

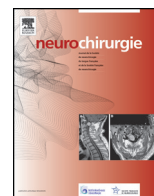


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Technical note

How I do it: Endoscopic endonasal approach for odontoid resection

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ABSTRACT

Background. – Since it was first described in 2005 by Kassam et al., the technique of endoscopic resection of the odontoid by the transnasal route has gained broad acceptance. Its advantages over the transoral approach are currently well-demonstrated.

Method. – The authors present the surgical technique developed by the senior author in a series of 12 patients, specifying the planning, complications avoidance and showing a film of the operating technique.

Conclusion. – Endoscopic endonasal odontoidectomy is an effective procedure with low morbidity. This technique has a place in the treatment of complex pathologies of the craniovertebral junction and has many advantages over the transoral route.

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1. Introduction

The resection of the odontoid process is a procedure, which may be required in the case of anterior compression of the bulbo-medullary junction. This situation may have several causes: basilar impression (congenital, post-traumatic, post-infectious), os odontoides, primary and secondary bone tumor, inflammatory panus (rheumatoid arthritis, pseudarthrosis). Historically, this surgery has been performed by a transoral approach. Since its first description in 2005 [1], the endoscopic endonasal approach has increasingly been used and several authors have reported good clinical results with this approach. The objective of this article is to detail the preoperative assessment as well as the technical aspects of this procedure. A surgical video has been included in this article to illustrate our topic (Appendix A).

2. Technical note

2.1. Surgical anatomy

The odontoid process and the anterior arch of C1 lie under the posterior wall of the pharynx. Below the mucosal layer is the insertion of the longus colli on the anterior tubercle of the atlas and

the longus capitis on the lower part of the clivus. Venous drainage may be relatively large on the midline at this level [2,3]. The posterior part of the anterior arch of the atlas articulates with the dens. The latter presents the alar ligament at its apex, which inserts on the medial faces of the occipital condyles, and the apical ligament, which is attached to the clivus. On the posterior surface of the odontoid is the cruciform ligament and the tectorial membrane, which continues the posterior longitudinal ligament. Sectioning of the alar and apical ligaments associated with resection of the odontoid process may cause craniocervical instability as it increases the neutral zone and the overall range of motion [4].

2.2. Description of the surgical technique

The patient is placed in a semi-seated position with the head fixed in a Mayfield® headrest. The procedure is performed under CT and MRI neuronavigation (StealthStation®, Medtronic, Louisville, CO), with the possibility to navigate the instruments in real time using the SureTrak® navigational system. The intubation is orotracheal without placing of any packing in order to avoid the soft palate elevation, which would hamper the passage of the instruments. The nostrils are prepared with 5% iodine and naphazoline. Antibioprophylaxis is administered prior to incision. The procedure is performed with a 4 mm–0° endoscope equipped with an irrigation sheath and under neuronavigation. The approach is bi-nostril, with the endoscope in the right nostril, the other dissection instruments and the drill being inserted through the left nostril. In all cases, the posterior and lower third of the nasal septum is

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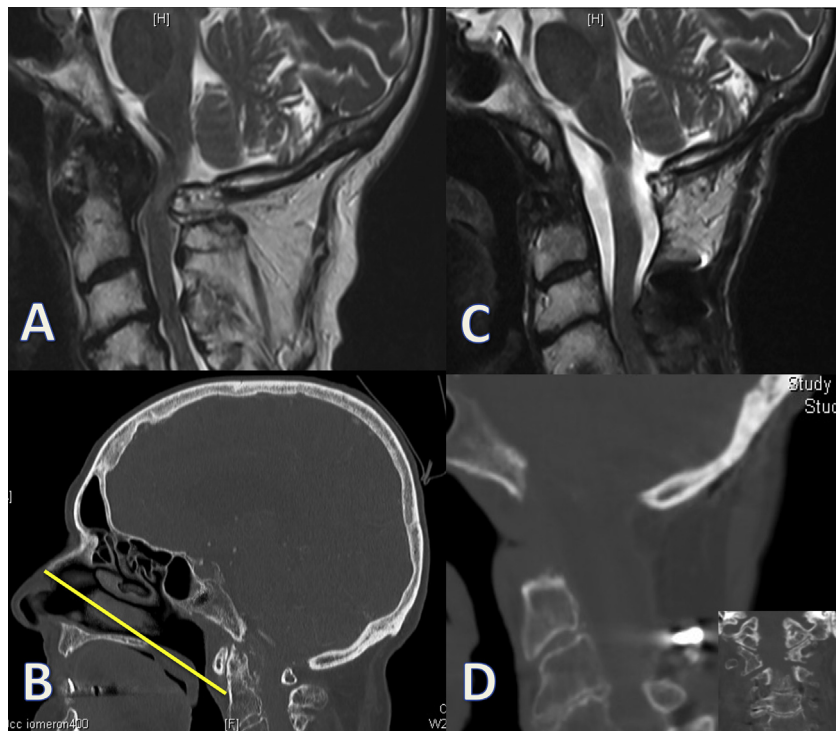


Fig. 1. Illustrative case 1: an 88-year-old patient with severe myelopathy in relation to a degenerative panus. A. The spinal MRI shows a degenerative retro-odontoid panus responsible for severe spinal compression. B. The CT-scan reveal some calcification in the panus. Given the age and history of the patient, we decided on a single anterior decompression surgery. The surgery lasted 131 minutes and permitted a partial resection of the panus with a good decompression. The nasopalatine line limits the resection of the dens downward (yellow line). The postoperative course was simple with net neurological improvement and discharge after 23 days. C and D. Postoperative CT-scan (C) and MRI (D) confirmed good spinal cord decompression.

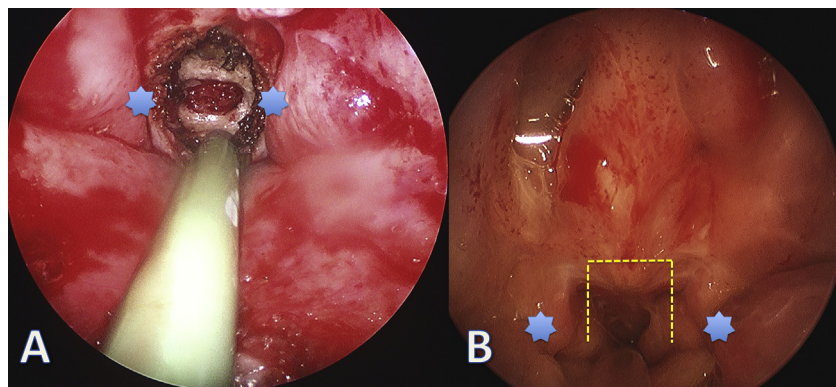


Fig. 2. Endoscopic view of the nasopharynx. A. The mucosal incision is limited laterally by the orifices of the Eustachian tubes (marked with a blue star). The flap is tilted downwards. B. Endoscopic control at three month confirms a good closure of the pharynx.

resected, with resection of the right middle turbinate in case of narrow channel. After passing the choana, the endoscope is tilted upwards, directed towards the base of the odontoid. For the rest of the procedure, the endoscope is fixed by an arm, allowing the operator to work bi-manually.

The incision of the posterior pharyngeal wall is made in an inverted U fashion. It begins at the level of the lower face of the sphenoid and then is extended medially downwards to the two Eustachian tubes. The incision is made by laser (Revolix Jr, LISA laser products, Katlenburg-Lindau, Germany) or by monopolar coagulation. Dissection of the muscles along the neck is done subperiosteally, exposing the lower part of the clivus, the anterior arch of C1 and the base of the odontoid. The musculomucosal flap is reclined downwards. The posterior part of the osseous palate and the floor of the sphenoidal sinus are thinned to widen the working

space for the passage of instruments. Bone resection is then performed by drilling, beginning with the anterior arch of the atlas, followed by the base of the dens. The apex is then resected by releasing it from the ligamentous attachments. The remaining bony shell, ligamentous structures and possible panus are then resected, using rongeurs, Kerrison punches, scissors and curettes, up to the dural plane. Final dissection of the panus is facilitated by the use of a 2.7–30° endoscope. If a fragment of panus is very adherent to the dural plane, we stop the resection when the dura is beating if these fragments are not compressive. The pulsatile character of the dura is a good criterion of sufficient decompression at this moment. The dural plane is covered with Surgicel and biological glue and the flap is then replaced and maintained by biological glue. A Foley catheter is left in place, balloon inflated against the flap. In cases of a dural tear, we repair it with a patch of fascia lata or fat with biological glue.

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