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The landmark for removal of sialoliths using sialendoscopy alone in parotid gland sialolithiasis

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ABSTRACT

Objective: To assess the general guidelines for removal of sialoliths in parotid gland sialolithiasis using sialendoscopy alone.
Methods: We analyzed 34 sialoliths treated using sialendoscopy in 26 patients with parotid gland sialolithiasis. We divided the Stensen's duct and parotid gland into for parts using computed tomography findings: (A) front of the masseter, (B) anterior and lateral to the center (anterolateral) of the masseter, (C) posterior and lateral to the center (posterolateral) of the masseter, (D) behind of the masseter. The location and size of each sialolith was assessed.
Results: The removal rates of sialoliths in the different locations by sialendoscopy alone were as follows: front of the masseter, 68.8%; anterolateral of the masseter, 60.0%; posterolateral of the masseter, 0%; and behind of the masseter, 33.3%. The removal rate using sialendoscopy alone was significantly higher in the sections anterior to the center of the masseter than in those posterior to the center of the masseter (66.7% [14/21] vs. 20.0% [2/10]; $P = 0.019$). The size of the sialolith was not correlated to the removal rate by sialendoscopy alone.
Conclusion: Sialoliths of the parotid gland located in positions anterior to the center of the masseter are significantly easier to remove by sialendoscopy alone. The center of the masseter is a general landmark for removal of sialoliths from the parotid gland using sialendoscopy alone. The size of the sialolith is not correlated with removal, except rare huge sialoliths.

1. Introduction

Parotid gland sialolithiasis is a relatively rare disease that causes pain, swelling, and sialadenitis of the parotid gland. The gland most frequently affected by sialolithiasis is the submandibular gland (87%), followed by the parotid (10%) and sublingual (3%) glands [1]. The longer length of the major duct is likely a factor, as well as the nature and consistency of submandibular gland saliva, which is thick in consistency, rich in phosphorous, and exhibits a high pH conducive to stone formation [2]. Conversely, the parotid gland saliva is serous, the main reason sialoliths are relatively rare in the parotid gland. The etiology of sialoliths is not fully understood. However, they are believed to result from inorganic material accumulating around an organic nidus in the duct or, less frequently, the parenchyma of the salivary gland [3].

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Traditionally, symptomatic patients with parotid gland sialolithiasis have been treated using an approach of superficial parotidectomy. However, postoperative complications include facial nerve injury (6–7%), facial hollowing, and Frey's syndrome [4]. Since Katz [5] first reported the potential of sialendoscopic surgery for sialolithiasis, sialendoscopy has been developed by Marchael et al. [6] and Nahlieli et al. [7]. Sialendoscopy allows endoscopic visualization of the salivary ductal system and is a minimally invasive surgical technique. It can be used as a diagnostic and interventional tool for inflammatory and obstructive pathology of the ductal system, thus providing an alternative to open surgery and its related complications [8]. Our department started performing sialendoscopic surgery in April 2009 and has treated more than 100 cases of salivary gland disease. Among those cases, we performed sialendoscopic surgery in 26 cases of parotid gland sialolithiasis, involving 34 sialoliths. We retrospectively reviewed the treatment results of parotid gland sialolithiasis, particularly those involving the location and size of the sialoliths. Based on our observations, we suggest using the center of the masseter as a landmark in the removal of sialoliths in parotid gland sialolithiasis when using sialendoscopy alone.

2. Material and methods

2.1. Patients

Between August 2009 and May 2016, 26 patients with parotid gland sialolithiasis underwent sialoendoscopic surgery at the Department of Otolaryngology of ***** ******* ******* University, *****, Japan. Several cases involved multiple stones in the parotid gland or Stensen's duct, and a total of 34 sialoliths were tried to remove using sialenodscopy. We retrospectively reviewed the findings of these 26 cases (17 men and nine women, between 20 and 74 years of age) involving 34 sialoliths. The protocol was approved by the Ethics Committee of the hospital.

2.2. Localization and size of sialoliths

We divided the Stensen's duct and the parotid gland into four portions with computed tomography (CT) scan findings; (A) front of the masseter, (B) anterior and lateral to the center (anterolateral) of the masseter, (C) posterior and lateral to the center (posterolateral) of the masseter, and (D) behind of the masseter (Fig. 1). We recorded the location of each sialolith according to the following classification. We measured the major and minor axes of the sialolith using a soft tissue CT scan. We used these images because the soft tissue CT scan was obtained in all patients, while many patients did not have bone condition images. Particularly, patients presenting at our department from other hospitals often brought CT scan images obtained while undergoing treatment there and these patients often lacked bone condition images.

2.3. Surgical procedure

Twenty-five patients were placed under general anesthesia for the procedures, and one case was treated using local anesthesia. In each patient, after adequate dilation of the papilla, a semi-rigid endoscope, 1.3 mm in diameter, (Karl Storz, Tuttlingen, Germany) was inserted into the Stensen's duct. Saline was administered through the scope's irrigation channel, and the sialendoscope was slowly passed into the Stensen's duct. If the papilla was not identified, we incised the buccal mucosa, identified the Stensen's duct, and incised it. In these cases, the sialendoscope was inserted into this incision. If the sialolith was identified, endoscopy was transferred to an all-in-one miniature endoscope, 1.6 mm in diameter, (Karl Storz, Tuttlingen, Germany). When removing the sialoliths, we utilized grasping forceps, biopsy forceps, a basket catheter used for urinary calculus extraction (stone extractor), and a balloon catheter used for treatment of coronary arteries. When unable to completely remove a sialolith, we modified to a combination approach [3] or open surgery. If the patients declined skin incision, the sialolith was left in place. We did not use extracorporeal shockwave lithotripsy (ESWL) or thulium-YAG laser for fragmentation of the sialoliths. We recorded the method of removal or and the reason the sialolith was not removed in each case.

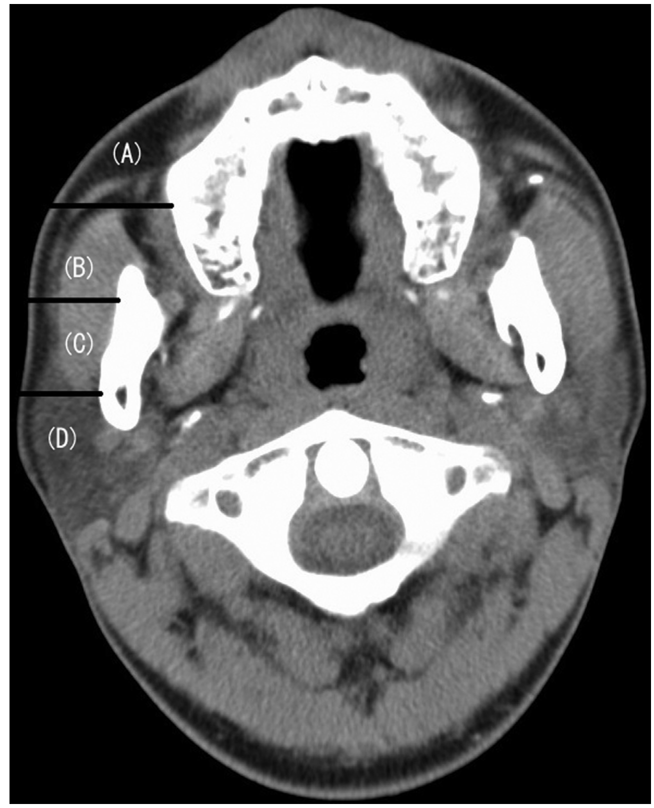

Fig. 1. Localization of sialoliths divided into 4 sections with CT findings. (A) Front of the masseter; (B) anterior and lateral to the center (anterolateral) of the masseter; (C) posterior and lateral to the center (posterolateral) of the masseter; (D) behind of the masseter; CT = computed tomography.

2.4. Statistical analysis

We used the Student's t-test to compare the sizes of the sialoliths and Fisher's exact probability test to compare the removal rates depending on the location of the sialoliths. Statistical significance was set at $p < 0.05$.

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