

## The Extended Endoscopic Endonasal Approach to the anterior Cranio-Vertebral Junction

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**Introduction:** Extended Endoscopic Endonasal approaches (EEA) are more and more used to address different types of anterior cranio-vertebral junction (aCVJ) diseases, including rheumatoid arthritis related bulbo-medullary compression, basilar invagination in complex CVJ malformations and non-healed odontoid type II fractures.

**Methods:** From July 2015 to July 2019, 50 patients affected by aCVJ disorders underwent EEA alone or combined with conventional surgical approaches at our institution. A combined classical anterior transcervical and endoscopic endonasal C1-C2 screw fixation approach for non-union of odontoid fractures or to remove pseudoarthrosis inflammatory pannus was used in 17 cases. An endoscopic endonasal decompression and C1-C2 fusion was performed in 8 patients affected by CVJ malformations. EEA was also used in 25 patients with irreducible bulbo-medullary junction compression due to a migrated odontoid process and/or retro-periodontoid inflammatory process. Endoscopic endonasal odontoidectomy was carried out sparing the anterior C1 arch, in order to preserve spine stability or to be used as pivot point for anterior C1-C2 screw fixation. All patients were followed-up by MRI, CT scan and dynamic X-Ray.

**Results:** An improvement in Ranawat or Nurick scales was observed in all cases. Radiologically, an adequate bulbo-medullary decompression was always achieved. Only two patients developed delayed spine instability, requiring posterior occipito-cervical fixation. Clear bone fusion was observed when anterior endoscopic C1-C2 screw fixation and/or cleaning up of pseudo-arthrosis was used. Two patients had a CSF leaks and two patients suffered from a dehiscence of the mucosal incision with secondary healing confirmed at endoscopic endonasal outpatient follow-up.

**Conclusions:** The EEA may represent an alternative approach to conventional open transcervical, posterolateral or transoral approaches. The potential advantages over the standard approaches include less invasiveness, straightforward working angle, enhanced chances of preserving anterior C1 arch, with the possibility for both decompression plus anterior endoscopic C1-C2 fixation/fusion in order to reduce the risk of cranial settling and the need of posterior fusion for spine instability.

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