

Styloid Process Syndrome

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Summary

Styloid syndrome is a condition in which an elongated styloid process or calcified stylohyoid ligament causes occasional pain in the neck, a feeling of a foreign body (in the pharynx?) or some other form of retromandibular-cervical pain. In adults the styloid process is approximately 25 mm long with a tip which is located between the external and internal carotid arteries, lateral to the pharyngeal wall and the tonsillar fossa.

Ossification of the stylohyoid and stylomandibular ligament causes prolongation of the styloid process and clinical symptoms.

There are three syndromes closely connected with the styloid process syndrome: Costen's, Trotter's and Myofacial painful syndrome. Diagnosis can be made by a clinical examination and palpation of the tonsillar fossa, during which pain is felt by the patient.

Radiographic finding may show several possible variations: elongated, pseudoarticulated and segmented styloid process, and according to the calcification: peripheral, partial, complete or nodular type calcification. Treatment is primarily surgical.

The physician's knowledge of possible clinical variations and diverse symptomatology is important.

The authors present the case of a female patient with Stylohyoid Syndrome treated by surgical shortening of the elongated styloid process.

Key words: *syndrome, styloid process, Eagle.*

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Introduction

The styloid process syndrome is a clinical condition of complex aetiology. Despite the complex aetiology it manifests relatively simply - as PAIN in the parapharyngeal, retromandibular or cervical region. Apart from the other disturbances caused by this condition, pain remains the dominant symptom (1).

Anatomical-topographic characteristics

The styloid process is a bony projection, situated immediately anterior to the stylomastoid foramen, averaging from 20 to 25 mm in length. It is of cylindrical form and projects downwards from the inferior surface of the temporal bone towards the front, downwards and medially narrowing towards the tip. The location of the tip is particularly

important, which is situated between the internal and external carotid arteries, laterally from the pharyngeal wall and immediately behind the tonsil fossa (1,2).

Three muscles and two ligaments are attached to the styloid process. *M. stylopharyngeus* attaches medially and from the posterior side next to the base of the process, *m. stylohyoideus* from the posterior side and laterally on the central part of the process and *m. styloglossus* which starts from the anterior part of the process immediately next to the tip. The muscles are innervated by *n. glossopharyngeus*, *n. facialis* and *n. hypoglossus*. The *stilothyoid* ligament extends from the tip of the styloid process up to the lesser horn of the hyoid bone and the *stylomandibular* ligament, which commences under the attachment of *m. styloglossus* and ends on the *angulus mandibulae* (1).

Painful syndrome of the orofacial region

If discussion on the orofacial region is focussed on the region of the styloid process it becomes clear that differential diagnostic diagnosis is hindered by numerous diseases and syndromes connected with the jaw joint (3). This succession of possible conditions begins with inflammation of all types and causes, congenital anomalies, traumas and, in this region rare although possible, malignant diseases. Numerous possibilities of projected pain caused by inflammation of the eustachium and middle ear, parotid diseases, impeded eruption of the upper and lower impacted or retinated wisdom teeth, neuralgia etc. should also be taken into account.

Other diseases that complicate diagnosis of pain in the area of the ascending branch of the mandibula and joints are carcinoma of the nasopharynx and diseases of traumatic etiology.

Several syndromes should certainly be mentioned which are marked by the symptom of pain in that region and whose symptoms are occasionally very similar to the symptoms of the styloid process syndrome.

This group of diseases is:

1. Costen's syndrome
2. Trotter's syndrome
3. Miofacial painful syndrome

Costen's syndrome

Manifests with several symptoms that can be divided into auricular, articular and cranial. The joint is sensitive to palpation, with pain and crepitation. Hearing is poorer with buzzing in the ears, dizziness and headache around the eyes, the crown and the back of the head. Today it is considered that only arthritic changes and neuralgia are realistic, and possibly certain auricular symptoms.

One explanation for this condition is that these changes are preceded by loss of posterior or all teeth, during which the bite drops and the mandibula moves distally, pressing the joint (*glavicom*) disc *articularis* and posterior part of the joint chamber. The pressure causes the disk to deform and shift, so that it no longer protects the arch and posterior part of the joint chamber from nerve pressure. This causes irritation of *n. auriculotemporalis*, which is most probably the cause of the headaches on the crown and back of the head (2).

In 1958 Freese gave a new explanation of the syndrome. He based his explanation on "trigger" centres (6). Namely, he considered that hearing disorders are caused by a "trigger" point in the masseter, dizziness a "trigger" point in the *sternocleidomastoideus*, and pain in the tongue and pharynx spasm of the *geniohyoideus*, *digastricus* and *pterygoideus* muscles.

Trotter's syndrome or Morgagni's sinus syndrome

Trotter's syndrome comprises three symptoms that occur in some patients suffering from nasopharyngeal carcinoma (30% patients). It manifests with neuralgiform pains in the lower jaw radiating towards the ear, with deafness and blockage in the ear, with palatal asymmetry (involving a tumour of the *m. levator palatini*) and trismus (involving *pterygoid* muscles) (7).

Painful myofascial syndrome

The syndrome manifests with muscular spasm, restricted mobility and sensitivity. There is also pain in the muscular-facial structure of masticatory, neck and back muscles. In the relevant muscles there are areas sensitive to touch and pressure from which masticatory impulses pass into the CNS

and return in the form of painful sensations on some other structures.

Such places in the muscles are "trigger" zones, and the places where the patient feels painful sensation are called zones of impact. The patient is well aware of these zones of impact and is conscious of their location (spasms and pain), while the "trigger" zone cannot be determined. The disorder can become more complicated by the occurrence of new "trigger" centres under the influence of previous "trigger" zones, thus creating a circulus vitiosus. For instance, a "trigger" point in the sternocleidomastoid has an effect on the area of the temporomandibular joint, temporal and frontal regions, and may induce the occurrence of new "trigger" points in the temporalis (7).

Trigeminal neuralgia

Trigeminal neuralgia is the most frequent neuralgia in the facial area. In 95% of cases it involves the second and third branches of the trigeminus (n. maxillaris and n. mandibularis). It occurs in the form of sudden excruciating, "boring" pain, resembling an electric shock, usually lasting for less than one minute (8).

Initially the attacks of pain are mild and infrequent, with remissions that may last for several months. However, in time the remissions become shorter and the attacks more severe, until finally the attacks may become extremely severe and occur daily for many months. Bilateral pain is very rare and as a rule the pain is unilateral and never passes to the other side. The pain occurs by activating the specific "trigger" zones, which can be stimulated by various stimulation: mastication, speech, movements of the lips and tongue, yawning, touching the facial skin, sudden movements of the head and walking, noise or strong light. The pain never occurs during sleep. The attacks are more frequent on the right side than on the left, with greater frequency in women than in men.

Aetiology is unknown, and the question is whether the pain is induced by a peripheral or central disturbance. A combination is suspected, consisting of degenerative changes in Gasser's ganglion, possible mechanical compression or

vascular modification. These factors could cause demyelination of the nerve fibre and consequent creation of a "short circuit" of afferent-efferent fibres, thus closing the vicious circle of stimulus and reaction.

Eagle's syndrome

Synonyms: Elongated styloid process syndrome, Styloid process and carotid artery syndrome, Styloid syndrome, Styloid process neuralgia, Stialgia.

In 1937 Eagle first presented two cases with symptomatology of elongated styloid process in an article entitled "Elongated Styloid Processes, Report of Two Cases" (9).

The symptoms were mainly localised in the pharynx, similar to chronic pharyngitis. According to Eagle's report it was possible for the pain to spread to the middle ear or to the area of the mastoid process. There was often a sensation of a foreign body in the pharynx, with difficulty swallowing.

"Simptomi slični glosofaringealnoj neurologij uz veliku mogućnost toga stanja zbog blizine glosofaringealnog živca" Eagle, 1937) (9). Diagnosis was made on the basis of palpation and X-ray.

According to Eagle the elongated styloid process can be without symptoms: "Neznatno duži, ali usmjeren medijalno može činiti velike posteškoće" (Eagle, 1937) (9).

Briefly, Eagle's two original cases were as follows: The first was a female patient, aged 31 years, who had felt pain for eight years in the left side of the neck, which radiated to the left middle ear and tip of the left mastoid. The symptoms occurred immediately after tonsillectomy. Following the operation during which approximately 2 cm of the left styloid process was removed, immediate improvement occurred.

Eagle's second case was a 56 year-old male, who had experienced difficulty swallowing for twenty years prior to the operation. He had been advised by his physician never to have a tonsillectomy, as it was considered that an elongated styloid process could cause problems after the operation. However, twenty years later tonsillectomy was performed

because of reaction to a focal infection, with tonsils as the focus. During the operation a 7 cm long styloid process was found.

In both cases Eagle stressed that the surgical treatment eliminated all symptoms (9).

Clinical appearance and frequency of elongated styloid process

Statistically, the same number of men and women suffer from Eagle's Syndrome, and patients are usually older than 40 years.

Symptomatology is varied. Patients most often complain of pain in the pharynx, a sensation of the presence of a foreign object (fish bone) (in the pharynx??), pain on swallowing which radiates to the area of the ear on the same side. Clinically, hardness can occasionally be felt in the tonsillar fossa which is painful on palpation. If the styloid process causes pressure on the area of the carotid arteries, the symptoms are more complicated. Pain may occur in the areas that supply the internal and external carotid arteries. In the case of affection of the external carotid, the case history records buzzing in the ears, pain during movement of the head and pain in the anterior neck triangle. Symptoms with regard to the internal carotid may be headache in the area of the orbit and other areas that supply that artery. Although the elongated styloid process is usually bilateral, the symptoms and disturbances are most frequently unilateral.

Of the remaining symptoms there is the possibility of temporary dizziness and flashing lights before the eyes, which appear when moving the head, temporary pain in the neck and a frequent need to swallow (10,11,12).

New knowledge

In order to classify all the symptoms connected with pain in the area of the neck and pharynx and ossification of the styloid process, in 1989 Camarda and coworkers proposed a classification of three syndromes: Eagle's Syndrome, Stylohyoid Syndrome and Pseudothyoid Syndrome.

Radiographic finding

According to Langlais and coworkers (13) radiographic finding of an elongated styloid process and calcified ligaments of the stylohyoid connection/attachment can be divided into several types according to two criteria:

- A) Morphological criteria (3 types):
- Elongated styloid process
 - Pseudoarticulated styloid process
 - Segmented styloid process
- B) Criteria determined by the means of calcification (4 types):
- Surface calcified styloid process
 - Partially calcified styloid process
 - Nodular type calcification
 - Completely calcified styloid process

Possible embryological basis of styloid process pathology

Styloid process, stylohyoid ligament and small horn of the hyoid bone developmentally originate from the second branchial or hyoid arch.

The formation of which the above structures originate consists of the following parts:

- 1) Tympanohyal part - the base of the styloid process
- 2) Stylohyal part - forms a large part of the styloid process
- 3) Ceratohyal part - precursor of the stylohyoid ligament
- 4) Hypohyal part - development precedes the small horn of the hyoid bone.

It is believed that the ceratohyal part of the second branchial arch contains small parts of embryonal cartilage that may or may not, at a later stage, mature into bone.

A similar theory can be applied to the stylo-mandibular ligament.

Another possibility is mineralisation of the ligament as a result of ageing and degenerative processes.

Case presentation

The case history of a female patient, S.P., indicated a diagnosis of styloid syndrome. The case history did not disclose information of a surgical procedure in the area of the head and neck, or previous tonsillectomy. The pain was characteristically dull and deep, and had occurred unilaterally for four years. It was felt in the cheek, submandibularly, in the temporal region and in the ear. The pain was also felt when swallowing, and the patient said that she was unable to drink water. The pain also increased on palpation of the tonsillar region and when turning the head.

There was no information on bone diseases in the family history, and although the patient suffers from some spinal disorders she was not aware of the precise diagnosis.

Prior to admittance to the Clinical Department of Oral Surgery at the Clinical Hospital Dubrava, she was examined ultrasonically, and by an ENT specialist and an endocrinologist. After hospitalisation the right tonsil and a styloid process underneath it were removed. Rehabilitation lasted for a period of approximately two months until the disappearance of symptoms.

Discussion

In daily practice a diagnosis of styloid process syndrome is usually made in the specialist clinic, and is most frequently made by an ENT specialist, a maxillofacial or oral surgeon. The question is whether, with knowledge of the characteristic symptoms of the disease, the circle of diagnosticians could be extended to include doctors of dental science and other specialist branches of the dental profession?

Knowledge of the clinical appearance and radiographic characteristics of styloid process syndrome would enable differential diagnosis of different pathological changes in the orofacial and perioral area, with the aim of easier orientation and faster arrival at the final diagnosis.

Knowledge of historical and contemporary information on the styloid process syndrome from the literature, enables complete understanding of this

syndrome, and provides insight of how understanding and human conception of this problem have changed throughout history.

Based on this information the polyvalent dentist would be able to join the team of physicians participating in the diagnosis and treatment of diseases of unclear etiology in the orofacial field.

The results of an analysis of available literature indicated the following:

- Styloid process syndrome occurs in 30% men and women.
- In this syndrome Eagle's Syndrome, Styloid Syndrome, Stylohyoid Syndrome, Pseudohyoid Syndrome should be differentiated, and the original Eagle's Syndrome should be restricted only to cases of posttraumatic and postoperative complications of elongated styloid process (13,14).
- In differential diagnostics other known syndromes and dental pathologies should be taken into account, including temporo-mandibular joint, salivary gland, muscles, blood vessels, nerves, mucous membrane etc.
- Detailed case history and clinical examination should be included in the treatment, together with radiographic finding, in order to eliminate all other diseases and syndromes which differentially-diagnostically interfere with the Styloid process syndrome, with the aim of maximally effective treatment of the patient.

Evidently Styloid process Syndrome is not such a rare occurrence. In 1998 Knežević examined two groups of patients. The first group comprised patients older than 30 years and the second group patients aged from 18 to 30 years (15).

In the first group elongated styloid process was found in 26% of patients, while in the second group this was not found. This corroborates the findings of other authors.

Elongated styloid process was found in:

- 2-30% of adults (Zaki and coworkers 1996) (16)
- 28% (Kaufman and Kaufman, Elazy and Irish 1970) (17,18)
- 33% females and 29% males (Keur and coworkers 1986) (19,20)
- 3.7% up to 20 years old, 37% 20-40 years old, 59.3% over 40 years old (Sokler 1999) (21)

Therefore every polyvalent dentist can count on sooner or later coming across the phenomena of pain in the retromandibular region, which he or she will be unable to determine the cause by a normal clinical examination (21,22).

Every practitioner, particularly the practitioner on the first line of dental health care, must have insight of the complex aetiology of pain in the aforementioned area. If the practitioner has the facts and general knowledge of all the aforementioned

syndromes and variations, and other pathological processes in this region the dentist can take part in the diagnosis of pathological conditions and later direct the patient to the appropriate institution. Clearly, the dentist is not expected to give the exact diagnosis. However, elimination of diseases and syndromes which are unlikely, and correctly sending the patient to a specialist will be sufficient help and the first step to rapid and effective solution of the problem.