

## Eagle's Syndrome Current Diagnosis and Transoral Surgical Treatment: a research update

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### Abstract:

**Aim and objective:** To discuss the different diagnosis of Eagle's syndrome and transoral surgical modalities for the treatment of the syndrome was the main aim and objective of the current study.

**Materials and Methods:** the current study comprises of 38 patients reporting to the oral surgery department with Eagle's syndrome due to elongated styloid process. Elongated styloid processes were resected via transoral approach under anesthesia.

**Results:** The chief symptoms of all patients regressed after surgery. 3 D computed tomography scanning shows how the preoperative estimation of the styloid length exactly correlated with the true styloid length measure intraoperatively. No postoperative complications were encountered in cases.

**Conclusions:** Three-dimensional computed tomography scanning is an advanced technique that can measure the definitive length of styloid process and takes the physician straightforward to the exact diagnosis. The transoral approach is a safe surgical alternative that achieves adequate treatment of Eagle's syndrome.

**Keywords-**Eagle's syndrome, styloid process, 3 D computed tomography.

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### I. Introduction

Eagle's syndrome, defined by Eagle in 1949, is characterized by morphological abnormality/ossification of the styloid process. The average length of the styloid process is 20-30 mm in the adult Caucasians and 15.4-18.8 mm in the Asian population. An elongated styloid process is defined by being at least 30 mm long. The clinical picture is composed of recurrent throat and neck pain, radiating into the ear and dysphagia. Symptoms can be bilateral or, more frequently, unilateral. The incidence is 4-8 per 10,000 people. Eagle's syndrome is characterized by the symptoms of recurrent throat pain, pharyngeal foreign body sensation, dysphagia, referred otalgia, and neck pain. Elongated styloid process or ossified stylohyoid or stylo-mandibular ligaments might clinically cause the so-called Eagle's syndrome or stylalgia.<sup>1,2</sup> Eagle has considered that any styloid process longer than 25 mm is elongated and usually responsible for Eagle's syndrome.<sup>3-5</sup> The incidence of elongated styloid process has been reported to be between 1.4% and 30%.<sup>5-8</sup>

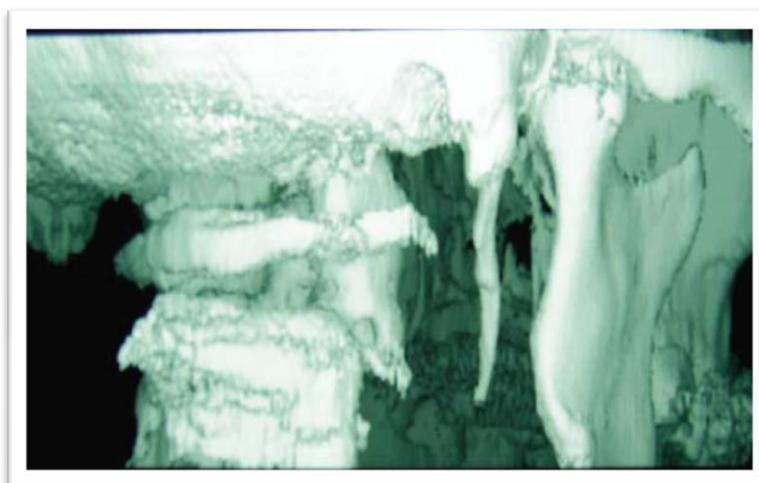
The differential diagnosis of the Eagle's syndrome should include all the conditions causing cervicofacial pain. Medical history is the main guide for the diagnosis of Eagle's syndrome; however, palpation of the lateral tonsillar fossa, infiltration of local anesthetics to the tonsillar fossa, and radiologic examination are combined to confirm the diagnosis. Although several types of radiographs have been used for a long time, 3-dimensional computed tomography (TDCT) is the current and advanced technique that measures the definitive length of styloid process and takes the physician straightforward to the exact diagnosis of elongated styloid process.<sup>9,10</sup>

Eagle's syndrome can be treated pharmacologically or surgically, or both. The surgical management of elongated styloid process consists of 2 major procedures: the transoral approach and the extraoral-cervical approach.<sup>11</sup> The choice of treatment usually depends on the experience of the surgeon.

The aims of this study were to present our management and treatment modality for Eagle's syndrome and to discuss the importance of exact diagnosis of Eagle's syndrome and cost-effectiveness of transoral surgical treatment.

## II. Materials and Methods

38 patients with Eagle's syndrome due to elongated styloid process were included in this retrospective study. Patient population consisted of 28 women and 10 men with the age range of 25 to 50 years (mean age, 34.2 years) who had been treated with surgical resection of the styloid process via transoral approach. The common complaints of the patients were pharyngeal foreign body sensation, recurrent throat pain, dysphagia, referred otalgia, and neck and throat pain exacerbated by head rotations (Table 1). The onset of the symptoms was extremely variable, with a mean of 3.4 years prior to diagnosis. Four of the patients were bilaterally symptomatic. Medical history was the main guide for the diagnosis of Eagle's syndrome. Completed diagnostic work-up included palpation of the lateral tonsillar fossa, infiltration of lidocaine to the tonsillar fossa, and radiologic examinations. The radiographs for the routine evaluation of the styloid process were a panoramic radiograph and a lateral cephalogram. Lidocaine (2%) was infiltrated to anterior pillar and deeply into the lateral tonsillar fossa of patients whose throat pain was exacerbated by head rotations. Relief of pain after infiltration partially supported the diagnosis and confirmed the need for surgical procedure. The last 10 patients were also examined by TDCT scanning to measure the exact length of styloid process and to observe their position. Elongated styloid (fig 1) processes of all patients were resected via transoral approach under general anesthesia. The operations started with tonsillectomy in patients who had no history of previous tonsillectomy. The protuberance of the elongated styloid process was routinely found at the superolateral corner of tonsillar fossa by deep digital palpation. Then overlying mucosa of styloid process was incised and the styloid process was carefully dissected and skeletonized through its origin. The ligaments that were attached to styloid tip were separated from the process. Finally, the naked and free styloid process was removed from the temporal bone at its origin. The muscles and mucosa of the surgical bed were closed in layers to get a smooth surface and to avoid bleeding at tonsillar fossa. The same procedure was applied to contralateral side in bilaterally symptomatic 8 patients.



**Figure 1-** 3-D computed tomography scanning of the styloid process.

## III. Results

The intraoperative lengths of the styloid processes were between 33 and 44 mm with a mean of 38 mm. No early or late postoperative complications, including intensive bleeding, deep cervical infection, or neurovascular injury, were encountered. The operations were as comfortable as tonsillectomy regarding the postoperative period. 34 patients were followed up for 1.5 year; the remaining 4 were lost to follow-up after the first postoperative visit at third month. A simple patient questionnaire was used to assess the status of symptoms before and after surgery. The most common complaint was pharyngeal foreign body sensation; persistent throat pain was the second common presenting symptom (Table 1 and 2). Complete remission of symptoms was achieved in 22 patients at the final follow-up, whereas partial remission was observed in the remaining 12 patients.

Patient	Gender	symptoms	Results
1	Female	Dysphagia, pharyngeal foreign body sensation	Complete remission
2	Female	Throat pain by head rotation, otalgia	Complete remission
3	Male	Dysphagia, throat pain	Complete remission
4	Male	Odynophagia, throat pain	Complete remission
5	Female	Pharyngeal foreign body sensation	Complete remission
6	Female	persistent throat pain	Complete remission
7	Female	Pharyngeal foreign body sensation	Complete remission
8	Male	Pharyngeal foreign body sensation	Complete remission
9	Female	persistent throat pain	Complete remission

**Table 1** and -DISTRIBUTION OF GENDER, CHIEF SYMPTOMS, AND REMISSION STATUS OF THE PATIENTS

Patient	Gender	Symptoms	Results
1	Male	Throat pain by head rotation, otalgia	Partial remission
2	Female	Pharyngeal foreign body sensation	Partial remission
3	Female	Odynophagia, throat pain	Partial remission
4	Female	Persistent throat pain	Partial remission
5	Male	Pharyngeal foreign body sensation	Partial remission
6	Female	Odynophagia, throat pain	Partial remission

**Table 2** - DISTRIBUTION OF GENDER, CHIEF SYMPTOMS, AND REMISSION STATUS OF THE PATIENTS

#### IV. Discussion

Eagle's syndrome comprises the symptoms of pharyngeal foreign body sensation, recurrent throat pain, dysphagia, referred otalgia, and neck pain.<sup>1,2</sup> The mis-diagnosed patients with Eagle's syndrome may undergo unnecessary treatments; some patients may even undergo various surgical procedures, including serial dental extractions, tuberosity reductions, galvanoplasties, and temporomandibular arthroscopies.<sup>12-16</sup> Therefore, the extensive differential diagnosis of Eagle's syndrome should include any condition that may result in cervicofacial pain such as temporomandibular joint diseases, trigeminal, sphenopalatine or glossopharyngeal neuralgias, temporal arteritis, chronic pharyngotonsillitis, otitis media, external otitis, mastoiditis, dental pain, improperly fitting dental prostheses, submandibular sialadenitis or sialolithiasis, true pharyngeal foreign bodies, and tumors of the pharynx or tongue base.<sup>12,16</sup> Nine of our patients were previously treated by neurologists with vague diagnosis, most probably neuralgia, whereas the others were referred to and treated in gastroenterology or psychiatry departments. Their symptoms had persisted despite all of these therapies.

Eagle's syndrome should be suspected in the presence of persistent throat pain that is triggered or exacerbated by head rotations, lingual movements, swallowing, or chewing. The pain in the throat may be accompanied by hypersalivation, foreign body sensation on the affected side, and, more rarely, by change of voice lasting for a few minutes. Exacerbation of pain during the palpation of lateral tonsillar fossa should alert the clinician to a possible diagnosis of Eagle's syndrome. Local anesthetic block can be applied to the tonsillar fossa to localize the site of the pain; relief of the pain may support the diagnosis and confirm the need for surgery.<sup>14</sup>

Eagle had noticed that 4% of the population had elongated styloid processes and only 4% of these individuals showed symptoms.<sup>1-4</sup> Gossman and Tarsitano<sup>5</sup> reported the incidence of elongated styloid process as 1.4% by analyzing 4,200 panoramic radiographs of men between 18 and 22 years old while the upper limit was 25 mm. However, taking the radiographic abnormality into account, Keur et al<sup>8</sup> found the incidence to be 30% in their clinical and radiologic study on 1,135 patients.

The most useful radiographs that can demonstrate the styloid process are panoramic radiograph, posteroanterior skull view, lateral cephalogram, lateral oblique mandible view, Towne's view, and open-mouth odontoid view.<sup>13</sup> The computed tomography scanning has still been frequently used, besides these radiographs. Furthermore, the TDCT is a new and more advanced technique and takes the physician straightforward to the exact diagnosis.

The patients in this study had elongated styloid processes that were much longer than the threshold and that made them riskier to be symptomatic. The TDCT scans of the patients also depicted how the pre-operative estimation of the styloid length correlated with the true length that was measured intraoperatively. Eagle's syndrome can be treated conservatively or surgically, or both. Conservative management includes analgesics and local corticosteroid or anesthetic administration. Additionally, manual fracturing through transpharyngeal manipulation can be applied; however, this does not usually relieve the symptoms and may

cause possible damage to nearby neurovascular structures. Surgical resection has generally been accepted as the primary treatment modality of Eagle's syndrome. Thus, several transoral and extraoral-cervical approaches have been described for the surgical management of elongated styloid process.<sup>11,14</sup> In our patients, the choice of treatment was the resection of styloid process via transoral approach. Transoral resection of the styloid process was relatively easy to perform and avoided external scar as well as extensive fascial dissection. Both operation and recovery times of this procedure were short. This technique could also be performed under local anesthesia. We did not encounter any neurovascular complication, while satisfactory symptomatic improvement was achieved in all patients. However, the rare disadvantages of the transoral approach are the possibility of a deep cervical infection, the poor visualization of the surgical field, and the risk of neurovascular injury, while attempting to leave the shortest residue of styloid process.<sup>14-16</sup> On the other hand, the external approach provides adequate anatomic exposure of both the styloid process and nearby structures. The exposure will be important in the presence of vascular injury with intensive bleeding. In addition, this sterile surgical technique decreases the risk of bacterial contamination. The major disadvantage of the external approach is the postoperative cosmetic deformity due to scar formation. The other disadvantages are the necessity of general anesthesia and extensive fascial dissection and uncomfortable paresthesia's of cutaneous nerves.<sup>17</sup> We believe that transoral approach is a safe surgical alternative achieving adequate treatment of Eagle's syndrome. However, it does not imply that this technique is superior to others. Since the TDCT is an advanced technique that can measure the definitive length of styloid process, we consider that radiologic evaluation of Eagle's syndrome should consist of TDCT, if available.

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