Temporal headaches and associated symptoms relating to the styloid process and its attachments

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KEY POINTS FROM THIS ARTICLE:

1) The styloid process is a thin “spike-like bony process” that is attached to the base of the skull.

2) 5 structures (3 muscles and 2 ligaments) are attached to the styloid process:
   A) The **styloglossus** muscle
   B) The **stylohyoid** muscle
   C) The **stylopharyngeal** muscle
   D) The **stylomandibular ligament**
   E) The **stylohyoid ligament**

3) Trauma (auto accidents, falls, sports injuries, prolonged or excessive mouth opening) can detach any of these 5 structures from the periosteum of the styloid bone.

4) “The detachment of Sharpey’s fibers results in the release of noxious chemicals such as kinins, histamines, prostaglandins, etc., which can produce a withdrawal reflex, causing muscle tension, ischaemia, spasm and pain.”

5) Pain transmission from “C” pain fibers induces a host of autonomic responses. **[Key Point]**

6) These authors have identified 11 common pains and symptoms associated with soft tissue lesions of the styloid process and stylomandibular ligament:
   A) Headaches localized in the anterior temporal fossa. This is due to the pain withdrawal reflex and spasm of temporalis muscle fibers.
   B) Sore throat and difficulty swallowing in the absence of inflammation. This is due to the pain withdrawal reflex and spasm of all three of the styloid-attached muscles.
   C) Pain radiating to the temporomandibular joint and ear. This is due to the pain withdrawal reflex and spasm of the muscles of mastication, particularly the masseter and the medial/lateral pterygoids.
D) Voice alteration. This is due to the pain withdrawal reflex and spasm of the stylopharyngeal muscles. Some of the stylopharyngeal muscle blend into the muscles of the larynx.

E) Dry, non-productive cough. This is due to the pain withdrawal reflex and spasm of the middle constrictor muscle.

F) Pain in the masseter muscle. This is due to the pain withdrawal reflex and spasm of the masseter muscle, usually as a consequence of lesions of the stylomandibular ligament.

G) Restricted mandibular opening or "closed lock." This is due to the pain withdrawal reflex and splinting spasm of the all of the muscles of mastication (temporals, masseter and the medial/lateral pterygoids).

H) Development of the "open lock" of mandible. "This is an alarming and painful condition" where the mandible is locked in a wide-open position, caused by a muscle spasm induced subluxation of the mandibular condyle.

I) Sinusitis, congested stuffy nose or post-nasal drip. This is caused by a nociceptive driven reflex causing increased tone of the pterygopalatine, otic, and/or submandibular parasympathetic ganglions.

J) Tinnitus. This is common, but the mechanism is unclear.

K) Excessive lacrimation and bloodshot eyes. "Pain from the styloid structures stimulates very specific areas of the parasympathetic pterygopalatine ganglions resulting in tearing and hyperemia of the blood vessels of the eye."

7) A few drops of local anesthetic into the styloid process and stylomandibular ligament attachment can temporarily relieve the pain and symptoms (diagnostic).

8) A low powered laser directed to the styloid process and stylomandibular ligament can relieve these symptoms. "Low level laser (60-100 mW at 830 nm) has proven to be an effective, safe, non-invasive modality of treatment for this clinical entity." The laser is placed on both the styloid process and the stylomandibular ligament attachment at the inner angle of the mandible for about a minute.

9) For more than 150 years, clinicians have noted the styloid process causing pharyngeal symptoms that radiate upwards to the temporal area and ear. These include "pains under the ear which appear to come from the throat." Other symptoms include the sensation of a foreign body in the throat causing difficulty swallowing.

10) These authors, based upon successful treatment of >100 cases, note symptoms are primarily due to "soft tissue lesions in the vicinity of the styloid process."
11) A ligament exists between the styloid process and the hyoid bone; this stylohyoid ligament can become calcified.

12) “Soft tissue lesions of the styloid process may be due to microscopic or macroscopic tears which may occur in the muscles, tendons, ligaments and periosteum.”

13) The most common styloid lesion is a disruption of the Sharpey fibers at the styloid periosteum. This causes a release of noxious chemicals including kinins, histamine, and inflammatory prostaglandins.

14) Following injury, the noxious chemicals stimulate the “C” pain afferents that innervate the styloid periosteum and other deep tissues. Upper styloid periosteal injury refers to the TMJ, the ear and the temporal fossa, causing temporal headaches. Injury to the lower styloid- mandibular ligament refers pain to the zygomatic arch, the masseter muscle, and the anterior temporal muscle. This constitutes NEUROGENIC pain.

15) Styloid periosteal injury and pain causes a withdrawal reflex (spasm) of the associated jaw and neck muscles. These chronically contracted muscles accumulate additional noxious chemicals, perpetuating pain through a positive feedback loop. This constitutes NEUROMUSCULAR pain.

16) The stylopharyngeal muscle elevates the pharynx in swallowing and speech. “Withdrawal” spasm of this muscle can therefore interfere with swallowing and/or speech.

17) There is a fine balance between the sympathetic and parasympathetic nervous systems. Styloid process related pain could bring forth stimulation of the pterygopalatine parasympathetic ganglion, resulting in excessive mucous secretion of the nasal cavity and maxillary sinuses, causing post-nasal drip and a “stuffy nose.” Increased parasympathetic pterygopalantine tone can also cause capillary engorgement of the Eustachian tube causing “stuffy” ears, a feeling of hearing loss, phonophobia, and tinnitus.

18) If there is an injury to the Sharpey fibers of the nuchal ligament or to the tendon of the trapezius onto the occipital bone, there will be an autonomic response in the parasympathetic ciliary ganglion, causing blurred vision and photophobia due to the ciliary and radial muscle muscles remaining relaxed because of this parasympathetic dominance.

19) Styloid process and stylomandibular ligament lesions “may occur as a result of auto accidents, falls, sport injuries, and prolonged medical or dental procedures requiring excessive mouth opening such as third molar extractions, tonsillectomy and intubation in general anesthesia.”