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Editor:

**ROBERT B. SHIRA, D.D.S.**

*School of Dental Medicine, Tufts University*

*1 Kneeland Street*

*Boston Massachusetts 02111*

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# Surgical management of a symptomatic fractured, ossified stylohyoid ligament

*Stephen X. Solfanelli, D.M.D.,\* Thomas W. Braun, D.M.D., Ph.D.,\*\* and  
George C. Sotereanos, D.M.D., M.S.,\*\*\* Pittsburgh, Pa.*

PRESBYTERIAN-UNIVERSITY HOSPITAL

Because of the number of symptoms on presentation and the overlapping with adjacent anatomic areas, cases of symptomatic styloid processes and ossified stylohyoid ligaments may be misdiagnosed and mistreated. Careful clinical examination, history, and evaluation of radiographs enhance accurate diagnosis. The case presented here required excision of the stylohyoid ligament by disarticulation at the hyoid bone and removal of the styloid process at the cranial base. As in this case, extraoral cervical incision may be the only rational surgical approach, depending on the size and extent of the process and its areas of articulation.

In the case that follows a symptomatic, ossified stylohyoid ligament was totally removed via an extraoral approach. Despite radiographic and clinical findings, the case was initially misdiagnosed. While most of the literature suggests management by an intraoral surgical procedure, the findings in this case mandated a surgical approach through the neck.

### CASE REPORT

A 31-year-old white woman was referred to the Oral and Maxillofacial Surgery Service for evaluation of left

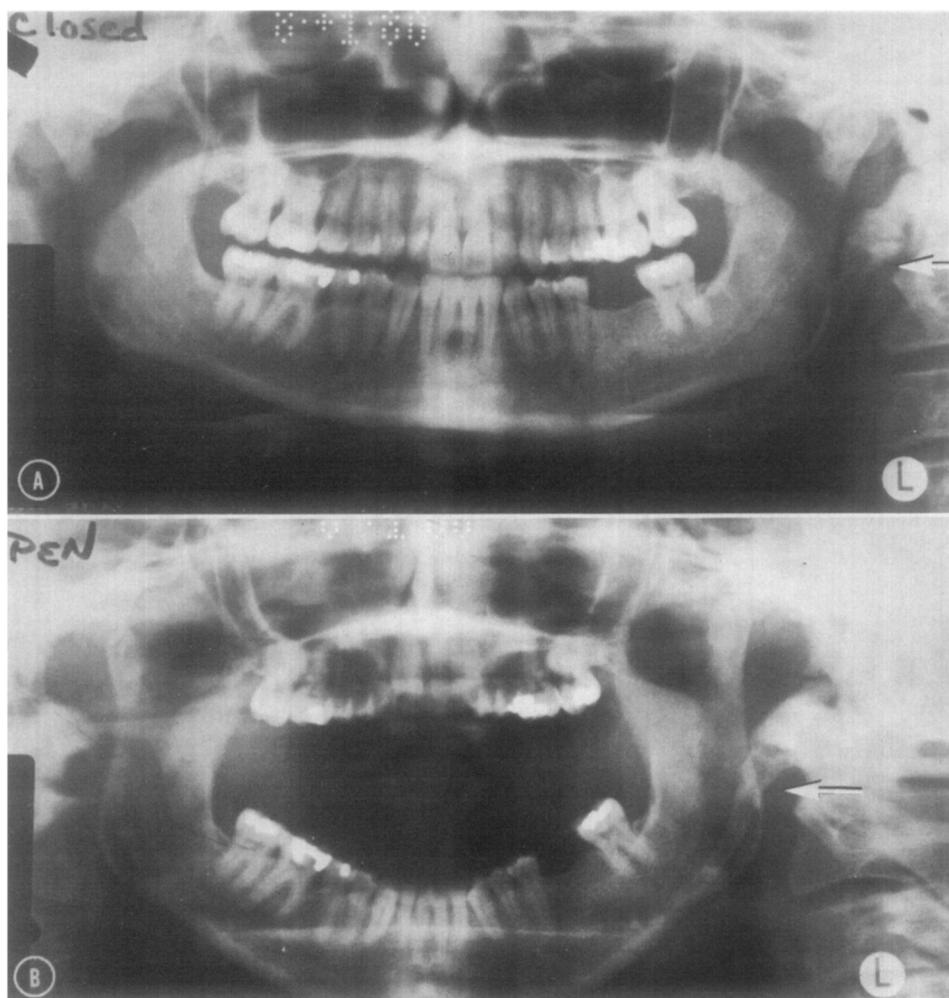
temporomandibular joint dysfunction. At the time of examination the patient's chief complaint was that of left-sided otalgia and left-sided sore throat. She stated that 2 months previously she had developed a common cold which was followed by a constant, dull, left-sided sore throat and left auricular pain. Further questioning revealed that occasionally the pain was located over the left temporomandibular joint, with retromandibular radiation. The patient also experienced occasional periods of dysphagia.

Past medical history revealed no significant medical illnesses or allergies. The only previous surgery involved the removal of multiple jaw impactions. Sixteen months previously, with the appearance of left submandibular tenderness and swelling and left-sided sore throat, the patient sought help at another clinic. A tentative diagnosis of acute sialadenitis was made. However, the sialogram was normal, all symptoms resolved within 2 weeks, and treatment was deferred. With the reappearance of symptoms, the patient was referred to us for evaluation of the temporomandibular joint. Head and neck examination revealed no signs of cervical or submandibular lymphad-

\*Senior Resident in Oral and Maxillofacial Surgery.

\*\*Chief, Oral and Maxillofacial Surgery, Western Pennsylvania Hospital, and Assistant Professor of Anatomy and Oral and Maxillofacial Surgery, University of Pittsburgh and Presbyterian-University Hospital.

\*\*\*Chairman, Department of Dentistry, Western Pennsylvania Hospital, and Director, Oral and Maxillofacial Surgery, Presbyterian-University Hospital.



**Fig. 1.** Radiographs open and closed mandible demonstrating the ossified stylohyoid ligament and styloid process. Note the “ball-and-socket” appearance at the articulation with the lesser cornu of the hyoid bone in the closed view (A) and the radiolucent areas at the styloid process, stylohyoid ligament junction, and at the most superior aspect of the styloid process seen on the open view (B).

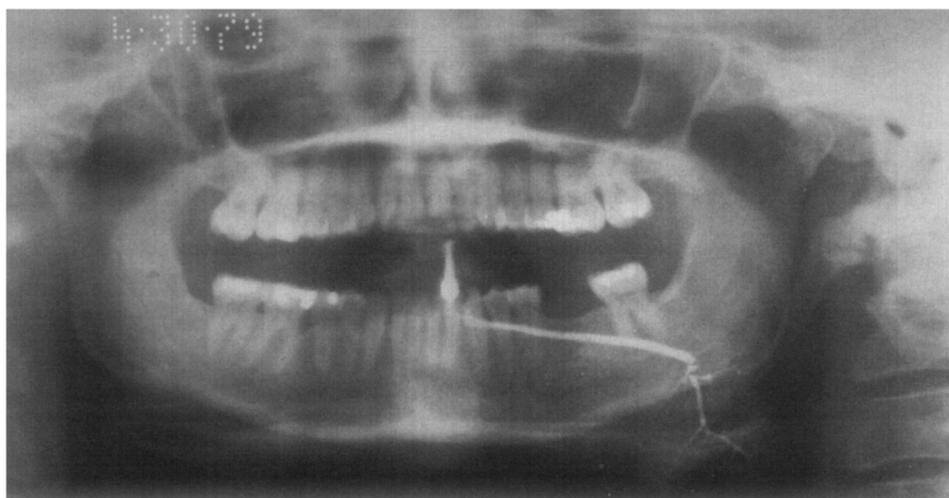
enopathy. Palpation over the left preauricular and retro-mandibular regions caused moderate discomfort. The patient had normal mandibular excursions but experienced pain on maximum mandibular opening. Intraoral occlusion was Class I. No intraoral lesions were present. The left internal (medial) pterygoid was tender to palpation.

Open and closed orthopantomograms immediately revealed a massive ossified stylohyoid ligament (Fig. 1). The most inferior aspect of the stylohyoid ligament demonstrated a pseudoarticulation consisting of a ball joint appearance articulating with a depression at the lesser cornu of the hyoid. Also, there were two radiolucent regions along the superior portion of the ossified stylohyoid ligament. Review of the previous sialogram also clearly showed the ossified stylohyoid ligament (Fig. 2). Comparison of old and recent radiographs demonstrated that the more superior radiolucency along the stylohyoid process was new.

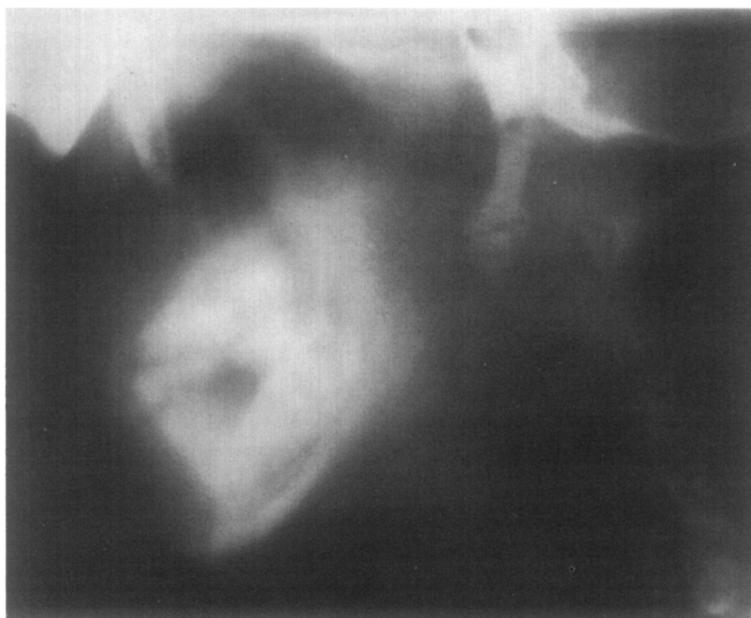
At this point the patient was re-examined, with specific

attention directed to the left tonsillar fossa and left submandibular triangle. Palpation of the left hyoid region revealed tenderness and hyoid fixation during swallowing. Tomograms verified the plain film findings (Fig. 3). Plans were then made for surgical excision of the styloid process and ossified stylohyoid ligament.

Three weeks later the patient was admitted to the hospital. The following day she was operated on under general halothane, nitrous oxide, and oxygen anesthesia. The neck was prepared with Betadine solution and draped in the usual sterile fashion. Intravenous steroids were administered to minimize edema. Methylene blue was used to demarcate a left submandibular, curvilinear incision. The incision was made and sharp dissection was carried down to the investing layer of the deep cervical fascia. Via blunt dissection, both the left submandibular gland and the left hypoglossal nerve were reflected superiorly. The digastric sling was released along with the most posterior portion of the mylohyoid muscle fibers



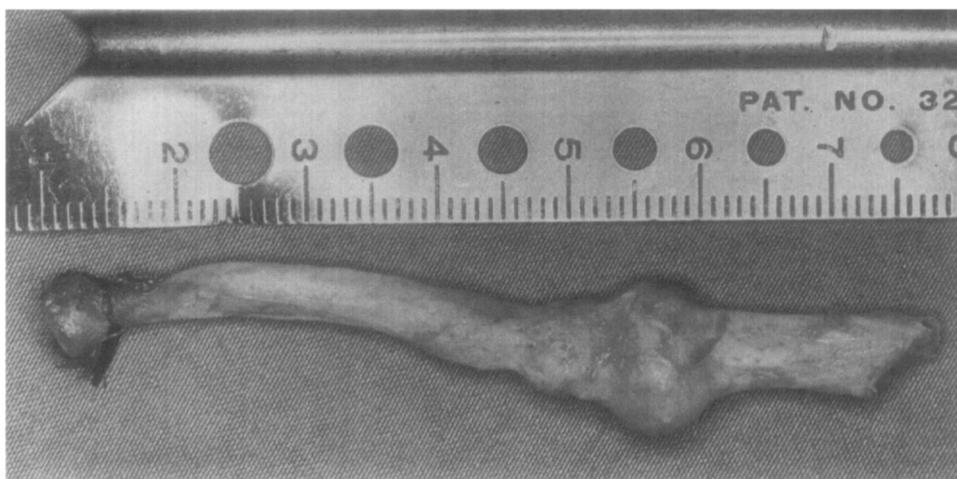
**Fig. 2.** Left submandibular sialogram demonstrating the ossified ligament and styloid process.



**Fig. 3.** Tomograms revealing the apparent styloid process—stylohyoid ligament junction (lower radiolucent line) and the fracture line of the styloid process at the base of the skull (upper radiolucent line).

from the hyoid bone. Reflection of the mylohyoid muscle exposed a thick fibrous connective tissue layer overlying the ossified stylohyoid ligament. This connective tissue was incised longitudinally and elevated. At the lesser cornu, the small “ball joint” head was disarticulated. Five centimeters superiorly, at the estimated styloid process—stylohyoid ligament junction, there was a linear fibrous tissue region representing either a previous fracture site or some type of pseudoarticulation. Two centimeters superior to this junction was the mobile, fractured part of the styloid process. It was at this point that the ossified structure was detached and removed in toto (Fig. 4). The remaining portion of the styloid process stump was recontoured with the Hall drill. The wound was well

irrigated and packed with microfibrillar collagen (Avitine). Closure was begun by reapproximating the mylohyoid fibers and digastric sling to the hyoid bone with interrupted 4-0 chromic sutures. The fascial layers were then closed with 4-0 chromic sutures. Final closure was accomplished with interrupted subcutaneous 5-0 Dexon and interrupted 6-0 silk sutures. A pressure dressing was placed. The remainder of the patient's hospital stay was uneventful, and she was discharged on the fourth postoperative day. Upon discharge she had transient minor weakness of the left side of the tongue, the full recovery of which occurred in 2 weeks. By the time of her 6-month recall visit, the patient was free of symptoms, with a well-healed left submandibular incision.



**Fig. 4.** Excised styloid process and ossified ligament. Note the ball appearance at the hyoid articulation and compare morphology with radiographic findings.

## DISCUSSION

The totally ossified stylohyoid ligament is an interesting and rare anomaly of the head and neck region which has produced a myriad of clinical symptoms and diagnoses in the past. This anomaly is known as Eagle's syndrome or styloid process syndrome.<sup>2</sup> In the past decade excellent articles have been published, reviewing the historical, anatomic, embryologic, and etiological aspects of this syndrome.<sup>1-4</sup> Because both the styloid process and the stylohyoid ligaments are cartilaginous (second branchial arch derivatives), there exists the potential for varying amounts of ossification from the styloid process tip to the lesser cornu of the hyoid bone. The incidence of elongated styloid processes has been reported at from 1 to 4 percent in the general population.<sup>5</sup> In a study of 484 patients, Kaufman and colleagues<sup>6</sup> found the incidence of styloid process elongation to be 28 percent. In these studies, 30 mm. served as the upper limit of normal styloid process length. However, only a very small portion of those patients had clinical symptoms. In 1970, Steinman<sup>7</sup> reported a series of thirty patients with symptoms of Eagle's syndrome in which only 20 percent exhibited elongated processes or ossified ligaments. He attributed their symptoms to an interesting phenomenon called "insertion tendonitis" which he said was due to degenerative and inflammatory changes in the tendinous attachments at the styloid process.

Varying symptoms of the syndrome include chronic sore throat, retromandibular pain, dysphagia, otalgia, vague atypical facial pain along the preauricular and mandibular regions, unilateral or bilateral orbital headaches, sensation of a sharp

foreign body lodged in the throat, and pain along the carotid arteries (carotodynia). Numerous possibilities, such as impingement of the glossopharyngeal, trigeminal, or vagus nerves against the elongated styloid process, fibrous tissue scarring after tonsillectomy; hyoid bone fixation, traumatically fractured processes, arthritis; hyoid bursitis, impingement of the internal or external carotid arteries, and insertion tendonitis have been implicated as causing these symptoms. Differential diagnoses must include trigeminal, glossopharyngeal, or sphenopalatine neuralgias, impacted third molars, chronic tonsillitis or pharyngitis, migraine headaches, cervical arthritis, esophageal diverticuli, and benign or malignant neoplasms.

Interestingly, the present case had been misdiagnosed approximately 16 months before. At that time the patient complained of a firm and tender submandibular region, left submandibular pain especially apparent while eating, and a mild sore throat. She was initially diagnosed as having acute sialadenitis, and her symptoms resolved in approximately 2 weeks. The sialogram was reported as being within normal limits. However, a review of these radiographs revealed the ossified stylohyoid ligament which was missed by the clinician and the radiologist. Sixteen months later the patient was referred to the oral and maxillofacial surgery clinic for evaluation of left temporomandibular joint pain. After the ossified stylohyoid ligament was diagnosed, 3 weeks passed without alleviation of symptoms and the ossified ligament was removed by an extraoral surgical approach. It is possible that a specific incident, such as a process fracture or inflammation of the pseudoarticulation, caused the initial symp-

toms. The patient's more recent symptoms may have been initiated by the recent styloid process fracture.

Most authors prefer the use of an intraoral approach through the tonsillar fossa. Their reasons are that the styloid process is more easily identified, the procedure is shorter, and there is no external incision or scarring. In this case the decision to use an extraoral approach was made because of the size of the ossified structure and the fact that it was fused to the hyoid bone. We believe, as does Moffat, that this method allows for more adequate visualization and exposure and for a safer, more controlled excision of the elongated styloid process, which measured more than 5 cm. Especially when the ossified ligament is fused with the lesser cornu, surgical removal via an extraoral route is simplified whereas it is very likely impossible via an intraoral route. Kopstein<sup>8</sup> also advocates the extraoral approach in cases of hyoid bursitis which require surgical intervention. Our experience had been that external scarring has been no problem following a careful plastic closure of extraoral incisions. The procedure is lengthened only by the time it takes to obtain a good closure. While we are not advocating

that all elongated styloid processes be approached extraorally, this case and those like it can perhaps better and more safely be approached via the extraoral route.

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#### *Reprint requests to:*

Dr. Thomas W. Braun,  
Mellon Pavilion  
4815 Liberty Ave.  
Pittsburgh, Pa. 15224