

Postoperative Relief and Complications in Eagle's Syndrome: A Retrospective Analysis

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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 of the study was to evaluate postoperative symptom relief and complication rates following styloidectomy in patients with radiologically confirmed Eagle's Syndrome.

Methods:

A retrospective review was conducted on 90 patients diagnosed with ES and treated surgically at a tertiary center in Bangladesh. Demographic data, symptom profiles, surgical approaches, and postoperative outcomes were analyzed. Symptom relief was assessed using the visual analog scale (VAS), and complications were recorded. Correlation between symptom duration and postoperative improvement was calculated.

Results:

Most patients were female (60%) and aged 46–60 years (40%). Throat pain (80%) and dysphagia (53.3%) were the predominant presenting symptoms. Intraoral styloidectomy was performed in 66.7% of cases. Complete relief was observed in 83.3% for throat pain, 80% for otalgia, and 72.9% for dysphagia. Complications were low (18.9%), with transient dysphagia (6.7%) and wound infection (5.6%) being most common. A significant correlation was found between shorter symptom duration and greater relief ($r=0.9999$, $p=0.0107$).

Conclusion:

Surgical management of Eagle's Syndrome yielded high symptom resolution and minimal complications, particularly when intervention was timely. Early diagnosis was crucial for optimal outcomes.

Keywords: Eagle's syndrome, Styloidectomy, Postoperative outcomes, Symptom relief, Surgical complications

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Introduction:

Eagle's Syndrome (ES), also known as stylohyoid syndrome or stylalgia, is a rare but clinically important condition caused by elongation of the styloid process or calcification of the stylohyoid ligament complex. First described by Watt W. Eagle in 1937, it results when the elongated bony structure or calcified ligament impinges upon adjacent tissues, producing varied craniofacial symptoms.^{1,2} Eagle identified two variants: the classic type, often post-tonsillectomy with localized pain, and the carotid artery type, associated with neurovascular compression. An

elongated styloid process is generally defined as exceeding 30 mm, though the normal range lies between 25–30 mm, with some population-based variation.^{3,4} Panoramic radiographs and anatomical studies support this threshold for diagnosis. Clinically, ES manifests with nonspecific symptoms such as cervicofacial pain, dysphagia, globus sensation, otalgia, and headache.^{5,6} Rarely, neurological deficits occur due to compression of cranial nerves like the glossopharyngeal or vagus. Its polymorphic presentation often leads to misdiagnosis, with ES frequently mistaken for temporomandibular joint dysfunction,

glossopharyngeal neuralgia, trigeminal neuralgia, or pharyngitis.^{7,8} Such diagnostic ambiguity underscores the importance of careful evaluation and imaging support. The radiographic prevalence of elongated styloid processes ranges from 4% to 28%, but only ~4% become symptomatic.⁸ Despite this, ES is underdiagnosed due to overlapping presentations with common head and neck conditions. Epidemiological data are especially scarce in South Asia, including Bangladesh, where only case reports exist. Given ethnic anatomical variations and healthcare disparities, context-specific studies are necessary. Diagnosis requires both clinical and imaging modalities. Tenderness on palpation of the tonsillar fossa may raise suspicion but lacks specificity.⁵ Panoramic radiographs are cost-effective and widely used initially,⁴ while three-dimensional CT provides definitive diagnosis and pre-surgical planning, correlating anatomical findings with symptoms and excluding differentials.^{1,5}

Treatment depends on severity. Conservative therapies, analgesics, anti-inflammatories, and steroid injections offer temporary relief.^{1,9} Surgical styloidectomy, either intraoral or extraoral, provides definitive management. Intraoral surgery minimizes scarring but offers limited visibility, whereas the extraoral approach improves access but carries risks of visible scarring and neurovascular injury.^{10,11} Surgical series report 80–95% symptomatic relief, with 5–20% complication rates including transient nerve dysfunction and infection.^{12–14} Given diagnostic challenges, under recognition, and outcome variability, especially in Bangladesh, this study evaluates postoperative outcomes and complications in tertiary care centers, contributing local and global insight into ES management.

Methods:

This retrospective study was conducted at Rajshahi Medical College, Rajshahi, Bangladesh, from July 2022 to June 2023. A total of 90 patients with radiologically confirmed elongated styloid processes and associated clinical symptoms were included. The data were collected from patient records, operative notes, radiologic findings, and postoperative follow-up documentation. Inclusion criteria comprised patients with classic Eagle's Syndrome who underwent intraoral or extraoral styloidectomy and had a minimum follow-up period of 3 months. Patients with atypical

presentations or incomplete records were excluded. Preoperative symptoms such as throat pain, dysphagia, otalgia, and neck pain were recorded and scored using a 10-point visual analog scale (VAS). The type of surgery, intraoperative findings, and immediate and delayed postoperative complications were documented. Symptom relief was assessed at the 3-month. Complication rates were calculated as proportions. The correlation between symptom duration and postoperative outcomes was evaluated Pearson correlation test. Ethical approval was obtained from the institutional review board, and patient anonymity was strictly maintained. A p-value less than 0.05 was considered significant.

Results:

The age of the patients ranged from 18 to over 60 years, with the majority falling within the 46–60-year age group (40.0%), followed by those aged 31–45 years (33.3%). Younger patients (18–30 years) and those over 60 years each accounted for 13.3% of the study population. There was a female predominance, with 54 patients (60.0%) being female. The condition was unilateral in 64.4% of cases, while bilateral involvement was observed in 35.6%. Regarding geographical distribution, rural patients constituted the majority (57.8%), while 42.2% were urban residents (Table-I).

Table-I: Demographic profile of patients with eagle's syndrome (N=90)

Basic characteristics	no. (%)
Age (Years)	
18–30	12(13.30)
31–45	30(33.30)
46–60	36(40.00)
>60	12(13.30)
Gender	
Male	36(40.00)
Female	54(60.00)
Affected side	
Unilateral	58(64.40)
Bilateral	32(35.60)
Residence	
Urban	38(42.20)
Rural	52(57.80)

Most reported complaint was throat pain, present in 80.0% of patients followed by dysphagia (53.3%) and foreign body sensation in the throat (43.3%). Additional symptoms included otalgia (38.9%), neck pain (33.3%), and headache (24.4%). Less frequently reported symptoms were tinnitus (8.9%) and other nonspecific complaints (6.7%) (Figure-1).

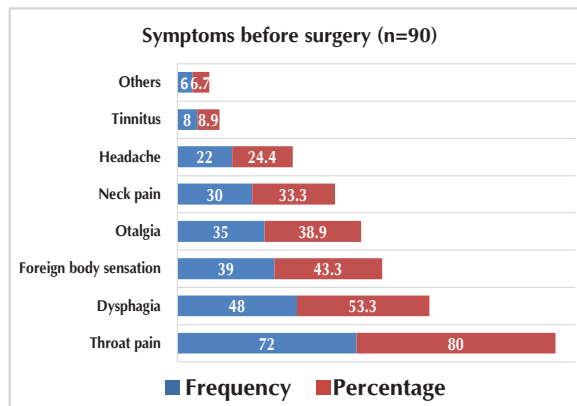


Figure-1: Presenting symptoms before surgery (N=90)

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 three months of symptom onset, underscoring the typical diagnostic delay associated with this condition (Figure-2).

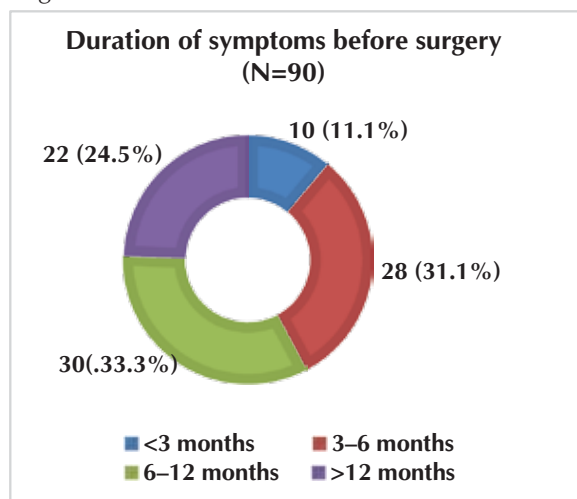


Figure-2: Duration of symptoms before surgery (N=90)

The majority underwent intraoral styloidectomy, which was performed in 66.7% of cases. The extraoral approach was employed in 26.7% of patients, typically for those with more extensive elongation or when greater visualization was required. A smaller subset (6.6%) underwent bilateral surgery (Figure-3).

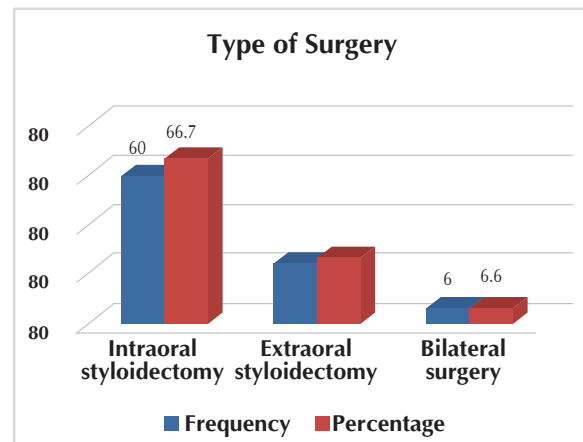


Figure-3: Type of surgical procedure performed (N=90)

The highest rate of complete symptom resolution was observed for throat pain, with 83.3% (n=60/72) of affected patients reporting full relief. This was closely followed by otalgia, with 80.0% (n=28/35) of patients experiencing complete resolution. For dysphagia, 72.9% (n=35/48) achieved full relief, while the remaining had partial or no improvement. Neck pain showed the lowest rate of complete resolution, with 66.7% (n=20/30) reporting full symptom relief, and 10 patients either experiencing partial improvement or no change (Table-II).

Table-II: Postoperative symptom relief (N=90)

Symptom	Complete Relief	Partial Relief	No Relief	Total	% with Complete Relief
Throat pain	60	10	2	72	83.3
Dysphagia	35	10	3	48	72.9
Otalgia	28	6	1	35	80.0
Neck pain	20	7	3	30	66.7

Among those who did experience complications, the most frequent was transient dysphagia, observed in 6.7% of patients. Wound infections occurred in 5.6%, while voice changes, likely attributable to transient neuropraxia or laryngeal

irritation, were noted in 3.3% of cases. Less common events included hematoma formation (2.2%) and a single instance (1.1%) of hypoglossal nerve injury (Table-III).

Table-III: Postoperative complications observed (N=90)

Complication	no. (%)
Wound infection	5(5.6)
Hematoma	2(2.2)
Nerve injury (hypoglossal)	1(1.1)
Transient dysphagia	6(6.7)
Voice change	3(3.3)
No complication	73(81.1)

An analysis of symptom duration in relation to postoperative relief demonstrated a negative correlation between longer symptom duration and the extent of improvement. Patients who underwent surgery within 6 months of symptom onset reported the most substantial benefit, with a mean preoperative symptom score of 8.2 ± 1.4 improving to 1.2 ± 0.2 postoperatively, an 85.4% reduction in symptom severity. This group showed a strong positive correlation between shorter symptom duration and symptom relief ($r=0.9999$, $p=0.0107$), indicating statistical significance. In contrast, patients with symptoms lasting 6 to 12 months experienced a 76.5% reduction, with scores decreasing from 8.5 ± 0.8 to 2.0 ± 0.4 . The lowest improvement was seen in the >12-month group, with a 63.9% reduction in VAS score (from 8.6 ± 1.9 to 3.1 ± 0.9), suggesting that delayed surgical intervention may be associated with diminished symptomatic relief (Table-IV).

Table-IV: Correlation between symptom duration and relief outcome

Symptom duration	Mean Symptom Score Pre-op	Mean Score Post-op	% Improvement	r-value	p-value
<6 months	8.2 ± 1.4	1.2 ± 0.2	85.4%		
6–12 months	8.5 ± 0.8	2.0 ± 0.4	76.5%	.9999	0.0107
>12 months	8.6 ± 1.9	3.1 ± 0.9	63.9%		

Discussion:

This retrospective study contributed to the literature on Eagle's Syndrome (ES) by examining demographic patterns, symptomatology, surgical

outcomes, and complications in a tertiary care setting in Bangladesh. Our findings aligned with international data but also highlighted region-specific trends and delays in diagnosis. Most patients were aged 46–60 years (40.0%) 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.^{15,16} Unilateral presentation was more common (64.4%), supporting O'Neill et al's description of unilateral elongation as typical.¹⁷ The symptom profile mirrored prior literature, with throat pain (80.0%), dysphagia (53.3%), foreign body sensation (43.3%), and otalgia (38.9%) being most frequent, paralleling Vilanilam and Gopal's findings.¹⁸ These results confirmed ES's polymorphic nature and the need for high suspicion in cervicofacial pain cases. A major finding was delayed presentation, with 57.8% symptomatic for over six months before treatment. This reflected under recognition, misdiagnosis, and limited specialist access, particularly among rural patients (57.8%). Similar diagnostic delays were noted by Lambor et al and Sharifi and Kouhi.^{19,20} Early recognition and referral, especially for underserved populations, remain crucial. Intraoral styloidectomy was the preferred technique (66.7%), with no revision surgeries required. This supports prior evidence favoring the intraoral route for reduced invasiveness and better cosmetic outcomes.^{12,19} Our results echoed Wang et al's findings of effective relief without revision. Postoperative outcomes were favorable: throat pain resolved in 83.3% of patients, followed by otalgia (80.0%), dysphagia (72.9%), and neck pain (66.7%). These results were comparable to Ravisankar and Murugesan (2022) and Hardin et al, who both emphasized greater responsiveness of pharyngeal and otologic symptoms to surgery compared to musculoskeletal complaints.¹⁶ Complication rates were low (18.9%), mainly transient dysphagia (6.7%), wound infection (5.6%), and voice change (3.3%). These were conservatively managed, consistent with Held et al, who reported ~17% complication rate, and Kozakovicova and Onderka, who also observed minor adverse events.^{14,21} Only one case (1.1%) of hypoglossal nerve injury occurred, underscoring the safety of surgery in experienced hands. A statistically significant correlation was noted

between shorter symptom duration and better postoperative relief, with the <6-month group achieving 85.4% improvement ($r=0.9999$, $p=0.0107$). This supports Waters et al. and Walters et al., who both associated delayed intervention with poorer outcomes (22,23). Patients with a >12-month duration had only 63.9% improvement, suggesting diminished outcomes with chronic symptoms. Overall, our findings reinforce the established role of styloidectomy as a definitive, effective treatment for symptomatic Eagle's Syndrome. The correlation between early diagnosis and better postoperative outcomes, low complication rates, and symptom-specific resolution contributes valuable region-specific evidence to the global understanding of this condition.

Limitations:

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

Conclusion:

This retrospective study reinforced the clinical value of surgical intervention in Eagle's Syndrome, particularly in patients presenting with classical symptoms such as throat pain, dysphagia, and otalgia. Intraoral and extraoral styloidectomy provided high rates of symptom relief with low complication rates. 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. Further prospective, multicentric studies are recommended to validate these findings across broader populations and healthcare settings.

Conflict of interest: None declared

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