Mazor Robotics

http://www.mazorrobotics.com

https://www.medtronic.com/us-en/healthcare-professionals/products/spinal-orthopaedic/spine-robotics/mazor-x-stealth-edition.html

Mazor Robotics (Hebrew: מזור רובוטיקה, Mazor Robotika) was an Israeli medical device company and manufacturer of a robotic guidance system for spine surgery that was acquired by Medtronic in December 2018.

Surgeons that utilize Mazor Robotics Renaissance generally specialize in orthopedic surgery or neurosurgery.

Case series

Adult patients (≥18-years-old) who underwent robot-assisted spine surgery from 2016-2019 were assessed. A propensity score matching (PSM) algorithm was used to match Mazor X to Renaissance cases. Preoperative CT scan for planning and an intraoperative O-arm for screw evaluation were preformed. Outcomes included screw accuracy, robot time/screw, robot abandonment, and radiation. Screw accuracy was measured using Vitrea Core software by 2 orthopedic surgeons. Screw breach was measured according to the Gertzbein/Robbins classification.

Results: After PSA, a total of 65 patients (Renaissance: 22 vs. X: 43) were included. Patient/operative factors were similar between robot systems (P > .05). The pedicle screw accuracy was similar between robots (Renaissance: 1.1%% vs. X: 1.3%, P = .786); however, the S2AI screw breach rate was significantly lower for the X (Renaissance: 9.5% vs. X: 1.2%, P = .025). Robot time per screw was not statistically different (Renaissance: 4.6 minutes vs. X: 3.9 minutes, P = .246). The X was more reliable with an abandonment rate of 2.3% vs. Renaissance:22.7%, P = .007. Radiation exposure were not different between robot systems. Non-robot related complications including dural tear, loss of motor/sensory function, and blood transfusion were similar between robot systems.

Conclusion: This is the first comparative analyses of screw accuracy, robot time/screw, robot abandonment, and radiation exposure between the Mazor X and Renaissance systems. There are substantial improvements in the X robot, particularly in the perioperative planning processes, which likely contribute to the X's superiority in S2AI screw accuracy by nearly 8-fold and robot reliability by nearly 10-fold [1)].

To study the differences between robot-guided (Mazor X, Mazor Robotics Ltd., Caesarea, Israel) and 3-dimensional (3D) computed tomography (CT) navigation (O-arm Surgical Imaging System, Medtronic, Minneapolis, Minnesota, USA) for the insertion of pedicle screws.

METHODS: We reviewed the charts of 50 patients who underwent robot-guided pedicle screw insertion (between May 2017-October 2017), and 49 patients who underwent 3D-CT navigation pedicle screw insertion (between September 2015-August 2016). Variables included were age, sex, body mass index, blood loss, length of stay, lumbar level(s), operation time, fluoroscopy time,

radiation dose, accuracy, and time-per-screw placement.

RESULTS: Mean ages were 59.3 years in the robotic group and 58.2 years in the 3D-CT navigation group. Mean was 30.7 kg/m2 in the robotic group and 32.1 kg/m2 in the 3D-CT navigation group. Mean time-per-screw placement was 3.7 minutes for the robotic group and 6.8 minutes for the 3D-CT navigation group, P < 0.001. In the robotic group, 189 of 190 screws were placed with Ravi grade I accuracy, and 1 was grade II. In the 3D-CT navigation group, 157 of 165 screws were Ravi grade I, and 8 were grade II (P = 0.11). Fluoroscopy time (P < 0.001), time-per-screw placement (P < 0.001), and length of stay (P < 0.001) were significantly lower in the robotic group.

CONCLUSIONS: Both technologies are safe and accurate. Robotic technology exposed patients to less fluoroscopy time, decreased time-per-screw placement and shorter hospital stay than 3D-CT navigation. Further studies are warranted to verify our results [2)].

1)
Lee NJ, Zuckerman SL, Buchanan IA, Boddapati V, Mathew J, Marciano G, Robertson D, Lakomkin N, Park PJ, Leung E, Lombardi JM, Lehman RA. Is There a Difference in Screw Accuracy, Robot Time Per Screw, Robot Abandonment, and Radiation Exposure Between the Mazor X and the Renaissance? A Propensity-Matched Analysis of 1179 Robot-Assisted Screws. Global Spine J. 2021 Jul 8:21925682211029867. doi: 10.1177/21925682211029867. Epub ahead of print. PMID: 34235996.
2)
Khan A, Meyers JE, Yavorek S, O'Connor TE, Siasios I, Mullin JP, Pollina J. Comparing Next-Generation Robotic Technology with 3-Dimensional Computed Tomography Navigation Technology for the Insertion of Posterior Pedicle Screws. World Neurosurg. 2018 Nov 27. pii: S1878-8750(18)32749-9. doi: 10.1016/j.wneu.2018.11.190. [Epub ahead of print] PubMed PMID: 30500593.

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