Original Article

Transoral Approach To CV Junction - Odontoidectomy - Case Series

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Abstract

BACKGROUND: The endoscopic transoral approach offers a risk-free access to midline and ventral lesions of the craniovertebral junction. Benefits of this approach include 1) Direct exposure to ventral lesions (bony pathology, granulation tissue etc) possible through this route alone; 2) Avascular plane of dissection through median pharyngeal raphe and clivus; 3) Less injury to brainstem structures as head is kept in an extended position.

METHODS: Endoscopic transoral approach (ventral route) was used to decompress the craniovertebral junction lesions. The odontoid process was drilled, to remove compression on the spinal cord. Stabilization of the cervical vertebra was done with occipitocervical fusion in the following week.

RESULTS: Cervicomedullary junction decompression through transoral odontoidectomy was done successfully in 7 patients from February 2013 to June 2014 with minimal or no complications. On a 1-2 year follow-up, there was no evidence of CVJ instability and patients had improvement of neurological function.

CONCLUSION: The endoscopic transoral odontoidectomy is a better surgical technique for ventral lesion of the craniovertebral junction.

Key Words: CV Junction, Odontoid, Endoscopic Trans Oral

Introduction

The CVJ is an area which encompasses the occiput, axis, atlas, and supporting ligaments[1]. It accounts for approximately 25% of the vertical height of the entire cervical spine. Surgical exposure of the region around the foramen magnum and the first two cervical vertebrae is necessary for lesions that threaten loss of stability and spinal cord compression, especially by dens.The endoscopic transoral approach provides a direct route ventral lesions of the craniovertebral junction [2-6]. Removal of the lesion may be combined with stabilisation procedure in a second sitting. In other cases clinical symptoms may require a posterior fusion to be performed first followed later by an ablative procedure.

Materials and Methods

Patients: The following seven patients were operated in our department from Feb 2013 to June 2014:

- Case 1- 16 years male with weakness of all 4 limbs with power 2/5 in all 4 limbs due to CV junction anomaly.
- Case 2- 24 years male with weakness of all 4 limbs with power 2/5 in upper limbs and power 1/5 in lower limbs diagnosed as a case of granulomatous lesion of odontoid.
- Case 3-32 years male with weakness of all 4 limbs due to granulomatous lesion of odontoid
- Case 4- 53 years male with weakness of all 4 limbs due to odontoid compressing the cord.
- Case 5-54 year male with weakness of all 4 limbs due to odontoid compressing the spinal cord.

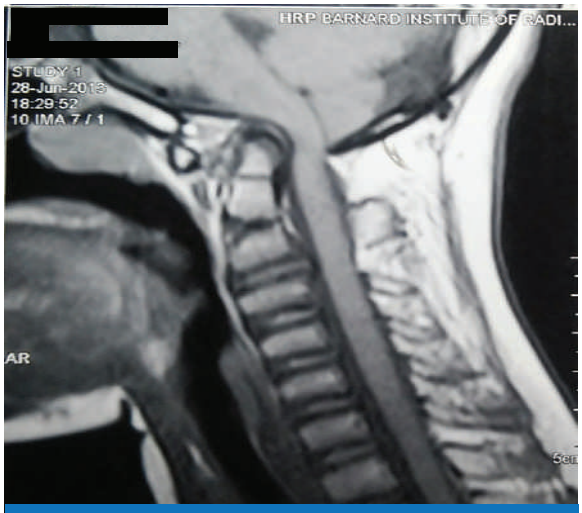

Fig 1 : MRI showing enlarged odontoid compressing the spinal cord

- Case 6 - 14 years female with paresis of all 4 limbs with power 4/ 5 in all 4 limbs diagnosed as granulomatous lesion of odontoid.
- Case 7 – 35 years female with paresis of all 4 limbs due to rheumatoid arthritis involving cervical spine.

Plain radiographs and dynamic polytomography formed the preliminary imaging[6]. For an accurate visualization of the lesion, computerized tomography (CT) with 3D reconstruction and magnetic resonance imaging (MRI)were taken(Fig 1).

Surgical technique

Patients were put under general anesthesia through orotracheal intubation. With the surgeon on the right side of the patient, endotracheal tube was fixed in the left. Using 0 degree Hopkins rod Telescope posterior pharyngeal wall was split open through a linear midline incision (Fig 2) extending from the upper border of the first cervical vertebra to the lower border of the second cervical vertebra, ligaments split in midline and longitudinal muscles retracted laterally, arch of atlas identified and drilled out exposing the underlying odontoid process (Fig 3).

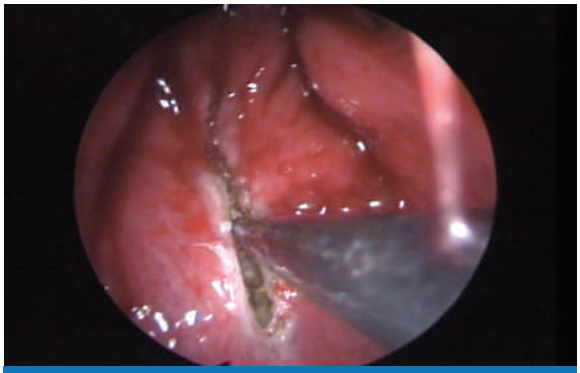

Fig 2 : Posterior Phryngeal Wall Spilt Incision Made

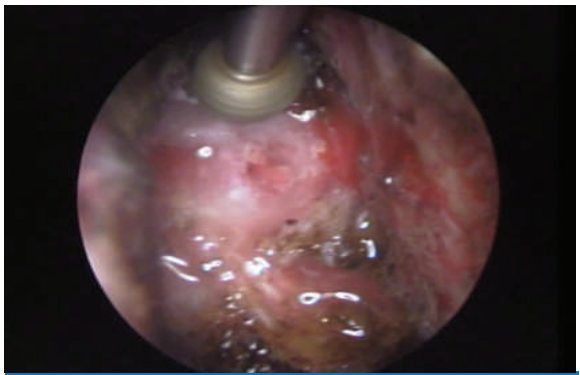

Fig 3 : Showing Arch Of Atlas Being Drilled

The odontoid process compressing the spinal cord was freed from the surrounding soft tissue attachments and drilled out by diamond burr leaving a thin plate of bone overlying the thinned out cruciate ligament and spinal dura. The residual egg shelled thin odontoid process was dissected from the spinal dura (Fig 4) till dural pulsations were encountered.

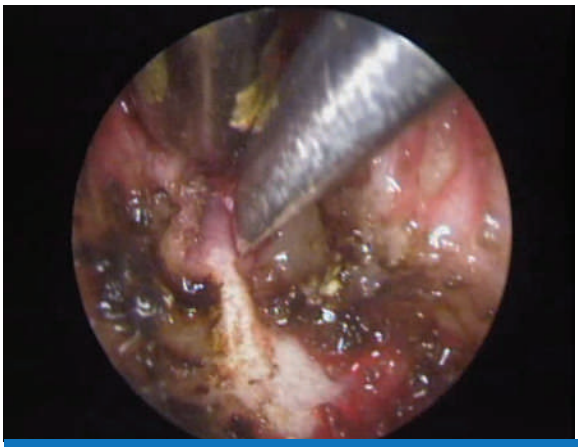

Fig 4 : Showing Showing Delineation of Odontoid Process

Patients were put on nasogastric tube feeding for one week. Stabilization of the cervical vertebra was done with occipitocervical fusion in the following week.

Results

Cervicomedullary junction decompression through transoral odontoidectomy was done successfully in 7 patients. None needed tracheostomy or gastrostomy tube placement in the post operative course. From the first week itself, patients were started on liquid diet and later to regular diet. There were no postoperative complications like velopharyngeal insufficiency, cerebrospinal fluid leakage, infection, or meningitis. All 7 patients underwent posterior stabilisation after odontoidectomy. On a 1-2 year follow-up, there was no evidence of CVJ instability. Patients with power 2/5 improved to 4/5 and patients with preoperative power more than 3/5 almost had near normal neurological function post operatively.

Discussion

Patients presenting with irreducible AAD with or without basilar invagination can be surgically managed by anterior or posterior approach. Posterior approach [7-10] has become obsolete because of the increased risk of complications. Commonly performed anterior approaches are transoral and transnasal. Occasionally, transcervical excision of the odontoid process, with anterior release and anterior fusion[11, 12] or anterior release and posterior fusion[13] has been done. Initially transoral odontoidectomy was done with the help of microscope. The procedure required palatal splitting for better exposure and so the incidences of complications were high. In our study, endoscopic transoral excision of the odontoid proved to be a safer and more effective approach. We have achieved excellent decompression with odontoidectomy and resection of C2 base and clivus in all patients.

As compared to the microsurgical technique, Pillai et al[14] reported better surgical exposure in the posterior pharyngeal wall and clivusregion by the endoscopic technique. Mazhar Husain et al[15] were also able to achieve good decompression in their patients. Palatal splitting that is needed in the microsurgical technique (especially in basilar invasion) was avoided in all our patients. Similar results have been reported before[16].

Compared to the microscopic excision which requires a 2.5 to 3cm mouth opening, this procedure was done with just a 1.5cm gap. Surgery could be performed in an extended or flexed neck position. We encountered intra- operative difficulty in dural closure and post operative dysphagia for up to 2 to 3 weeks. Even with risk of contamination by oral bacterial flora, there was not any incidence of infection. The endoscopic transnasal approach to CVJ lesions also reveals a comparable result in safety and efficacy[17-20] with added advantage of early oral feeding, avoidance of palatal splitting, less occurrence of tongue edema and infection. Its drawback lies in the difficulty in excision of lesions in lower body of C2[21]. The choice between transoral and transnasal approach was decided by the radiological line drawn along the floor of palate to the posterior pharynx (nasopalatal line). This serves as the reference point to assess the location of the lesion. Lesion high above the nasopalatine line can be easily accessed by endoscopic transnasal approach. Lesion just above the nasopalatine line can be dealt by both transoral and transnasal approach[22,23]. Whereas, lesions below the reference line is safely approached transorally. The transoraland transnasal approaches do have their own restraints. Patients may need an additional posterior approach for atlantoaxial fusion[11]. Endoscopic transcervical single - stage anterior release, reduction, and posterior fixation (with video guidance) were found to be effective [11, 24]. An artificial atlanto-odontoid joint could be implanted, which provides stability and preserves rotatory movements after odontoid resection[25]. A single - stage transoral procedure using atlantoaxial reduction plate for fixed AAD avoids the need for resection of dens and clivus or a posterior fusion process.

Meticulous preoperative assessment of the airway and pulmonary status was done for all patients. In those with unstable spine, awake intubation was performed to prevent injury to the spinal cord. We did immediate extubation after surgery for all except in those who had difficult airway or post - operative tongue / pharyngeal edema. In the latter, ET was kept for a few more days.

As with pre-operative respiratory function, the status post surgery should also be monitored[26]. We have observed that there is more deterioration of pulmonary reserve (Functional vital capacity, forced expiratory flow etc)in the AAD group than in patients undergoing surgery for compressive cervical lesions.

Conclusion

The endoscopic transoral odontoidectony is a better surgical technique for ventral lesion of the craniovertebral junction. It provides a direct visualization of the lesion which is further improved with angled endoscopes. It carries the distinct advantages of a safe and complete decompression of the lesion with minimal mouth opening and avoidance of palatal splitting. Complications like meningitis or velopharyngeal insufficiency is negligible. Occipitocervical fusion and tracheostomy is seldom needed in this approach.

References

1) Menezes AH, Traynelis VC. Anatomy and biomechanics of normal craniovertebral junction (a) and biomechanics of stabilization (b). Childs Nerv Syst 2008;24(10):1091–100.

2) Apuzzo ML, Weiss MH, Heiden JS. Transoral exposure of the atlantoaxial region. Neurosurgery. 1978 ;3(2):201–7.

3) Crockard HA. The transoral approach to the base of the brain and upper cervical cord. Ann R Coll Surg Engl. 1985 ;67(5):321–5.

4) Crockard HA, Bradford R. Transoraltransclival removal of a schwannoma anterior to the craniocervical junction. Case report. J Neurosurg. 1985 Feb;62(2):293–5.

5) Bonkowski JA, Gibson RD, Snape L. Foramen magnum meningioma: transoral resection with a bone baffle to prevent CSF leakage. Case report. J Neurosurg. 1990 ;72(3):493–6.

6) Landeiro JA, Boechat S, Christoph D de H, Gonçalves MB, Castro I de, Lapenta MA, et al. Transoral approach to the craniovertebral junction. Arq Neuropsiquiatr. 2007 ;65(4B):1166–71.

7) Belen D, Simsek S, Yigitkanli K, Bavbek M. Internal Reduction Established by Occiput-C2 Pedicle Polyaxial Screw Stabilization in Pediatric Atlantoaxial Rotatory Fixation. Pediatr Neurosurg. 2006;42(5):328–32.

8) Goel A, Kulkarni AG, Sharma P. Reduction of fixed atlantoaxial dislocation in 24 cases: technical note. J Neurosurg Spine. 2005 ;2(4):505–9.

9) Kerschbaumer F, Kandziora F, Klein C, Mittlmeier T, Starker M. Transoral decompression, anterior plate fixation, and posterior wire fusion for irreducible atlantoaxial kyphosis in rheumatoid arthritis. Spine. 2000 ; 25 (20):2708–15.

10) Oya S, Tsutsumi K, Shigeno T, Takahashi H. Posterolateral odontoidectomy for irreducible atlantoaxial dislocation: a technical case report. Spine J. 2004;4(5):591–4.

11) Yadav YR, Ratre S, Parhihar V, Dubey A, Dubey NM. Endoscopic technique for single-stage anterior decompression and anterior fusion by transcervical approach in atlantoaxial dislocation. Neurol India. 2017 ;65(2):341–7.

12) Wolinsky JP, Sciubba DM, Suk I, Gokaslan ZL. Endoscopic image-guided odontoidectomy for decompression of basilar invagination via a standard anterior cervical approach. Technical note. J Neurosurg Spine. 2007;6(2):184–91.

13) Ma H, Dong L, Liu C, Yi P, Yang F, Tang X, et al. Modified technique of transoral release in one-stage anterior release and posterior reduction for irreducible atlantoaxial dislocation. J Orthop Sci 2016 ;21(1):7–12.

14) Pillai P, Baig MN, Karas CS, Ammirati M. Endoscopic image-guided transoral approach to the craniovertebral junction: an anatomic study comparing surgical exposure and surgical freedom obtained with the endoscope and the operating microscope. Neurosurg. 2009;64 (5 Suppl 2): 437-42.

15) Husain M, Rastogi M, Ojha BK, Chandra A, Jha DK. Endoscopic transoral surgery for craniovertebral junction anomalies. Technical note. J Neurosurg Spine. 2006;5(4):367–73.

16) Frempong-Boadu AK, Faunce WA, Fessler RG. Endoscopically assisted transoral-transpharyngeal approach to the craniovertebral junction. Neurosurgery. 2002 ;51(5 Suppl):S60-66.

17) Messina A, Bruno MC, Decq P, Coste A, Cavallo LM, de Divittis E, et al. Pure endoscopic endonasalodontoidectomy: anatomical study. Neurosurg Rev. 2007 ;30(3):189–94.

18) Leng LZ, Anand VK, Hartl R, Schwartz TH. Endonasal endoscopic resection of an osodontoideum to decompress the cervicomedullary junction: a minimal access surgical technique. Spine. 2009 15;34(4):E139-43.

19) Kassam AB, Snyderman C, Gardner P, Carrau R, Spiro R. The expanded endonasal approach: a fully endoscopic transnasal approach and resection of the odontoid process: technical case report. Neurosurg. 2005;57(1 Suppl):E213.

20) Nayak JV, Gardner PA, Vescan AD, Carrau RL, Kassam AB, Snyderman CH. Experience with the expanded endonasal approach for resection of the odontoid process in rheumatoid disease. Am J Rhinol. 2007;21(5):601–6.

21) Seker A, Inoue K, Osawa S, Akakin A, Kilic T, Rhoton AL. Comparison of endoscopic transnasal and transoral approaches to the craniovertebral junction. World Neurosurg. 2010;74(6):583–602.

22) El-Sayed IH, Wu JC, Ames CP, Balamurali G, Mummaneni PV. Combined transnasal and transoral endoscopic approaches to the craniovertebral junction. J Craniovertebral Junction Spine. 2010;1(1):44–8.

23) Yin Tsang RK, Ho WK, Wei WI. Combined transnasal endoscopic and transoral robotic resection of recurrent nasopharyngeal carcinoma. Head Neck. 2012 ;34(8):1190–3.

24) Liu T, Li F, Xiong W, Du X, Fang Z, Shang H, et al. Video-assisted anterior transcervical approach for the reduction of irreducible atlantoaxial dislocation. Spine. 2010;35(15):1495–501.

25) Lu B, He XJ, Zhao CG, Li HP, Wang D. Artificial atlanto-odontoid joint replacement through a transoral approach. Eur Spine J. 2009;18(1):109–17.

26) Reddy KRM, Rao GSU, Devi BI, Prasad PVS, Ramesh VJ. Pulmonary function after surgery for congenital atlantoaxial dislocation: a comparison with surgery for compressive cervical myelopathy and craniotomy. J Neurosurg Anesthesiol. 2009; 21(3):196–201.