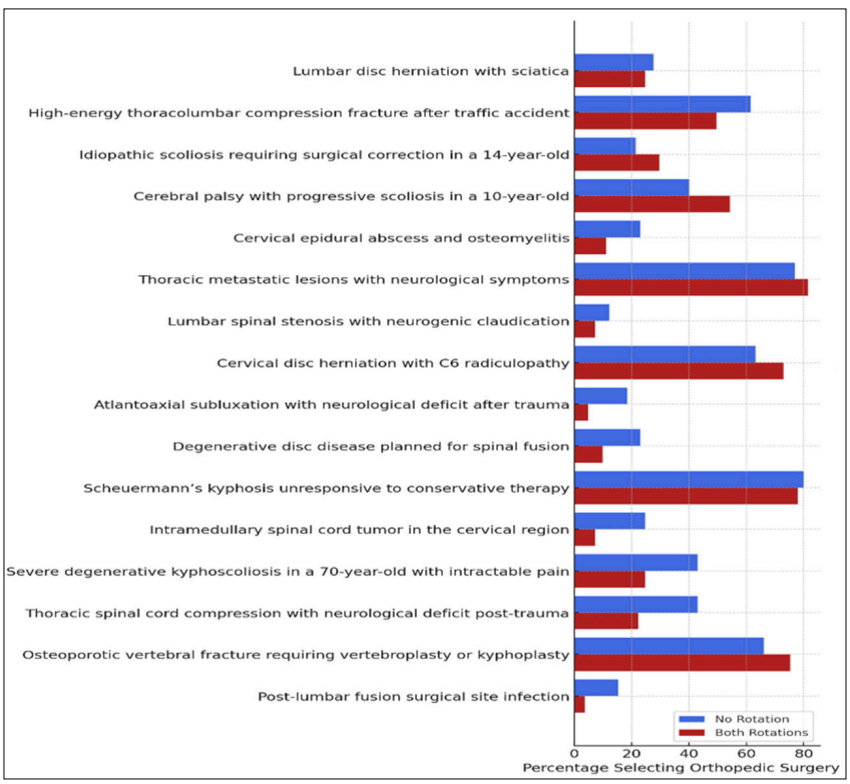

Figure 1. *Percentage of students selecting orthopedic surgery for each spinal pathology scenario, stratified by clinical exposure. (Statistically significant differences (p <0.05) are marked with asterisks (* p <0.05, ** p <0.01, *** p <0.001).*

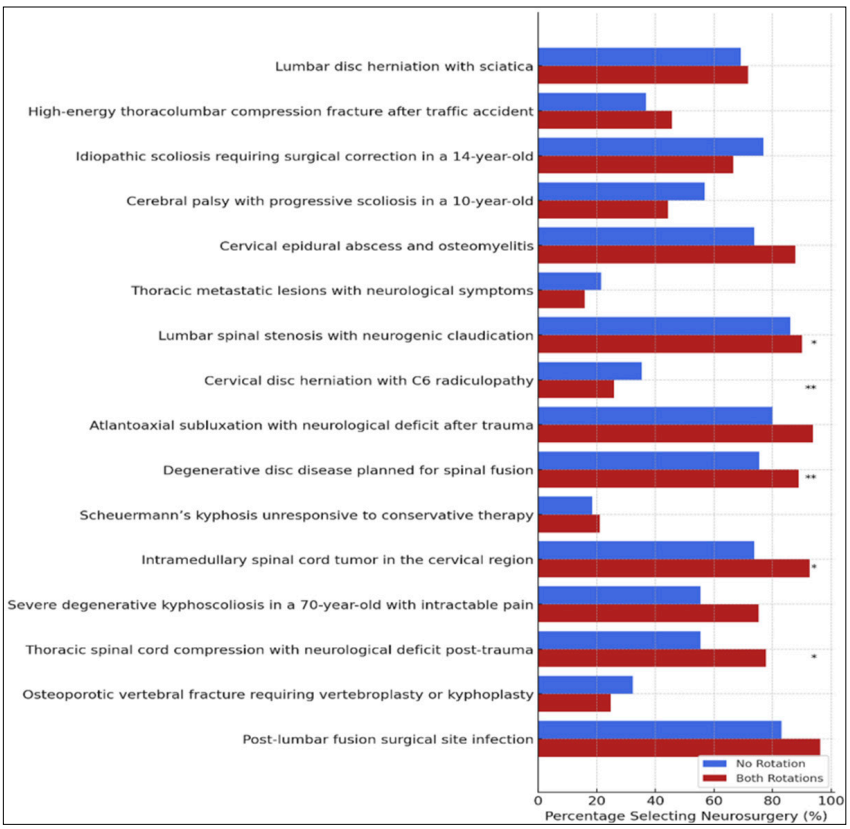

Figure 2. *Percentage of students selecting neurosurgery for each spinal pathology scenario, stratified by clinical exposure. Statistically significant differences (p <0.05) are marked with asterisks (* p <0.05, ** p <0.01, *** p <0.001).*

Fig. 1 and Fig. 2 illustrate the proportion of medical students who selected orthopedic surgery and neurosurgery across 16 spinal pathology scenarios, comparing those with no clinical exposure to students who had completed orthopedic and neurosurgery rotations. The results demonstrate that prior clinical experience significantly influenced specialty preferences in several scenarios. For spinal fusion due to degenerative disc disease, 72.8% of students with exposure selected orthopedic surgery compared to 55.4% without exposure (p=0.043), while neurosurgery was chosen by 49.4% of the exposed group and 32.3% of the unexposed (p=0.008). In thoracic spinal cord compression with neurological deficits, 56.8% of experienced students selected orthopedic surgery versus 40.0% of those without exposure (p=0.020). In comparison, neurosurgery was chosen by 67.9% and 52.3% of students in the same groups, respectively (p=0.023). In the case of cervical disc herniation with C6 radiculopathy, orthopedic surgery was chosen by 40.7% of exposed students and 26.2% of unexposed students (p=0.030). In contrast, neurosurgery was selected by 80.2% of students with exposure and 61.5% without (p=0.018). A similar pattern was seen in more specialized pathologies. For intramedullary spinal cord tumors, neurosurgery was selected by 87.7% of exposed students compared to 69.2% of those without exposure (p=0.016). In deformity-related cases such as Scheuermann's kyphosis, orthopedic surgery was favored by 84.0% of experienced students and 66.2% of those unexposed (p=0.007). Finally, in elderly patients with degenerative kyphoscoliosis, 59.3% of students with clinical training selected orthopedic surgery and 49.4% chose neurosurgery, compared to 41.5% and 32.3%, respectively, in the unexposed group (p=0.035 for both). Since students could select more than one specialty per scenario, the percentages for orthopedic and neurosurgical preferences are not mutually exclusive. These findings suggest that hands-on clinical experience substantially increases students' understanding of surgical specialty roles in spine care, particularly in scenarios involving structural deformity, degenerative pathology, or central nervous system involvement.

When asked which specialty they perceived as more competent in spine surgery, 78 students (47.9%) selected neurosurgery, 74 students (45.4%) considered both orthopedic and neurosurgery equally skilled, and only 11 students (6.7%) favored orthopedic surgery. Regarding their knowledge about the division of roles between the two specialties, 76 students (46.6%) described themselves as neutral, 53 (32.5%) reported feeling uninformed, 20 (12.3%) felt informed, 13 (8.0%) considered themselves very uninformed, and just 1 student (0.6%) reported being very well informed.

Discussion

This study investigated how final-year medical students perceive the division of responsibility between orthopedic surgeons and neurosurgeons in managing spine-related conditions, and how their clinical exposure may shape these perceptions. The data strongly suggest that the nature and extent of a student's clinical experiences influence how they view specialty competence, particularly in borderline or overlapping clinical scenarios. Students who had completed both orthopedic and neurosurgery rotations consistently aligned more with standard referral

patterns observed in clinical practice. Their tendency to refer deformity cases to orthopedic surgery and intradural pathologies to neurosurgery mirrors real-world interdisciplinary practice patterns reported in prior literature (1,2).

One of the most significant findings from this research is the consistent difference in referral preferences between those with dual specialty exposure and those with none. For example, in conditions such as Scheuermann's kyphosis or degenerative scoliosis, students who had completed both rotations were significantly more likely to favor orthopedic surgeons. Meanwhile, those without such exposure were more ambivalent, suggesting either a lack of familiarity with the condition or an unclear understanding of surgical duties. Similar disparities were covered in the selection of neurosurgeons for cases involving spinal tumors and cervical disc herniation. This pattern suggests exposure increases knowledge and decisiveness, possibly driven by observed clinical workflows and mentorship influence.

Interestingly, even among students with clinical exposure, there remained variability in how confidently and accurately they differentiated between the two specialties. This may reflect heterogeneity in the teaching approaches across departments or differences in clinical caseloads during rotation blocks. Furthermore, institutional factors—such as whether spine cases are handled predominantly by one department—may inadvertently skew students' understanding of practice trends. Prior studies have similarly reported that student perceptions of specialties like plastic surgery and oral-maxillofacial surgery often fail to reflect their true procedural scope due to inadequate or unbalanced exposure (3–6).

Despite considerable procedural overlap between orthopedic and neurosurgical spine surgery, students perceive the specialties through marked conceptual filters. This could stem from differing emphases during rotations: orthopedic surgeons are often interested in biomechanics, alignment, and deformity correction, while neurosurgical teams emphasize nerve decompression and intradural pathology. The cases reinforce these issues students encounter and the language supervisors use, which may unintentionally reinforce disciplinary limits on medical students' knowledge.

Considering that these early perceptions may have long-term consequences, influencing future referral habits and even specialty selection is essential. Interventions to reduce misconceptions, such as combined teaching modules, interdisciplinary case conferences, or co-supervised clinical rotation, may offer more balanced insight. Encouragingly, the finding that students who had completed both rotations exhibited greater alignment with realistic referral pathways suggests that educational design can play an amenable role. Further study investigating these rotations' content, structure, and mentorship quality may help identify specific aspects that most strongly shape perception.

Ultimately, the results from this study contribute to the broader conversation about how medical students construct their understanding of surgical specialties—not simply from textbooks or lectures, but through direct clinical engagement. As the lines between disciplines continue to blur in modern spine surgery, it becomes increasingly important that students are equipped with a balanced, accurate understanding of what each specialty offers. Structured, intentionally integrated exposure may represent the best opportunity to address these perceptual gaps.

Limitations

Firstly, this study was confined to a single medical institution, which may limit how widely the results apply to other educational subjects. There is still a response bias because of the self-reported nature of the data. Students may misinterpret clinical scenarios or selected answers based on perceived expectations. Another limitation that must be acknowledged is the lack of qualitative data regarding the reasons for students' preferences. The other thing, while the survey covered different spinal pathologies, it did not investigate the dialectic behind students' choices or evaluate long-term understanding. Lastly, the simulated nature of the scenarios does not perfectly reflect real-world referral dynamics, where additional systemic and interpersonal factors play a role.

Conclusion

This study shows the influence of clinical exposure on medical students' understanding of the surgical management of spinal conditions. Students who rotated in orthopedic and neurosurgery departments demonstrated more consistent and specialty-appropriate referral choices in complex cases. Their decisions often aligned with established clinical practice, especially in spinal deformity or neurologic compromise scenarios. These results emphasize the importance of well-rounded exposure in undergraduate surgical education and suggest that integrated spine teaching, drawing from both disciplines, may enhance specialty-neutral, patient-centered decision-making.

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