Endoscopy as minimal invasive routine treatment for sialolithiasis

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Endoscopy as a minimally invasive procedure with video-monitoring and documentation is demonstrated for diagnostics and therapy of sialolithiasis, which is the main indication for endoscopy in the area of the submandibular and parotid glands. Sialoendoscopy has become the routine procedure under ambulatory conditions. While on the one hand endoscopy is a diagnostic method especially in the case of radiolucent calculi, on the other hand it can be used as a therapeutic option for calculi removal in the same session. Endoscopy is also of high value in the diagnosis and treatment of other salivary gland diseases. In our experience, this procedure has an extremely low complication rate and is less stressful for the patient than other methods. □ *Minimally invasive technique; routine procedure; salivary calculi; sialadenitis; sialoendoscopy*

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During the past two decades, endoscopy has become the routine procedure for a wide range of indications in many different medical fields. In the head and neck area it is important, for example, in diagnosing and treating the nasal sinus. Videoendoscopy is well suited as a minimally invasive dynamic procedure in the diagnosis and therapy of sialopathies of the major salivary glands (1). The main indication is the sialolithiasis of the submandibular and parotid glands.

Sialoendoscopy offers simultaneous options regarding the diagnosis, especially in the case of radiolucent calculi and calculi removal in the same session. Endoscopy is also of high value in the investigation and treatment of other salivary gland diseases with pathological changes of the ductal system (2). For example, in the case of a chronic sialadenitis a regeneration of the gland is possible as a result of removal of a sialostenosis possibly caused by a calculus. An alternative necessary sialadenectomy can therefore often be avoided.

Materials and methods

During the course of 7 years, a total of 60 sialoendoscopies were performed in 60 patients with sialolithiasis. Indications for this particular treatment were a clinical and/or radiographic suspicion of one or more concrements in the ducts of the major salivary glands causing clinical symptoms and complaints. Limitations for an endoscopical intervention were intraglandular sialoliths, an acute inflammatory sialoadenitis and a total atrophic gland with no functional activity. Sialoliths located directly in the area of the papilla were treated by conventional means (incision of the papilla with removal of the sialoliths). Afterwards, the distal duct was endoscopically inspected for any concrements undetected previously. The sex ratio was 32 males and 28 females aged between 12 and 69 years.

Nineteen endoscopies took place in the region of the parotid duct and 41 in the region of the submandibular duct. The follow-up period of investigation was between 3 months and 6.5 years, with a medium follow-up of 21 months. All of these patients received a pantomogram preoperatively and an occlusal X-ray as conventional X-ray diagnostics. In 39 patients with roentgenopaque calculi an X-ray was taken for postoperative comparison. In 28 cases, scintigraphy as well as a sonography were done because of the clinical finding of a simultaneous sialadenitis with a swelling and tenderness of the gland. In 17 of these cases a second corresponding investigation was done postoperatively. All sialoendoscopies were performed under local anesthesia and ambulatory conditions. Sixteen patients were treated with an administration of antibiotics for systemic diseases or due to their being in an acute inflammatory stage a short time previously.

Surgical technique

After finding and threading with the help of a small probe, the papilla of the duct is dilated or, if necessary, lanced. An intraluminal instillation of 2 ml local anesthetic (Xylocain 1%) is also used to obtain maximum expansion. Then a working canal with an outside diameter of 1.7 mm and a 1.3 mm 0°-optic is inserted. After connecting an irrigation and evacuation unit, the endoscope is pushed slightly forward under continuous rinsing with saline solution. The videomonitor allows direct visual control and the procedure can be documented. In the case of a planned calculus removal, several different options depending on the size of the calculus are possible: duct dilatation, along with the irrigation effect, is usually sufficient for lavage in the case of small concrements. In cases when it is not, removal can be made with the help of grasping instruments. For this purpose, baskets or balloon catheters are used. Bigger

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Fig. 1. Panoramic X-ray showing a big radio-opaque sialolith in the area of the left mandibular angle.

sialoliths (more than ca. 4 mm in diameter) are generally extracted after prior pulverization (e.g. mechanically by forceps). Other intraluminal pathologies, such as adenoids and adhesions with consecutive stasis of the salivation, can also be removed under direct vision. In this way, a sphincter-like finding is handled through the use of a Fogarty catheter. At the end of the procedure, a flexible tubulus is fixed in the excretory duct for temporary splinting and drainage—this for a duration of 4 or 5 days Possible postoperative cicatricial strictures can be avoided in this manner. Further clinical and sonographical controls are usually made postoperatively after 6 weeks and again at about 6 months. If necessary, an additional scintigraphy follows about 3 months after endoscopy. Invasive diagnostics are not necessary if the patient is symptom-free (with no pathological findings) with clear salivation as well as negative intra- and extraoral palpation. These criteria are sufficient to provide evidence of the success of the endoscopic intervention.

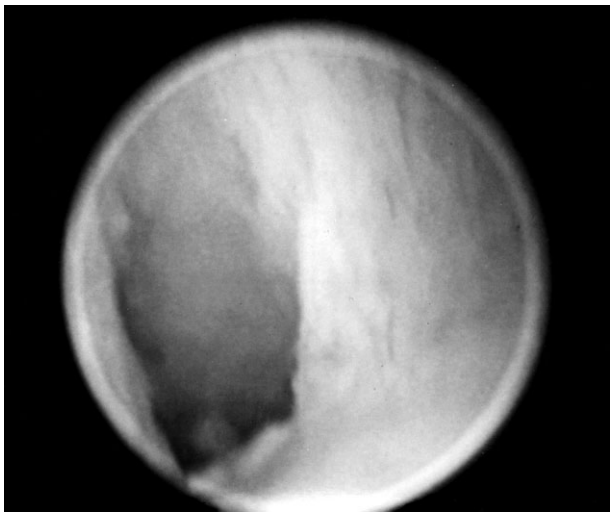

Fig. 3. Same ductal region after sialolith removal.

Results

In a further 4 cases in which an endoscopical intervention was planned it was not possible to probe the orifice because of existing cicatricial strictures. Therefore no insertion of the endoscope and examination could be carried out. In 74% of cases, only a demonstration of roentgenopaque calculi through the preoperative X-ray diagnostics was possible. The other patients showed only clinical symptoms but adequate to raise suspicion of an existing sialolithiasis intermittent swelling and tenderness of the gland.

Mean duration of the endoscopies was 32 min (ranging between 18 and 49 min). The amount of local anesthesia

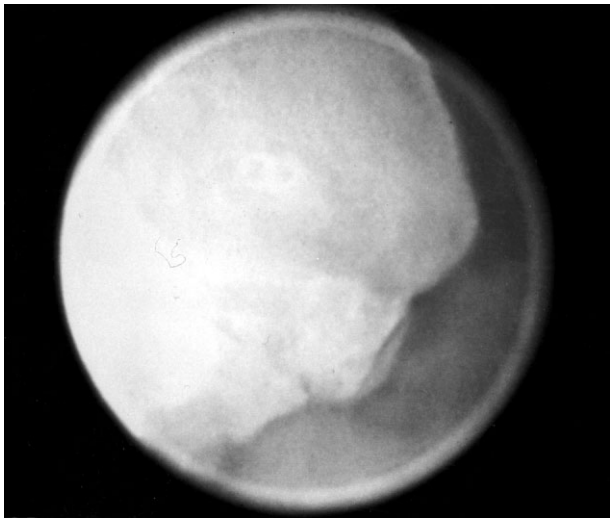

Fig. 2. Intraluminal endoscopic finding demonstrating the sialolith.

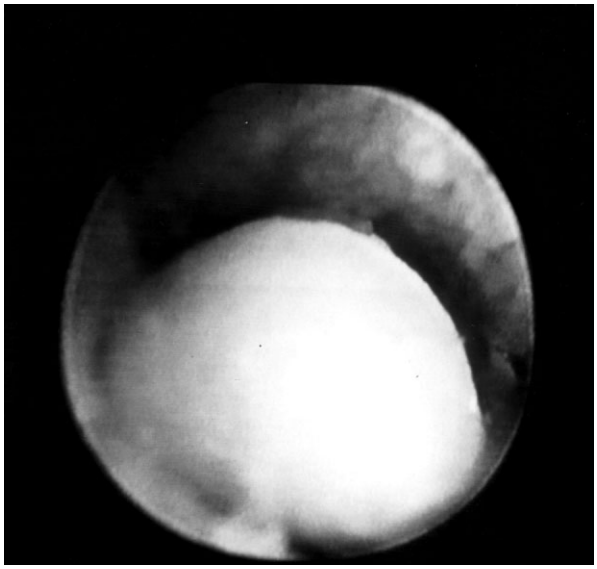

Fig. 4. Inflammatory adhesions between the ductal wall and the sialolith.

Fig. 5. Two pieces of a sialolith in comparison to a rigid endoscope.

given was in the range 3–5 ml Xylocain 1%; 2 ml of that was routinely applied to the ductal lumen while the rest was given as lingual nerve blocking. The patients could be treated painlessly under this management.

All endoscopies were tolerated well. Apart from a temporary swelling, mainly due to the rinsing liquid but receding within a few days, no intra- or postoperative complications such as nerve injuries or bleedings occurred.

Only 4 patients did not experience any satisfactory improvement of the clinical symptoms or their subjective problems after the endoscopic intervention, so a removal of the gland was indicated. In all 4 cases, the glandula submandibularis was affected. In one case, a large sialolith within the gland could not be removed by endoscopy, and in the other 3 cases a pre-existing chronic sialadenitis with glandular atrophy did not recover. In 6 patients with a large calculus (over 1 cm in diameter), no sufficient lithotripsy could be achieved. It was possible, however, to locate the calculus exactly. After calculus removal via a small duct incision, a reconstruction of the duct under endoscopic control was performed without the need to shift the orifice. Afterwards, there were no clinical or sonographical signs of an iatrogenic duct stricture.

In 7 of the 41 patients (17%) who had a sialolith detected by X-ray, we found—after removing the sialolith from the Wharton's duct (5 patients) or the Stensen's duct (2 patients)—even smaller concrements that were detected endoscopically in the distal area near the gland.

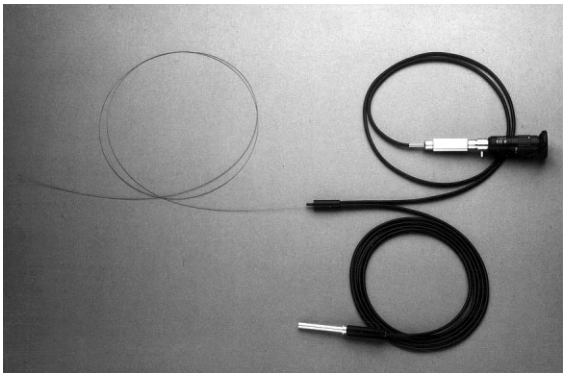

Fig. 7. 'Baby endoscope' with a diameter of only 0.5 mm.

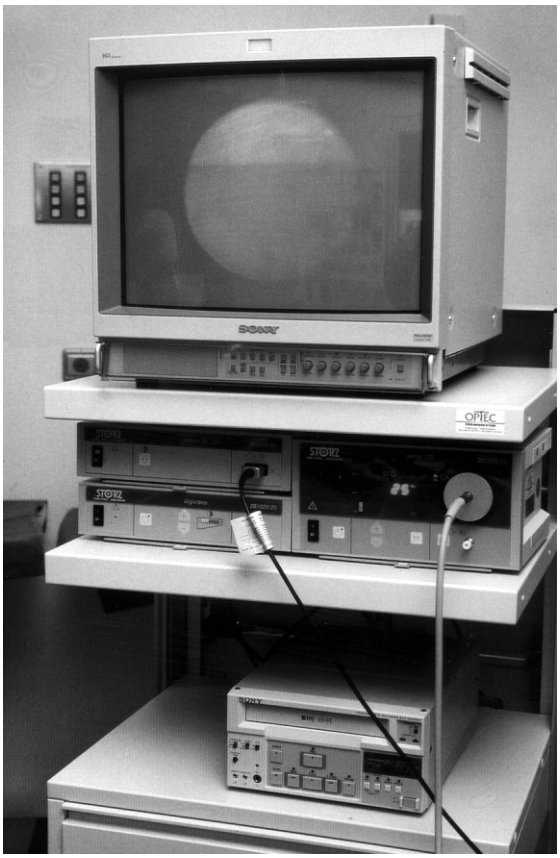

Fig. 6. Endoscopic unit with video-monitor.

Apart from calculi in the duct system, some patients also showed other intraluminal pathologies, e.g. adhesions (7 patients) or sphincter-like obstructions (2 patients). Furthermore, we found duct kinkings as a potential cause for salivary stasis in 3 other cases. Here, too, renewed physiological salivation with sufficient improvement of the clinical symptoms was noticed after the endoscopical intervention in the follow-up.

Discussion

Endoscopy of the salivary glands is a dynamic, minimally invasive and extremely uncomplicated procedure (3, 4). Final diagnotics can be obtained in cases in which investigation methods such as X-ray, ultrasound, etc. do not offer clear findings. Endoscopy can rule out potential differential diagnoses. Its importance has been proved, especially in the case of sialolithiasis of the large salivary glands (5–7). Even radiologic invisible concrements can be represented endoscopically. Using endoscopy, Nahlieli & Baruchin (8) found sialoliths in the region of the glandula

submandibularis (32% of the cases) and of the glandula parotis (70% of the cases), which had not been detected before via radiology. Among our patients, however, the number was lower. Furthermore, it is remarkable that after removal of the sialolith from the front area of the excretory duct, in some cases further concrements can be found endoscopically in the back area of the duct, which—using a conventional method—could have led to persisting clinical symptoms. Corresponding with our own results (17%), there are frequencies in the literature of between 15% and 18% for the excretory duct system of the glandula submandibularis (9, 10). For this reason, not just our opinion, an endoscopic follow-up should also be considered after conventional sialolithotomy (11).

Conventional surgical removal of a sialolith could be problematic, especially in the knee area of Wharton's duct, and involves the risk of an iatrogenic lesion of the nervus lingualis. Depending on the symptoms, even extirpation of the glandula submandibularis has to be considered as a therapeutic alternative. By comparison, sialoendoscopy offers a further therapeutic option besides the already mentioned diagnostic possibilities. In summary, all the above criteria show the advantages and possibilities of the endoscopic procedure over conventional methods. With the range of indications mentioned previously, we have largely been able to get along without conventional treatments during recent years.

After endoscopic intervention and removal of mechanical obstructions with interrupted salivation a renewed secretion and even regeneration of an atrophic gland can be obtained (8, 12) in most cases. In the follow-up, a clear improvement of the clinical symptoms and the patient's subjective problems can be observed. Thus, possible postoperative strictures after an endoscopic duct revision can be excluded if there is unsuspicious palpation with clear salivation and if the patient is symptom-free. Safe prognoses cannot be made for a complete restitutio ad integrum in the case of a chronic sialadenitis (8). Alternative procedures to pulverization are the use of a pulsed laser (8, 13), electro-hydraulic-intracorporeal lithotripsy or extracorporeal piezoelectric shock wave induction (14–16). When using fragmentation via shock wave lithotripsy, however, it should to be considered that damage to the glandular tissue (of nociceptors and proprioceptors) cannot be totally excluded (8, 9). Furthermore, although a lithotripsy can possibly be proved by extracorporeal shock wave induction, the problem of removing concrements from the duct system remains. This aspect is important in the assessment of the procedure, especially when the frequent adhesions between sialoliths and the inner wall of the duct are considered, usually involving a stasis of the salivation in the case of large sialoliths (8).

Further intraductal pathologies possibly leading to salivation stasis and consequently to sialoadenitis are strictures and bendings of the duct system (2), intraductal adenoids and sphincter-like findings of the duct walls (17). Examples are, above all, sphincter-like duct systems, intraluminal adenoids and duct adhesions (8, 12). These pathologies and corresponding findings, however, can be detected and treated by endoscopy.

Owing to the diverse options, all with a low complication rate and low stress for the patient, we recommend the routine use of endoscopy for diagnostics and the therapy of sialolithiasis.

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