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Technical Notes

Neurosurgery versus orthopedic surgery: Who has better access to minimally invasive spinal technology?

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ABSTRACT

Background: Our aim was to evaluate differences in neurosurgeons versus orthopedists access to technologies needed to perform minimally invasive spine surgeries (MISS) in Latin America.

Methods: We sent a survey to members of AO Spine Latin America (January 2020), and assessed the following variables; nationality, level of hospital (primary, secondary, and tertiary), number of spinal operations performed per year, spinal pathologies addressed, the number of minimally invasive spine operations performed/year, and differences in access to MISS spinal technology between neurosurgeons and orthopedists.

Results: Responses were returned from 306 (25.6) members of AO Spine Latin America representing 20 different countries; 57.8% of respondents were orthopedic surgeons and 42.4% had over 10 years of experience. Although both specialties reported a lack of access to most of the technologies, the main difference between the two was greater utilization/access of neurosurgeons to operating microscope (e.g., 84% of the neurosurgeons vs. 39% of orthopedic spine surgeons).

Conclusion: Although both specialties have limited access to MISS spinal technologies, orthopedic spine surgeons reported significantly lower access to operating microscopes versus neurosurgeons ($P < 0.01$).

Keywords: Microscope, Minimally invasive spine surgery, Neurosurgeons, Neurosurgery, Orthopedics, Technologies

INTRODUCTION

For Latin America, we evaluated the main obstacles spinal neurosurgeons and orthopedists have to performing minimally invasive spine surgeries (MISS). Variables studied included high MISS implant costs, and limited access to navigation technology, percutaneous screws, and to operating microscopes.[4]

MATERIALS AND METHODS

Study design

This cross-sectional study utilized a survey to evaluate accessibility to MISS technology in Latin America. Members of AO Spine Latin America received an email with an internet link to the survey.

MISS technology accessibility survey

Emails explaining the study objectives in Spanish and Portuguese were sent to 1192 spinal surgeons (neurosurgeons and orthopedists) in January 2020. All authors were blinded to the identity of the respondents. Once a response was accepted, it was immediately anonymized.

Survey data

In the survey, respondents were asked about their personal practice [Table 1]. All questions had five possible responses regarding the performance of MISS: always, frequently, sometimes, infrequently, and never.

Statistical analysis

Statistical analysis was performed using the statistical software program SPSS (IBM version 25.0, Chicago, IL). Additional cross-tabulation methods were used to assess for any statistically-significant differences between the two surgical specialties, utilizing a Pearson Chi-square analysis. The a-priori criterion for statistical significance was set as $P \leq 0.05$.

RESULTS

We received 306 responses (25.6% response rate) from spinal surgeons; 177 were orthopedists (58%) and 129 were neurosurgeons (42%). Notably, 42.4% of all spinal surgeons reported more than 10 years of surgical experience, and performed fewer than 50 MISS procedures per year [Table 1].

Obstacles to MISS technology

Both neurosurgeons and orthopedic spine surgeons reported limited access to intraoperative CT, bone morphogenetic protein, neuronavigation technology, interbody cages, tubular retractors, intraoperative X-rays, and percutaneous screws [Figures 1-3]. Further, 84% of neurosurgeons reported always having access to a microscope versus 39% of orthopedists ($P < 0.01$).

DISCUSSION

Latin American spinal surgeons have limited access to perform MISS spine surgery due to the; high cost, lack of availability of implants/hardware, and the high cost of neuronavigation. Further, we found that neurosurgeons have more access (84%) to operating microscopes versus orthopedists (39%).[4]

Of interest, Avellanal *et al*. determined that neurosurgeons may have greater need for utilizing operating microscope, as they perform 2-times more neural decompressions while orthopedists performed 2.5 times more fusions (instrumented and non-instrumented).[1]

Further, Pejrona *et al*. found that neurosurgeons felt more competent dealing with certain cervical pathologies (e.g., spinal tumors) warranting an operating microscope versus orthopedists spinal surgeons who were more frequently treating spinal deformities/pelvic trauma.[5]

MISS

MISS have inherently greater risks to neural/vertebral structures, as they typically provide more limited/insufficient exposures, restrictive maneuverability, and restrictive operative corridors.[3] Further, limited visibility is often associated with greater neurological deficits resulting in

Table 1: Demographic data of the respondents in terms of: experience, place of work, number of surgeries performed per year, and the types of pathology (indications), for which surgery was performed.

Demographic data	*n*	%	*n*	%
	Neurosurgeons		Orthopedic surgeons	
n=306	129	42	177	58
Experience in years (years)				
<5	31	24	52	29
From 5 to 10	40	31	53	30
>10	58	45	72	41
Place of work				
Trauma or 1st level center	32	25	37	21
Private practice	55	43	87	49
University hospital practice	42	33	53	30
Number of surgeries per year				
0–50	37	29	56	32
51–150	59	46	76	43
>150	33	26	45	25
MISS per year				
0–50	103	80	151	85
51–150	20	16	22	12
>150	6	5	4	2
Surgical diagnosis				
Degenerative spine	114	88	154	87
Infection	1	1	1	1
Trauma	12	9	18	10
Tumor	2	2	4	2

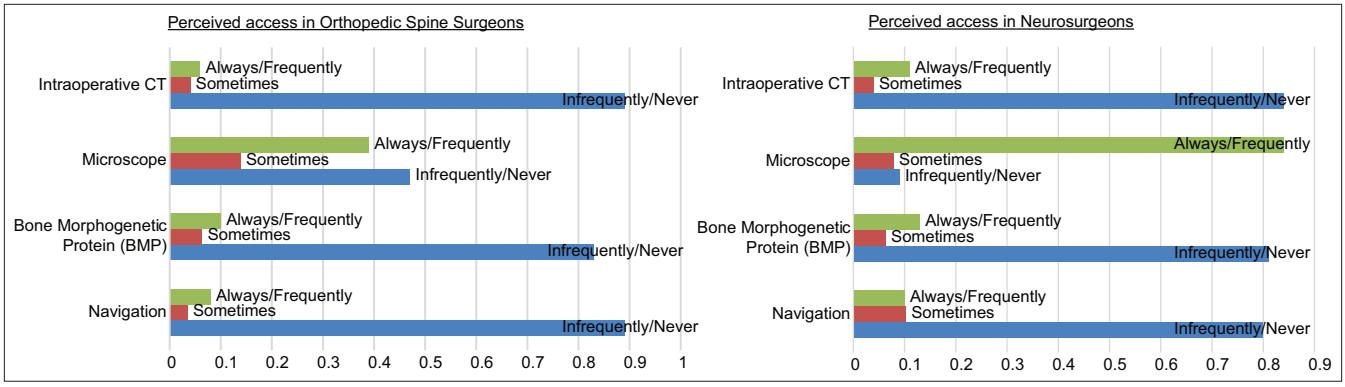

Figure 1: Comparing neurosurgeons' and orthopedic spine surgeons' perceived access to protheses to perform ALIF, LLIF or TLIF, tubular retractors, percutaneous screw fixation and intraoperative X-rays.

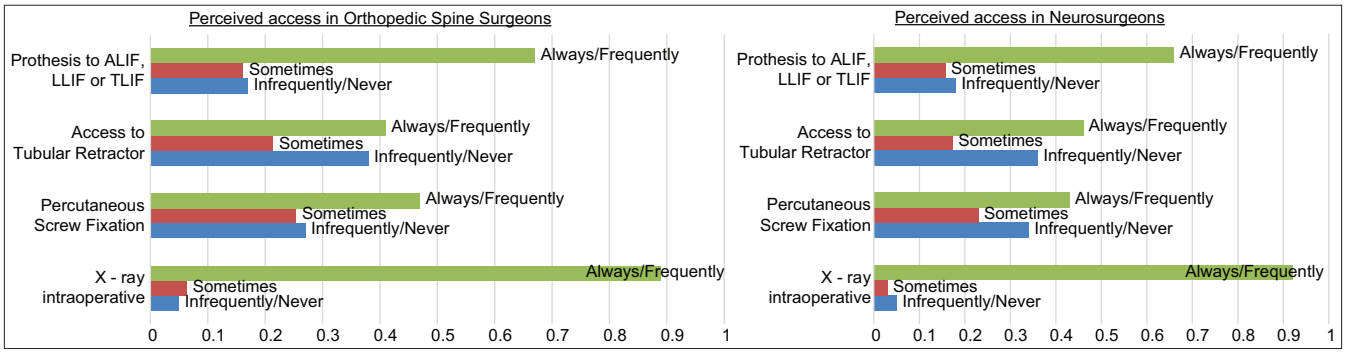

Figure 2: Comparing neurosurgeons' and orthopedic spine surgeons' perceived access to intraoperative CT, microscopes, bone morphogenetic protein, and navigation devices.

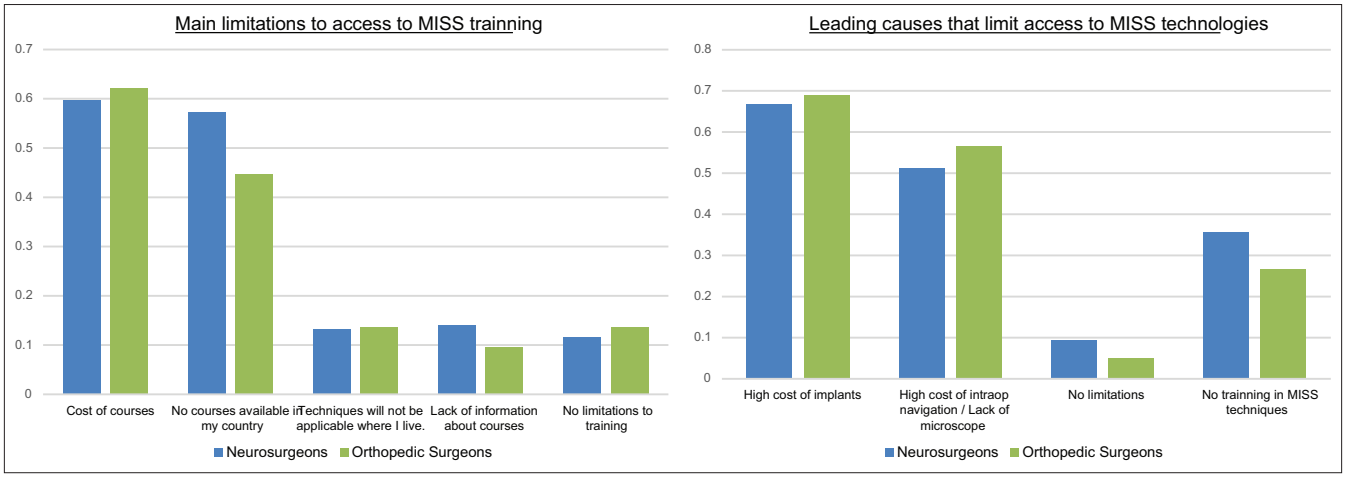

Figure 3: Perceived causes of limited access to minimally invasive spine surgeries-required technologies.

inadvertent lumbar plexus injuries, major vascular injuries, and bowel perforations.[2,6]

CONCLUSION

Although both neurosurgeons and orthopedic spine surgeons in Latin America have limited accessing to the technologies for performing MISS, neurosurgeons are better able to utilize operating microscopes versus their orthopedic spinal surgeons' counterparts.

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Declaration of patient consent

Patient's consent not required as there are no patients in this study.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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