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Minimally Invasive Intraoral Styloidectomy: A Surgical Perspective

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Abstract

Introduction: *Styloidectomy is a surgical procedure to address oropharyngeal symptoms caused by elongated styloid processes. The intraoral approach is valued for its minimally invasive nature, avoiding visible scars and reducing recovery time. This study explores the efficacy and challenges of this approach through a case report. A 56-year-old female, who presented with difficulty swallowing, radiating throat pain, and right submandibular tenderness, was found to have an elongated styloid process (49.3 mm) on the right side via imaging. She underwent a styloidectomy via the intraoral approach under general anesthesia. Postoperative recovery was uneventful, with significant symptom relief. In conclusion, the intraoral approach for styloidectomy offers distinct advantages, including a scar-free outcome, reduced recovery time, and effective symptom resolution. However, challenges like limited visibility require meticulous surgical planning. Emerging techniques, such as robotic-assisted procedures, show promise for further enhancing outcomes.*

Keywords: *Intraoral Styloidectomy, Elongated Styloid Process, Minimally Invasive Surgery, Oropharyngeal Pain, Surgical Outcomes.*

INTRODUCTION:

Eagle Syndrome, a clinical condition first described in 1937, arises due to an elongated styloid process or calcification of the stylohyoid ligament. It manifests with a diverse spectrum of symptoms, including dysphagia, orofacial pain, tinnitus, and a sensation of a foreign body in the throat. These symptoms often overlap with other conditions such as temporomandibular disorders, glossopharyngeal neuralgia, and chronic pharyngitis, leading to delayed or misdiagnosis.[1,2,3]

Anatomically, the styloid process originates from the petrous part of the temporal bone, serving as an attachment site for ligaments and muscles. Abnormal elongation or calcification can result in compression or irritation of adjacent neurovascular structures, such as the carotid arteries and cranial nerves IX and X.[3,4] The condition has been variably reported to affect between 0.01% and 84% of the population, with symptomatic cases representing a fraction of those affected.[1,2,5]

The gold standard for diagnosis includes a combination of clinical examination and imaging studies. Digital palpation of the tonsillar fossa often reproduces symptoms, while 3D CT imaging provides detailed visualization

of the styloid process's anatomy, enabling precise measurement and planning.[3,5] Surgical intervention, particularly styloidectomy, is the most effective treatment, with both intraoral and transcervical approaches being commonly employed. Minimally invasive techniques, such as endoscope-assisted or robotic-assisted styloidectomy, are gaining prominence due to their ability to reduce complications and improve recovery.[1,4,5,6]
This study aims to evaluate the intraoral approach for styloidectomy, focusing on its advantages in minimizing complications, improving recovery, and avoiding visible scarring. It seeks to analyze surgical outcomes, address challenges, and highlight the role of preoperative imaging and advancements in technology to optimize the treatment of elongated styloid processes.

CASE REPORT

A 56 year-old female patient reported to the Department of Oral and Maxillofacial Surgery with a chief complaint of difficulty swallowing and dull pain over the throat region since1 month. The pain was insidious in onset, intermittent, and radiated to the right mastoid area and right pharyngeal region. It was relieved by bending the neck to the ipsilateral side. Associated headaches, dysphagia, discomfort on the extension of the tongue and neck pain aggravated during swallowing were seen. The patient's past medical history was non-contributory,
and the examination of the temporomandibular joint was normal. Extraoral physical
examination revealed a tender, small, bony, hard projection in the right submandibular area at the anterior border of the sternocleidomastoid muscle. All third molars were impacted, and no infection or decay was seen. The bone of the styloid process could be felt when palpating the tonsillar fossa on Right side. Radiographic examination Orthopantomogram (Figure 1) demonstrated an elongated styloid process on right, and this can be further confirmed by computed tomography (Figure 2), shows an elongated styloid process showing S curvature growing downwards and forward with 49.3 mm in length. On left side is 23 mm.
Operative procedure: The patient underwent a styloidectomy via the intraoral approach under general anaesthesia in the operating room. The procedure involved making a transoral incision along the ascending border of the ramus (Figure 3) and performing blunt dissection using a curved hemostat. The dissection was directed posteriorly, medial to the medial pterygoid muscle, and lateral to the superior constrictor of the pharynx muscle. The styloid apparatus was then exposed, grasped between two hemostats (Figure 4), fractured, and easily removed (Figure 5). The closure was performed with 3.0 polyglactin (figure 6), and postoperative analgesics and antibiotics were administered for three days. The patient was discharged on the third postoperative day and was asymptomatic at the one-year follow-up, with no complaints on either side. Follow up done with post operative OPG . (figure 7)

DISCUSSION:

The intraoral surgical approach to Eagle Syndrome has garnered attention due to its minimally invasive nature, avoidance of external scars, and shorter recovery times.[1,2,7] The intraoral method is particularly suitable for cases where the styloid process can be easily palpated through the tonsillar fossa, as seen in the case of the 56-year-old female patient described. This patient presented with classic symptoms of Eagle Syndrome, including dysphagia and radiating throat pain, which were alleviated postoperatively following an intraoral styloidectomy.
The intraoral method eliminates the need for external incisions, thus avoiding visible scars. Surgical access through the tonsillar fossa allows for a direct approach to the styloid process, reducing overall operative time and facilitating faster recovery.[5,7] In the described case, the procedure was completed with minimal complications, and the patient demonstrated significant symptom relief and functional improvement at follow-up.
Despite its advantages, the intraoral approach has inherent challenges, such as limited surgical field visibility and an increased risk of neurovascular injury. The proximity of the styloid process to critical structures, including the carotid arteries and cranial nerves, requires meticulous dissection. Additionally, poor visualization can lead to incomplete resection, resulting in potential symptom recurrence.[5,7] In the reported case, careful preoperative imaging using 3D CT scans aided in surgical planning, mitigating these risks.
In the reported case, the intraoral approach was deemed appropriate due to the easily palpable styloid process and the patient's overall anatomical suitability. The use of absorbable sutures (3.0 polyglactin) facilitated wound healing, and the patient experienced no postoperative complications, such as oropharyngeal edema or infection.[7]

Compared to the extraoral approach, the intraoral method offers significant advantages in terms of patient satisfaction and cosmetic outcomes. However, in cases involving extensive calcification or elongated styloid processes with complex anatomical orientations, the extraoral approach may provide better access and control.[3,5,7]

Advancements in endoscopic-assisted and robotic-assisted intraoral techniques are poised to address the limitations of traditional intraoral surgery. Enhanced visualization and precision offered by these technologies may further reduce complications and improve outcomes.[2,3] Preoperative imaging modalities, such as angio-CT scans, continue to play a critical role in surgical planning and risk assessment.[7]

CONCLUSION

A thorough preoperative evaluation is essential for selecting the appropriate surgical approach for Eagle Syndrome. Factors such as the length of the styloid process, surgeon expertise, patient comorbidities, and anatomical considerations must be considered. While the extraoral approach offers superior visualization and control, the intraoral method provides a scar-free alternative with shorter recovery times. The choice of technique should be tailored to the patient's specific needs and the surgeon's experience.

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Figure ligands

Figure 1 Pre-operative radiograph

Represents the orthopantomogram, showing elongation of the styloid process on right side

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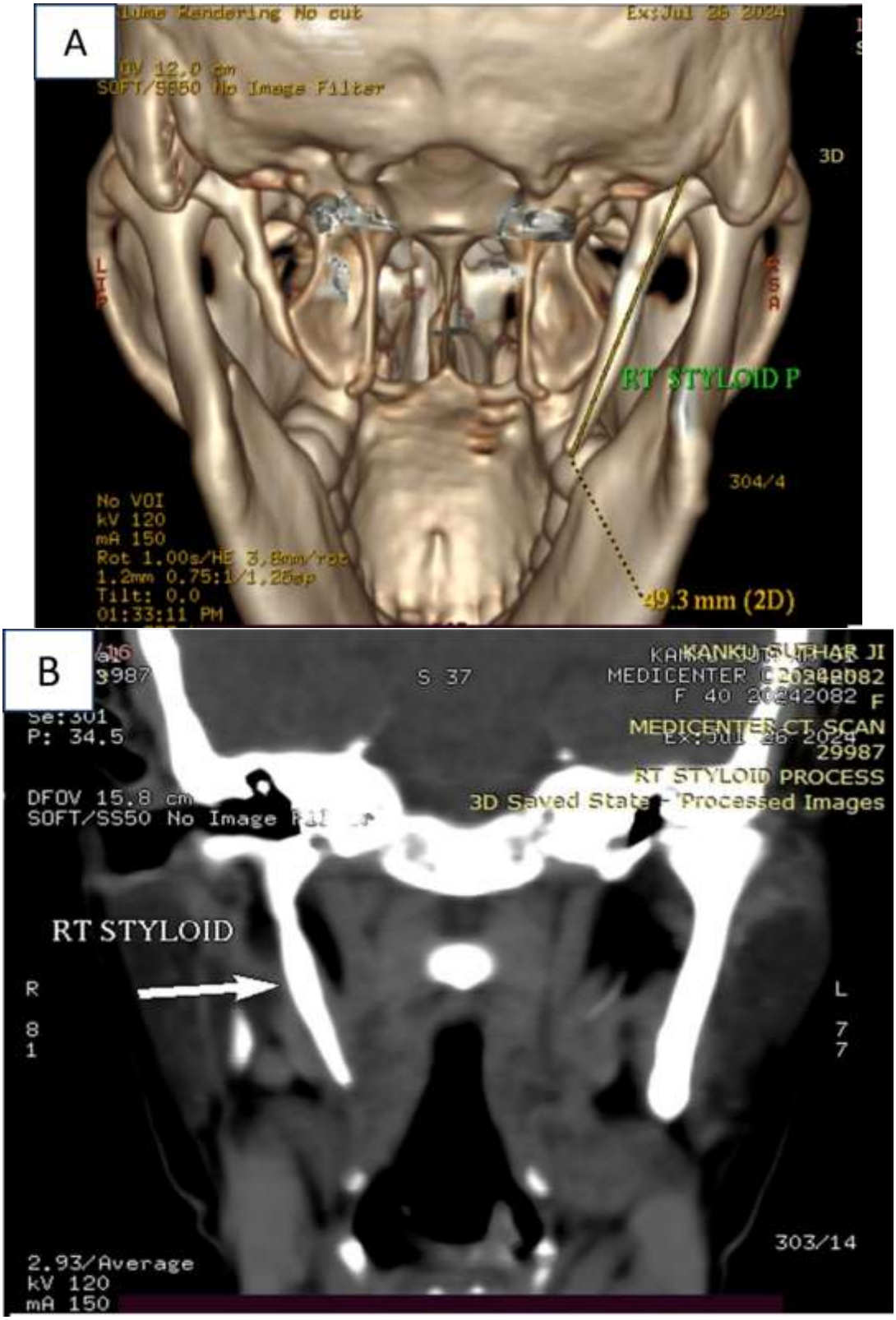

Figure 2 : Pre-operative CT Scan

The arrow mark represents the elongation of the styloid process showing S curvature, the downward and forward directions in [A] the 3-dimensional view of CT Scan with length measurement
B] Coronal view of CT scan

Figure 3: Intra-oral incision

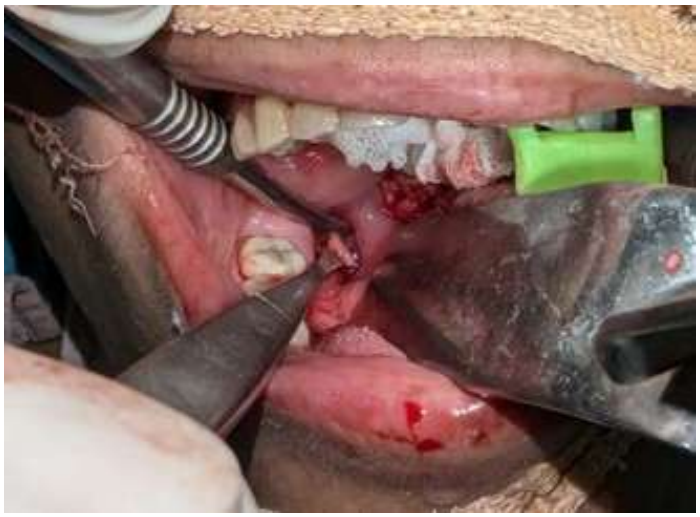

Figure 4: Removal of the styloid process

Figure 5: Specimen ,Styloid process : 2.5 cm

Figure 6 : Post operative suture

Figure 7 : Post operative OPG