Abstract: Transoral resection of the odontoid has been accepted as a standard procedure to decompress the cervico-medullary junction during the past several decades. Endoscopic transnasal odontoidectomy is emerging as a feasible surgical alternative to conventional microscopic transoral approach. In this case report, we describe our experience about this approach, which provided successful decompression.

Methods: A patient with basilar invagination with trismus (due to tobacco pan chewing), underwent endoscopic transnasal odontoidectomy. He also received occipitocervical fixation during the same admission to ensure stability. Results: The patient was extubated after recovery from anesthesia, and underwent elective tracheostomy, since patient was having trismus due to tobacco pan chewing. Remarkable neurological recovery was observed postoperative period. Conclusion: The endoscopic transnasal odontoidectomy is a feasible approach for anterior decompression of pathology at the cervicomedullary junction. The advantages over the standard transoral odontoidectomy include alternative route for anterior decompression when oral pathology is present, elimination of risk of tongue swelling and teeth damage, improved visualization, alleviation of prolonged intubation, reduction of need for enteral tube feeding and less risk of affecting phonation. The minimally invasive access and faster recovery associated with this technique make it a valid alternative for decompression of the ventral side of the cervicomedullary junction.

Keyword: Endoscopy, Transnasal, Odontoidectomy, Basilar invagination

Introduction: Basilar invagination is a developmental anomaly of the craniovertebral junction (CVJ) due to several etiologies, in which the brainstem and/or the cervicomedullary junction are compressed from the ventral side by the odontoid process [1,2]. The surgical treatment remains challenging because of the complex anatomic and biomechanical characteristics of this region [3,4]. During the past several decades, transoral resection of the odontoid followed by posterior fixation procedures has been accepted as a standard procedure [3–7].

Case Report: A 24 year old labourer by occupation who was apparently normal till 1 year back when he had injury over his nape of the neck by fall of a wooden door. After the fall he only had localized neck pain and continued his regular activities for 8 months. He only consumed over the counter pain medications for his pain. After 8 months he had increase in his neck pain and found difficulty in doing his routine activities. His pain was aggravated by coughing and sneezing. He also had restriction of movement of neck in all directions. His pain was also associated with difficulty in swallowing. He had h/o regurgitation of liquids. He also had h/o voice change with slurring of speech for the past 2 months. He had h/o decreased mastication due to difficulty in chewing food. No h/o deviation of angle of mouth, hard of hearing. No h/o decreased sensation over his trunk. No h/o unsteadiness while washing face with closed eyes.

Endoscopic Transnasal Odontoidectomy for Basilar Invagination-A Novel Treatment

Method

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No H/o weakness of limbs or any sensory loss. No H/o bladder/bowel disturbance. No H/o cerebellar symptoms. No H/o breathing difficulty. Patient is a tobacco chewer and had restriction of mouth opening. Patient was treated empirically for tuberculosis for 9 months and investigation for rheumatoid arthritis was found to be negative. Other blood investigations to rule out infectious causes of basilar invagination were done and was found to be normal.

On examination his vitals were normal. No neurocutaneous markers were present. Higher mental functions were normal. Cranial nerves I to VIII were normal. IX, X cranial nerves - uvula in midline and gag reflex was present. XI cranial nerve – restriction of movement of neck in all directions. XII cranial nerve – deviation of tongue to right side on protrusion. His bulk, tone, and power was normal in all the four limbs. Reflexes – both superficial and deep reflexes are normal bilaterally. Sensation – all modalities of sensation including posterior column sensation are normal. Romberg’s was negative.

No cerebellar signs. Height-neck ratio was normal (158/14=11.3). Chest expansion was adequate. Cranium is normal. Tenderness was present over upper cervical spine with restriction of all movements of the neck.

INVESTIGATIONS
CT scan and MRI showed Basilar Invagination with assimilation of C1. (Fig 1)

MANAGEMENT
We planned for a two staged operation. In the first stage patient underwent Endoscopic transnasal odontoidectomy(Fig 2) and tracheostomy since the patient had trismus. Later patient underwent Occipito Cervical Fusion(Fig 5). Posterior Stabilisation was planned since the ligaments around CV junction were deeply dissected during odontoidectomy and stabilisation was mandatory.

Occipitocervical fusion was done with occipital plate(Fig 5), C2 pedicle screw, C3 and C4 lateral mass screws(Fig 4). Post-operatively power was normal in all limbs. Tracheostomy closure was done on the 7th post-operative day. The postoperative CT scans(Fig 3) demonstrated that the odontoid had been drilled off and the postoperative MRI showed that the ventral cervicomedullary compression was completely relieved. The post op followup for the patient was done periodically and the neck pain was relieved post operative and on followup period. The motor power of the limbs was normal. Patient was symptomatically better on the last review. His slurring of speech remained nonprogressive.

Dissection
During the past several decades, the transoral approach has been widely accepted as the standard approach for the resection of odontoid to decompress the ventral side of cervicomedullary junction [3–7]. Since Kassam et al. [12] firstly reported the endoscopic transnasal odontoideotomy in 2005, there have been several case reports demonstrating the feasibility and effectiveness of this new approach [11–20]. The patient underwent two nostrils endoscopic technique, the endoscope and suction in one nasal cavity and a dissecting instrument or drill in the other. Two nostrils techniques can make the instruments move smoothly to facilitate maneuver. Intraoperative C-arm fluoroscope aided to localize the key structures. As a general rule, basilar invagination treated with transoral odontoideotomy usually is followed by posterior occipitocervical stabilization [3, 4, 26–28]. Neither the transoral approach nor the endoscopic transnasal approach will alter the indication for posterior procedures [11].

Goel et al. studied 190 surgically treated patients with basilar invagination. In his opinion, simultaneous dorsal fixation following a transoral decompression is not mandatory and in some patients fixation is required but can safely be staged [3]. However, if the patient with basilar invagination due to congenital osseous malformations presents stability preoperatively, the risks of creating craniocervical instability with odontoideotomy have never been fully delineated. Dickman et al. [29] studied the influence of transoral odontoid resection on stability of the craniocervical junction. Patients with congenital osseous malformations were more likely to maintain occipitocervical stability after odontoideotomy.

Yin et al. [30] studied the 3D configuration and morphometric data of obliquity of the lateral atlantoaxial articulations (LAA) in congenital anomaly with occipitalization of atlas. The LAA were the weight-bearing positions in normal individuals. They believed that instability at the C1–C2 junction in congenital normalia with atlas assimilation was a direct result of the anteverision of AAF. Variations in the anatomy of the LAA could logically account for the C1–C2 instability. Of course, the patient not receiving fixation should be followed up carefully. Excessive pain and spasm of the neck muscles and suboccipital radicular pain may form the primary indication for fixation in these patients [3, 19, 25].

Compared to transoral surgery [31], the endoscopic transnasal odontoideotomy has the following
advantages:
(1) The property of endoscopy is to provide a wider view of the surgical field and a more close-up multiangled vision, thus improving visualization in deep surgical corridors [10, 12, 13, 16].
(2) The use of mouth retractors is no longer necessary, which eliminates the risk of tongue swelling and teeth damaging [10, 11, 15, 18].
(3) The transnasal approach decreases the risk of tongue and posterior oropharyngeal wall swelling, ameliorates the need for nasogastric tube feeding and prolonged extubation or tracheostomy [11, 12, 21, 31].
(4) The incision is above the oropharynx. This may reduce the infection risk, as the wound is not constantly bathed in saliva [11, 12].
(5) The transnasal endoscopic approach does not need the soft palate splitting or the hard palate resection, thus minimizing the risk of postoperative dysphonia or velopharyngeal insufficiency (VPI) [15, 16, 31].

In recent years, more aggressive posterior reduction including transoral-transpharyngeal approaches has been used to treat basilar invagination, which reduced the need of anterior decompression [32–36]. We believe that the value of the anterior approach decompression can never be underestimated, although some patients may benefit from the posterior reduction. In the future, endoscopic anterior decompression and posterior reduction will be the two directions of development to treat basilar invagination.

Conclusion
The endoscopic endonasal odontoidectomy is a feasible approach for anterior decompression of pathology at the cervico.medullary junction. This approach provides an excellent surgical route, with many advantages compared to the conventional trans-oral approach, potentially avoids serious intraoperative and postoperative complications. The minimally invasive access and the fewer complications associated with this technique make it a valid alternative for decompression of the ventral side of the craniovertebral junction.

References