Eagle's Syndrome: Report of Three Cases

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Abstract Eagle's syndrome is defined as the symptomatic elongation of the styloid process or mineralization of the stylohyoid ligament complex. It can present as a variety of different symptoms which can mislead the otolaryngologist and the dentist in diagnosing the condition. We are presenting three cases of Eagle's syndrome describing the importance of digital palpation through tonsillar fossa and use of panoramic radiographs in confirming the elongation of styloid process.

Keywords Eagles syndrome · Panoramic radiography · Stylohyoid ligament · Styloid process

Introduction

Eagle's syndrome is defined as the symptomatic elongation of the styloid process or mineralization (ossification or calcification) of the stylohyoid ligament complex. This condition was first described by Watt W. Eagle, an Otorhinolaryngologist in 1937 [1]. He has further described it as atypical facial neuralgia and reported that it has various symptoms like feeling of a foreign body lodged in the throat, difficulty and pain during swallowing, throat pain, pain on turning the head, pain in infraorbital, infratemporal, ear and occipital areas, pain on wide opening of mouth, headache, tinnitus and vertigo [2, 3]. As the diagnosis is not very easy, number of cases are underestimated in the population [4]. Due to variable and non-specific nature of symptoms, patients seek treatment in several different clinics such as

otolaryngology, neurology, neurosurgery, psychiatry and dentistry.

In this scientific article, three cases of Eagle's syndrome are presented and the importance of digital palpation through tonsillar fossa and panoramic radiographs in differentiating the pain of elongated styloid process from the pain of dental origin is emphasized.

Case Report 1

A 49 year old male patient reported to the Department of Oral Medicine and Radiology primarily with the complaint of pain and mobility in all the teeth. He simultaneously complained of mild to moderate pain while rotating his neck to the left side and on deglutition since 2 years for which no treatment was sought. Patients past and present medical history was non-contributory. On extraoral examination, tenderness was present in the right post auricular and mastoid region. Intra oral examination revealed poor periodontal condition with generalized mobility of teeth and artificial prosthesis over maxillary anterior teeth. On palpation of the right tonsillar fossa, tender elongated styloid process was felt and a clinical diagnosis of Eagle's syndrome was made.

The panoramic radiograph revealed that all the third molars, both central incisors and mandibular right second molar were missing. Also, artificial prosthesis from maxillary right canine to maxillary left canine with a periapical rarefaction in maxillary right canine, carious lesion in mandibular left second molar and generalized interdental bone loss was observed. A linear calcified radiopaque structure originating from right styloid process extending towards the hyoid bone below the angle of mandible, measuring approximately 55 mm was observed. This structure was identified as mineralized stylohyoid ligament

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confirming the clinical diagnosis (Fig. 1). The mineralized stylohyoid ligament was classified as Langlais type I styloid with partial calcification.

For dental management, the patient underwent oral prophylaxis and periodontal flap surgical procedure. Root canal treatment was done in maxillary right canine and mandibular left second molar and the missing teeth were replaced.

For pain due to elongated styloid process, symptomatic treatment of non-steroidal anti-inflammatory drug—piroxicam 20 mg tablet once daily for a period of 15 days along with hot fomentation and physiotherapeutic exercises was advised. Patient was also suggested about styloidectomy if the symptoms were not relieved. The patient was asymptomatic during regular follow up for a period of 1 year.

Case Report 2

A male patient of 48 years was referred from ENT department (to rule out pain of dental origin) with complain of severe pain on neck movements and deglutition. Patients past and present medical history was non-contributory but his past dental history revealed that he had undergone treatment for fracture of left angle of mandible 7 years back.

On extraoral examination, severe pain on left and right neck movements was noticed. The angle of mandible, trapezius and sternomastoid muscles were tender bilaterally. Intraoral examination revealed presence of artificial prosthesis in maxillary arch and poor periodontal condition of mandibular teeth. Bilateral tenderness in the tonsillar fossa along with elongated styloid process was noted and a clinical diagnosis of Eagle's syndrome was made. The pain of dental origin was ruled out.

The digital panoramic radiograph (Fig. 2) showed implant prosthesis in maxillary arch and generalized interdental bone loss in mandibular teeth. Radiopaque bone plate was seen over the left angle of mandible. The left and right styloid process were elongated measuring 74 and 50 mm respectively thus confirming the clinical diagnosis of Eagle's syndrome. A single pseudo-articulation was noted between the right styloid process and stylohyoid ligament. The left and right styloid process were classified as Langlais type I and Langlais type II elongation respectively with partial calcification.

Patient was treated symptomatically and was advised tablets containing NSAID's and muscle relaxants for a period of 15 days along with topical diclofenac ointment and physiotherapeutic neck exercises especially upper cervical stretches. After this regimen, patient reported with no symptoms. Presently, patient is on physiotherapeutic exercises and regular follow up. Patient was also suggested about styloidectomy if the symptoms recur.

Fig. 1 Panoramic radiograph of case 1 showing Langlais type I elongation of right styloid process

Fig. 2 Panoramic radiograph of case 2 showing Langlais type II elongation of right styloid process and Langlais type I of left styloid process

Case Report 3

A 62 year female patient reported bilateral pain in the mandibular third molar region with consistent headache and difficulty in swallowing since 3–4 months. The previous medical history was unremarkable except for hysterectomy before 20 years. The extraoral examination revealed tenderness over post auricular region, angle of mandible and sternomastoid bilaterally. The intraoral findings showed completely edentulous maxillary and mandibular arches except few root pieces and carious maxillary left second molar. Severe tenderness was noticed bilaterally on palpation of mandibular third molar region, faucial pillars and tonsillar fossa with presence of elongated styloid process. Thus, a clinical diagnosis of Eagle's syndrome was made.

The panoramic radiograph (Fig. 3) showed upper and lower edentulous arches with few root pieces in either of the arches and carious maxillary left second molar. The radiograph distinctly demonstrated left and right elongated styloid process measuring 55 and 61 mm respectively thereby confirming the clinical diagnosis of Eagle's syndrome. The right and left styloid process showed a Langlais type I and type II elongation respectively with partial calcification.

The root pieces and the carious tooth were extracted. Patient was advised artificial complete denture. To relieve from symptoms, she was given tablets of NSAID's along

Fig. 3 Panoramic radiograph of case 3 showing Langlais type I elongation of right styloid and type II elongation of left styloid process

with muscle relaxants for the period of 15 days along with topical diclofenac ointment and physiotherapeutic neck exercises. This patient was lost to follow up.

Discussion

The stylohyoid apparatus is formed by the styloid process, stylohyoid ligament and the lesser horn of the hyoid bone. Embryologically, it has been derived from the Reichert's cartilage of the second branchial arch. It is a slender, pointed structure which projects anteroinferiorly from the inferior aspect of temporal bone. It tapers towards the apex like a pinnacle. It descends between the external and internal carotid arteries to reach the side of the pharynx. It is interposed between the parotid gland laterally and the internal jugular vein medially. The accessory, hypoglossal, vagus and the glossopharyngeal nerves are located medial to the styloid process. The structures attached to the styloid process are the stylohyoid, styloglossus and stylopharyngeus muscles and the stylohyoid and stylomandibular ligaments [5, 6].

The length of the styloid process is variable. Eagle documented that the average length of styloid ranges from 2.5 to 3.0 cm [2, 3]. Kaufman et al. [4] reported that 30 mm is the upper limit for normal styloid process. Mansour and Young [7] concluded that the diagnosis of an elongated styloid process could be made whenever the styloid process was longer than 40 mm. In radiological studies, the normal length of styloid process is reported to be no longer than 25 mm [8]. In our cases, all the styloid process were more than 40 mm.

Because of an elongated styloid process or a calcified stylohyoid ligament, a patient with Eagle's syndrome may develop non-specific pain which may be felt during head movements, neck, ear and mastoid region. In addition, patient may feel dysphagia or foreign body like irritation in the pharynx [9].

Eagle has described two syndromes, which are attributed to elongated styloid process. *Classic Eagle's syndrome*

usually follows tonsillectomy and includes pain in throat, sensation of foreign body in throat and pain on deglutition. The second syndrome, *Stylocarotid syndrome* may or may not follow tonsillectomy and even if the styloid process is not elongated or deviated to one side. Pain is caused by mechanical irritation of the sympathetic nerve tissue in the walls of the internal and external carotid artery by the tip of the styloid process or the ossified ligament [2, 3, 10].

The elongated Styloid process syndrome is often observed in the third and fourth decade of life and women are more frequently affected than in men. Bilateral involvement is more common, but does not always involve bilateral symptoms [11]. All of our cases were above 40 years and out of which two were males and one was female. Two cases had bilateral involvement and one had unilateral involvement and all were symptomatic.

Steinman [10] has proposed three theories to explain the ossification of the Stylohyoid ligament. The *theory of Reactive Hyperplasia* states that trauma can cause such ossification, the *theory of Reactive Metaplasia* which explains that it is a post traumatic healing response and *theory of Anatomic variance* which states that such ossification is an anatomical variation that occurs without any recognizable trauma. One of our case had a history of trauma 7 years before.

Langlais et al. [12] have classified elongated Styloid process as *Type I* which is uninterrupted, elongated Styloid process, *Type II* which is a pseudo-articulation between Styloid process and Stylohyoid ligament and *Type III* in which there are interrupted segments of the mineralized ligament, creating the appearance of multiple pseudo-articulations (Fig. 4). The elongated Styloid process is also classified as *calcified outline* having thin radiopaque border with central radiolucency that constitutes the majority of the process, *partially Calcified* having thicker radiopaque outline and almost complete opacification, but small, sometimes discontinuous radiolucent cores, *Nodular complex* having knobby or scalloped outline which may be partially or completely calcified with varying degrees of central radiolucency and *Completely calcified* in which there is a totally radiopaque process with no evidence of radiolucent interior [12]. Two of our cases had type I styloid on one side and type II on other whereas one case had unilateral type I styloid. All the styloids were partially calcified.

The differential diagnosis of elongated Styloid process should include Glossopharyngeal and Sphenopalatine neuralgia, Temporo-mandibular joint disease, Migraine headaches, Temporal arteritis, Myofascial pain dysfunction syndrome, impacted molar teeth and Faulty dental prostheses [10].

Several imaging modalities have been used for the diagnosis of Eagles syndrome which include panoramic

Fig. 4 Langlais classification of elongated styloid process

radiograph, lateral head and neck radiographs, Towne's radiographs, lateral oblique radiograph of mandible, antero-posterior head radiograph and computed tomography. However, the complete details of length, angulation and relation to adjacent structures can be obtained from a CT scan by formulating a 3D-CT [13].

Treatment of Eagle's syndrome is both non-surgical and surgical. Nonsurgical treatment includes reassurance, nonsteroidal anti-inflammatory drugs, physiotherapeutic neck exercises and steroid injections [14]. Steinmann has reported good results with injection of a steroid solution or a long acting anesthetic at the lesser horn of the hyoid bone or the inferior aspect of tonsillar fossa [15]. The surgical treatment may be by intraoral or extraoral approach, however, extraoral approach for surgical trimming of elongated styloid process is preferred because of better visualization and decreased risk of deep space neck infection [14].

To conclude, elongated styloid process should be kept in mind when the clinician is faced with oro-facial pain originating from third molar region, neck pain, dull aching headaches, dysphagia or temporomandibular joint pain. Careful palpation of post auricular region, mastoid region and tonsillar fossa along with panoramic radiography will confirm the diagnosis of elongated styloid process.

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