

# Surgical Approaches to the Cranio-Vertebral Junction Disorders: Our Experience

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**Introduction:** The cranio-vertebral junction (CVJ) is an anatomically complex region, affected by a wide range of tumor, vascular and traumatic diseases. In recent years surgical approaches to CVJ underwent technical improvements that increased both surgical maneuvering space and working angle, with minimal manipulation of vascular-nervous structures. However, in some cases, the extent of bone demolition raise the issue of post-operative instability and the need of appropriate reconstruction techniques. We report our experience in a case series of CVJ diseases, discussing for each of them the type of surgical approach.

**Materials and Methods:** All clinical records regarding patients undergone surgery for CVJ disorders from January 2015 to January 2019 were collected. Pre and post-operatively all patients were stratified by clinical features and eventual post-surgical instability was assessed by CT scan and/or MRI evaluation. Mean follow-up was at 6 and 12 months from surgery.

**Results:** We report a series of 35 patients affected by CVJ disorders: 2 of them, affected by PICA aneurysm, and one with foramen magnum meningioma, underwent far-lateral approach; 2 with giant clival chordomas were treated with a combined endoscopic endonasal approach (EEA) and open transmandibular-transcervical approach; 1 patient with an anterior CVJ chordoma underwent an antero-lateral approach sec. Bernard George; 13 patients were treated with a combined anterior transcervical and endoscopic endonasal C1-C2 screw fixation approach for either odontoid fractures or pannus retrodontoideum; 14 patients with irreducible bulbo-medullary junction compression due to a migrated odontoid process and/or retro-odontoid inflammatory process and 2 patients with spheno-petro-clival meningiomas were subjected to an extended EEA. In the first two cases, condilum demolition was necessary to widen the exposure and clip the aneurysm. When performing the odontoidectomy, the anterior C1 arch was spared, if possible, in order to preserve spine stability. Four patients presented a CSF leakage and for 2 of them a revision surgery was needed. Post-operatively, one patient suffered from a mucosal dehiscence, with secondary healing confirmed at endoscopic endonasal outpatient follow-up. A complete tumor removal was achieved in 4 out of 6 patients.

**Conclusions:** CVJ approaches should be chosen and designed on a case-by-case basis, with the goal of achieving an appropriate surgical exposure, with the best working angle and minimizing manipulation of vascular-nervous structures. Bone demolition is essential and, for selected cases, even more invasive approaches should be considered to have a shorter route to the surgical target. At the same time, whenever a bone demolition approach is chosen, the issue of post-operative instability must be addressed, in order to plan specific reconstruction techniques.

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