

Evaluation of Postoperative Outcomes of Styloidectomy in refractory cases of Eagle Syndrome: A Retrospective Observational Study in a Tertiary Care Center of Garhwal Region

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Abstract: Introduction: Eagle's Syndrome (ES) is a rare clinical condition characterized by symptomatic elongation of the styloid process or calcification of the stylohyoid ligament. **Objective:** The objective was to evaluate postoperative symptom relief following styloidectomy in patients with radiologically confirmed refractory cases of (unilateral) Eagle's Syndrome.

Methods: A retrospective study was conducted on 30 patients diagnosed with refractory cases of unilateral ES and treated surgically at a tertiary center in Srinagar, Uttarakhand. Demographic data, symptom profiles, postoperative outcomes were analyzed. Symptom relief was assessed using the visual pain analogue scale (VAS) preoperative & postoperative.

Results: Most patients were female (60%) & 80 % patient belonged to rural population. otalgia (60%) and odynophagia (23.19%) & cervical pain (16.6 %) were the predominant presenting symptoms. Intraoral styloidectomy was performed. Complete relief was observed in 88.8% for otalgia, 85.71% for odynophagia, and 80% for cervical pain.

Conclusion: Surgical management of Eagle's Syndrome yielded high symptom resolution. Early diagnosis was crucial for optimal outcomes.

Keywords: Eagle's syndrome, Refractory, Styloidectomy, Postoperative outcomes, Symptoms relief

Introduction : The term "styloid process", originating from the Greek word "στῆλος" (stylos) meaning "stylet", was first introduced by Galen in the 2nd century A.D. Eagle initially reported that typical styloid process measures 25 mm. Any length exceeding these values was deemed a contributing factor to Eagle syndrome [1]. The styloid process is the attachment point for 3 muscles and 2 ligaments, known as Riolan's bouquet [2]. The stylohyoid ligament, developing from the Reichert's cartilage, spans from the styloid process's apex to the lesser cornu of the hyoid bone, forming part of the stylohyoid apparatus with the styloid process. The stylohyoid apparatus extends inferiorly and anteriorly into the parapharyngeal space, dividing it into retrostyloid and prestyloid compartments. The retrostyloid compartment contains essential structures, including the internal jugular vein (IJV), internal carotid artery (ICA), sympathetic trunk, glossopharyngeal, vagus, accessory, and hypo glossal cranial nerves. The prestyloid compartment contains the external carotid artery, lingual, and auriculotemporal nerves [3]. Involvement of one or more of these structures within the parapharyngeal space or direct contact of the SP with the lateral wall of the pharynx has been associated with various symptoms. Elongated styloid process recognized as Eagle syndrome (ES), is a medical condition characterized by various neurovascular symptoms, including unilateral cervical and orofacial pain, a sensation of a foreign body in the throat, dysphagia, auditory symptoms (otalgia and tinnitus), and neck discomfort. These symptoms are attributed to the elongation of

the styloid process or ossification of the stylohyoid ligament, compressing the adjacent vascular and neuronal structures [4]. Elongation of the styloid process can lead to severe complications, such as carotid artery dissection, which can result in ischemic stroke and other vascular issues. The most significant is pain localized in the orofacial and cervical regions.

Glossopharyngeal Neuralgia Characterized by recurrent, paroxysmal attacks of unilateral pain along the distribution of the glossopharyngeal nerve. Pain location: posterior tongue, tonsillar fossa, pharynx, angle of the mandible, or in the ear. Pain is typically severe, brief (seconds to 2 minutes), electric shock-like, stabbing, or sharp. Can be precipitated by swallowing, coughing, talking, or yawning. Compression of the glossopharyngeal nerve by an elongated styloid process is a proposed mechanism for pain in some Eagle syndrome patients.

AIM is to determine the outcome of styloidectomy in medically refractory cases of Eagle syndrome.

Methods: We conducted a retrospective study of patients at Department of ENT, HNB Base Hospital, Srinagar, Garhwal from February 2025 to January 2026 on 30 subjects with Eagle syndrome refractory to medical management. All the patients fulfilling the inclusion criteria were evaluated both clinically as well as radiographically. Patients in whom styloid process was clinically palpable were sent for CT SCAN with 3D facial reconstruction for accurate assessment of length of styloid process & ossification of stylohyoid ligament. Patients in whom length of styloid process were >3cm went for stylotonsillectomy (intra-oral approach) under GA. This involves removing the tonsils (if present) and then shortening the elongated styloid process. These patients were followed up for a period of 1 month. The severity of these symptoms was documented using the visual pain analogue scale (VAS). (Visual Pain Analogue Scale). A subjective measure of pain intensity used to assess pre-operative pain levels and post-operative outcomes. Typically a 10-centimetre line where one end represents "no pain" (0) and the other end represents "worst pain imaginable" (10).

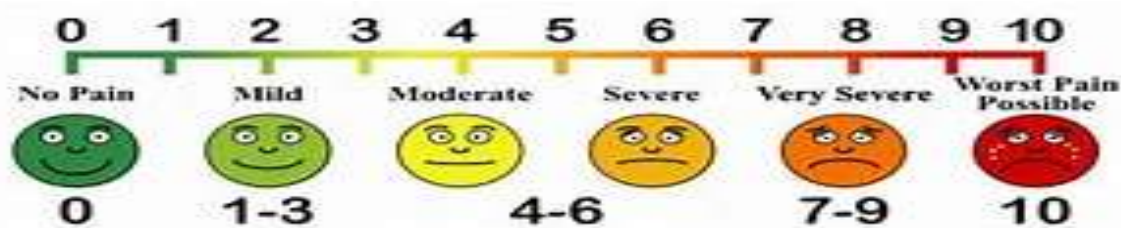


Figure 1: Visual pain analogue scale

Patients mark a point on the line that corresponds to their current pain level.

Inclusion Criteria: Elongation of the styloid process (unilateral) or calcified stylohyoid ligament, as proved radiologically, Cases refractory to medical management (Pregabalin 75mg HS for three weeks)

Exclusion Criteria: Significant systemic co-morbidities (cardiovascular, cerebrovascular diseases), Malignancies, Dental malocclusion.

Prior to surgery, the 30 subjects in our study presented with a range of symptoms, including: Odynophagia, Otagia, Cervical pain.

Table-I: Demographic profile of patients with eagle's syndrome (N=30)

Basic characteristics	
<i>Gender</i>	
Male	12 (40%)
Female	18(60%)
<i>Residence</i>	
Urban	6 (20%)
Rural	24(80%)

There was a female predominance, with 18 patients (60.0%) being female. Regarding geographical distribution, rural patients constituted the majority (80%), while 20% were urban residents (Table-I)

Results:

Most reported complaint was otalgia present in 60.0% of patients, odynophagia (23.19%), neck pain (16.6%),

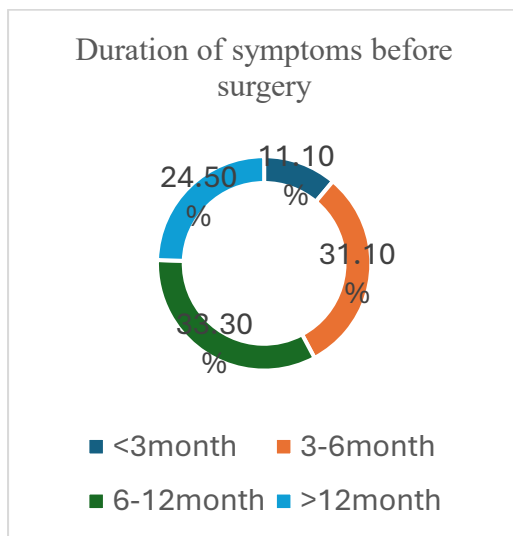


Figure -2:Duration of symptoms before surgery

Presenting symptoms before surgery (N=30) 33.3% had symptoms lasting between 6 and 12 months, while 31.1% reported a 3 to 6-month symptom history. Chronic symptoms lasting more than 12 months were noted in 24.5% of cases, indicating a significant delay in diagnosis and treatment for nearly one in four patients. Only 11.1% presented within the first 3 months of symptom onset, underscoring the typical diagnostic delay associated with this condition.(Figure- 2)

Table 2 :Symptom resolution after styloidectomy

Symptoms	Complete Relief	Partial Relief	No Relief	Total	% with complete relief
Otalgia	16	2	0	18	88.8 %
Odynophagia	6	1	0	7	85.71%
Cervical pain	4	0	1	5	80 %

The highest rate of complete symptom resolution was observed for otalgia with 88.8% (n=16/18) of affected patients reporting full relief. This was followed by odynophagia , with 85.71% (n=6/7) & cervical pain 80 % (4/5) patients.(Table 2)

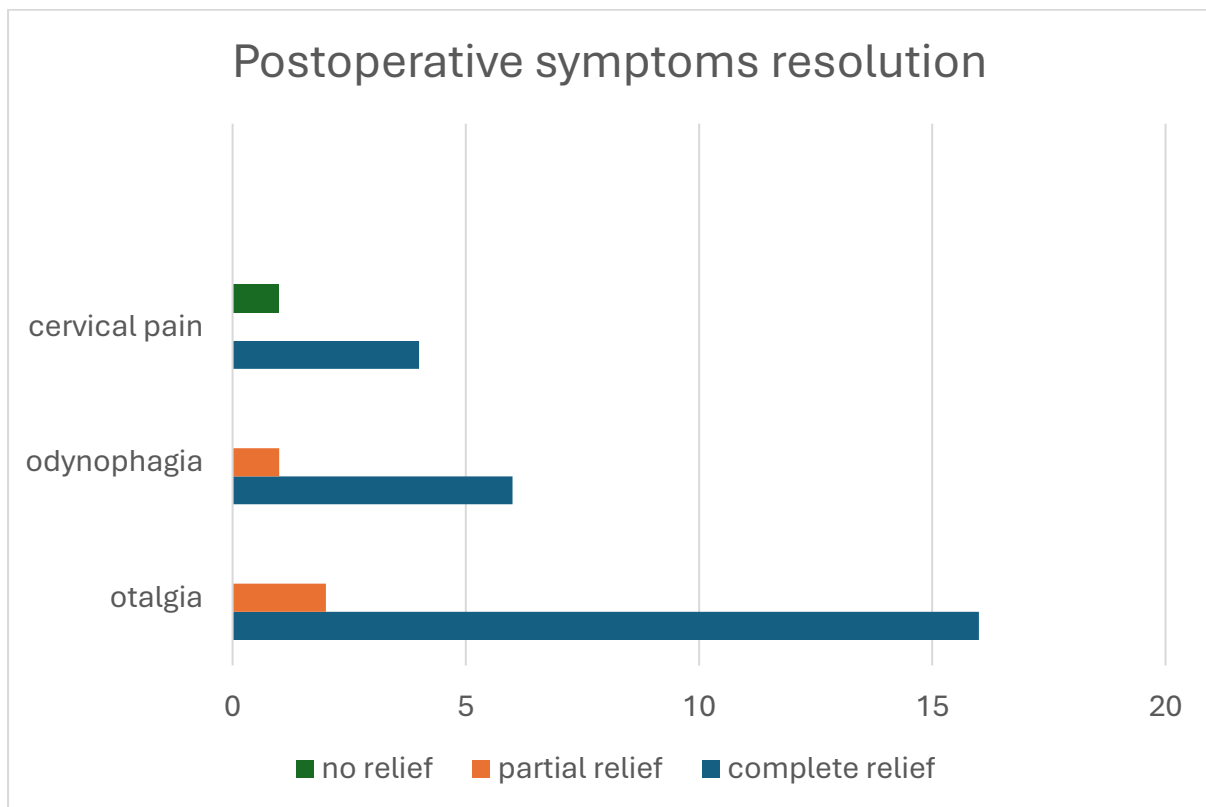


Figure 3: Postoperative symptom resolution

Intraoral styloidectomy performed with no revision surgery required; support for its favorable postoperative outcomes.

Table 3: Assessing improvement after Styloidectomy

Pain score	Otalgia	Odynophagia	Cervical pain
Preoperative	8.5	7.5	5
Postoperative	1	1.15	1.25

The severity of symptoms was documented using the visual pain analogue scale Visual Pain Analogue Scale. A subjective measure of pain intensity used to assess pre-operative pain levels and post-operative outcomes. (Table -3)

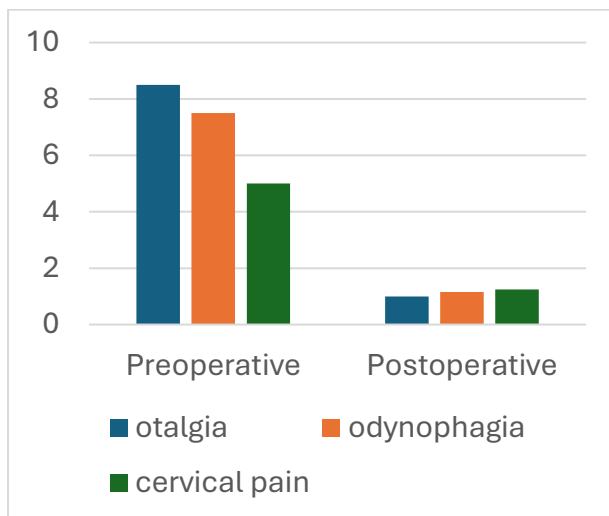


Figure 4:preoperative &postoperative assessment with VAS

Patients mark a point on the line that corresponds to their current pain level. Typically a 10-centimetre line where one end represents "no pain" (0) and the other end represents "worst pain imaginable" (10).Preoperative pain & postoperative outcome assessment with Visual pain analogue scale representing symptom relief & effective outcomes.

DISCUSSION: This retrospective study on Eagle's Syndrome (ES) by examining demographic patterns, symptomatology, provides comprehensive evidence in support of the effectiveness of styloidectomy as a therapeutic intervention for Eagle's syndrome and defines crucial factors that influence functional recovery outcomes. Most patients were with a female predominance (60.0%), consistent with de Assis Brito's cohort and Hardin et al, who observed a higher prevalence among women and suggested hormonal or anatomical influences.(5,6) Unilateral presentation was more common (63.3%), supporting O'Neill et al's description of unilateral elongation as typical. Early recognition remain crucial & Intraoral styloidectomy was performed. Postoperative outcomes were favorable.otalgia(60%) and odynophagia (23.19%) & cervical pain (16.6 %)were the predominant presenting symptoms. Intraoral unilateral tonsillostyloidectomy was performed in refractory cases of unilateral elongated styloid process. Complete relief was observed in 88.8% for otalgia, 85.71% for odynophagia, and 80% for cervical pain. These results were comparable to Ravisankar and Murugesan (2022) and Hardin et al, who both emphasized greater responsiveness of otologic and pharyngeal symptoms to surgery compared to musculoskeletal complaints.(6)

CONCLUSION :Cervicofacial pain caused by elongated styloid process or calcified stylohyoid ligament is often misdiagnosed tonsillitis, referred otalgia, etc. Hence, correct clinical examination along with radiological investigations is of utmost importance in diagnosing cases of Eagle syndrome. The key symptoms that should alert health professionals include otalgia , odynophagia or cervical pain. These symptoms should prompt further diagnostic imaging(CT SCAN with 3D facial reconstruction) for Eagle syndrome . Early identification and surgical management in ES is crucial as the severity and number of symptoms increase over time, adversely affecting affected individuals' quality of life . This retrospective study reinforced the clinical value of surgical intervention in Eagle's Syndrome,

particularly in patients presenting with classical symptoms such as otalgia ,odynophagia & cervical pain. Intraoral u/L styloidectomy provided high rates of symptom relief in u/L eagle syndrome . Notably, patients with shorter symptom duration before surgery experienced significantly greater postoperative improvement, emphasizing the importance of early diagnosis and intervention. Our findings supported the safety, efficacy, and symptom-specific benefits of surgical management for Eagle’s Syndrome and highlight the need for increased clinical awareness, especially in underserved rural populations.

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Photo gallery



Figure 5: Measuring dimension of elongated styloid process CT SCAN with 3D facial reconstruction



Figure 6 : Elongated styloid process intraoperative during styloidectomy

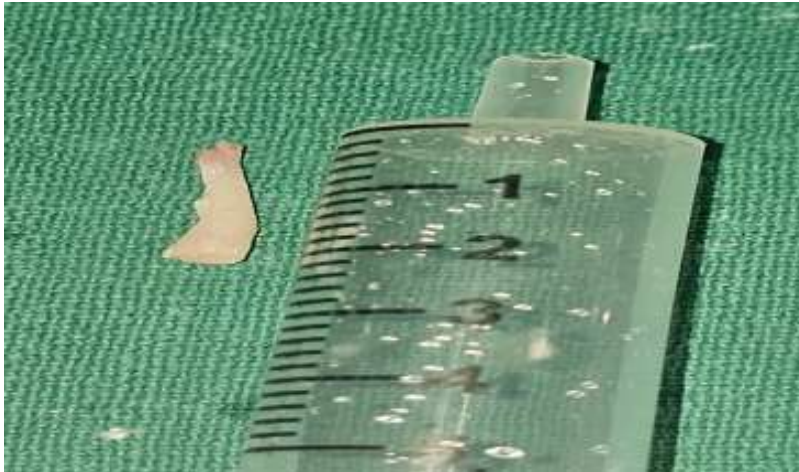


Figure 7 : Elongated styloid process post styloidectomy