



HSS

Why (Or Why Not) Navigation and Robotics in Spine Surgery: A Survey-Based Study

Pratyush Shahi, MBBS, MS(Ortho), Junho Song, BS, Sidhant Dalal, BS, Dimitra Melissaridou, MD, Evan Sheha, MD, James Dowdell, MD, Sheeraz Qureshi, MD, MBA, Sravisht Iyer, MD

Hospital for Special Surgery, New York, NY, USA

DISCLOSURES

- Pratyush Shahi: none
- Junho Song: none
- Sidhant Dalal: none
- Dimitra Melissaridou: none
- Evan Sheha: none
- James Dowdell: none
- Sheeraz Qureshi: Royalties: Stryker K2M, Globus Medical, Inc.; Globus Medical, Inc.: HS2, LLC; Private Investments: Tissue Differentiation Intelligence; Consulting: Stryker K2M, Globus Medical, Inc.; Speaking and/or Teaching Arrangements: AMOpportunities, Globus Medical, Inc.; Board of Directors: Society of Minimally Invasive Spine Surgery; Scientific Advisory Board/Other Office: International Society for the Advancement of Spine Surgery, Cervical Spine Research Society, Lumbar Spine Research Society, North American Spine Society, Association of Bone and Joint Surgeons, Simplify Medical, Inc., LifeLink.com Inc., Society of Minimally Invasive Spine Surgery, Minimally Invasive Spine Study Group, Spinal Simplicity, LLC, Contemporary Spine Surgery, Annals of Translational Medicine.
- Sravisht Iyer: Research Support: Innovasis; Speaker's Bureau: Globus Medical, Stryker; Advisory Board Member: Healthgrades

- Several studies have demonstrated the “added value” of navigation and robotics for pedicle screw accuracy and radiation exposure.
- Few recent studies have also demonstrated encouraging results in terms of cost-effectiveness.
- The integration of these assistive technologies in our practices, however, has a substantial impact on how we train the next generation of spine surgeons.
- An over-reliance on robotics and navigation may have a detrimental impact on training traditional freehand screw placement.

PURPOSE

- While these questions are frequently discussed at various academic meetings, there is scant data on how trainees and early-career spine surgeons perceive these technologies.
- This survey was therefore conducted to determine their perspective of robotics and navigation in training and their experiences in practice.

- A survey gathering information on utilization of navigation and robotics in training and practice was administered to the young surgeon members of Society of Minimally Invasive Spine Surgery (SMISS) and orthopaedic spine fellowship applicants from past 6 years
- For analyses, only respondents who were trainees (residents or fellows) or early attendings (≤ 5 years of practice) were included.

- 51 surveys were returned completed.
- 71% were attendings (average practice years: 2), 29% were trainees.
- During training, 22% of respondents were exposed to only fluoroscopy, 75% were exposed to navigation, 51% were exposed to robotics, and 40% were exposed to both navigation and robotics.
- 87% and 61% of respondents who had exposure to navigation and robotics, respectively, felt that it had a positive impact on their training.
- The top 3 reasons behind positive impact on training were: 1) increased pedicle screw accuracy, 2) exposure to upcoming technology, and 3) less radiation exposure.
- The top 3 reasons behind negative impact were: 1) compromises training to independently place screws, 2) time and personnel requirements for setup, and 3) concerns about being able to avail it in practice.

- In practice, 28% reported utilizing only fluoroscopy, 69% reported utilizing navigation, 30% reported utilizing robotics, and 28% reported utilizing both navigation and robotics.
- The top 3 reasons behind incorporating navigation and robotics in practice were: 1) increased pedicle screw accuracy, 2) keeping up with upcoming technology, and 3) less radiation exposure.
- The top 3 reasons behind not incorporating navigation and robotics were: 1) high cost/difficulty to obtain, 2) time and personnel requirement for setup, and 3) technical complexity.
- Amongst the attendings currently utilizing navigation or robotics, 68% and 100%, respectively, felt that they will be utilizing it more in 5 years' time.
- >65% of attendings reported that navigation and robotics had a positive impact on their ability to teach trainees.
- The confidence level was reported higher when placing screws with navigation and robotics than fluoroscopy.

CONCLUSION

- Navigation and robotics have a largely positive impact on spine surgery training, practice, and teaching.
- The most commonly reported reasons for this are increased pedicle screw accuracy, exposure to/keeping up with new technology, less radiation exposure, and utilization in anatomically difficult cases such as deformity.
- Confidence while placing screws with navigation and robotics is higher.
- Most attendings believe they will be using more navigation and robotics in the coming years.
- However, the concerns of negative impact, too much exposure, and high cost voiced by some respondents demand spine surgeons to be thoughtful about how they integrate these technologies moving forward.