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Endoscopic odontoidectomy for anterior cervicomedullary junction decompression

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doi: 10.1017/cjn.2025.10336

Background: Endonasal endoscopic odontoidectomy (EEO) is a well-established method for treating symptomatic ventral compression at the cranio-cervical junction (CCJ). This study aims to review the clinical outcomes of patients undergoing EEO, focusing on clinical presentation, progression, and prognostic factors. Methods: We retrospectively analyzed data from patients who underwent EEO between October 2001 and October 2023. Information was collected on demographics, indications, reconstruction techniques, complications, fusion requirements, readmission rates, and outcomes. Results: Fifteen patients were included, with 60% classified as ASA class III. The majority presented with myelopathy (80%). Indications for surgery included basilar invagination, Chiari malformation, and rheumatoid arthritis. The mean blood loss was 317 ml. No perioperative lumbar drains were used, and 26.7% of patients had intraoperative CSF leaks, though no postoperative leaks were noted. A pedicled nasal flap was required in 66.7% of cases. Fourteen patients needed occipitocervical fusion, and six were readmitted within 30 days due to bulbar deficits. At the last follow-up, 86.6% of patients experienced symptom improvement. A significant association was found between decompression extent and symptomatic improvement (p=0.003). Conclusions: EEO is a safe and effective method for CCJ decompression, often accompanied by posterior cervical stabilization, with most patients showing symptomatic improvement and a low complication rate.

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Open and minimally invasive in-vivo accuracy of pedicle screws with an autonomous robotic system

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doi: 10.1017/cjn.2025.10337

Background: Surgical robotics can minimize the discrepancy between surgical preoperative plan and postoperative execution. This work explores the performance of a supervisory-control architecture robot (8i Robotics) for autonomous pedicle instrumentation in both an open and MIS workflow in a poricne model, as well as guidance accuracy in humans. Methods: 11 porcine subjects (7 open, 4 minimally invasive) had clinical grading assessment of pedicle screw placement. 3 of the open cohort had detailed precision analysis. Post-operative CT assessed screw location. Euclidean error was calculated at screw head and screw tip and confidence ellipses generated. In two human patients, guidance accuracy was compared to existing neuro-navigation. Results: All screws where GRS A. There was no clinical difference between clinical assessment of MIS vs Open workflow. Mean tip and head Euclidean error where 2.47+/-1.25mm and 2.25+/-1.25mm respectively. Guidance was successfully obtained in both human cases. Conclusions: 100% of screws obtained satisfactory clinical grading. This demonstrates the capability of a supervisory controlled robotic pedicle screw insertion robot in both open and minimally invasive workflow. Furthermore, initial guidance was feasible in living human patients with comparable agreement to current navigation. This work demonstrates exciting promise for the future of autonomous surgical robotics.