ORIGINAL ARTICLE

# Therapeutic Sialendoscopy for the Management of Radioiodine Sialadenitis

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**Objective:** To describe our experience with therapeutic sialendoscopy for radioiodine (iodine 131 [$^{131}$I]) sialadenitis.

**Design:** Retrospective medical chart review.

**Setting:** Academic tertiary referral center.

**Patients:** The study included 11 patients who underwent therapeutic sialendoscopy for the treatment of $^{131}$I sialadenitis after failing medical management.

**Interventions:** Therapeutic sialendoscopy with dilation and irrigation of the ductal system was performed in all patients.

**Main Outcome Measures:** Patient-reported frequency and severity of symptoms.

**Results:** Our series included 9 women and 2 men (mean age, 51 years; age range, 35-65 years). A total of 23 parotid glands and 5 submandibular glands were treated. Sialendoscopy was possible in all patients, except one in whom the Stensen duct could not be cannulated. Typical endoscopic findings included pale ductal mucosa, thick mucous plugs, ductal debris, and stenosis of the duct. Most patients (91%) reported improvement of symptoms after a single procedure. Complete resolution of symptoms, with sustained benefit, was reported by 6 patients (54%) at a mean follow-up of 18 months. Partial improvement of symptoms, with some persistent intermittent episodes of pain or swelling, was reported by 4 patients (36%). One patient reported no subjective symptomatic improvement after 2 procedures and subsequently underwent a parotidectomy.

**Conclusions:** Sialendoscopy is useful for the improvement of symptoms due to radioiodine-induced sialadenitis in patients who are refractory to conservative medical therapy. Therapeutic sialendoscopy appears to provide effective and sustained symptom improvement in most patients in our experience.

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Radioiodine (iodine 131 [$^{131}$I]) treatment is a critical modality for the management of both benign and malignant thyroid diseases owing to its utility in targeting and ablating both normal and malignant thyroid tissue. The reported average dose of $^{131}$I treatment for ablation therapy ranges from 30 to 150 mCi per treatment; however, some patients undergo multiple rounds of treatment for recurrence and are therefore exposed to higher cumulative doses.[1] The success of this treatment is based on the propensity of thyroid cells for iodine uptake. Salivary gland parenchymal and ductal cells contain a sodium/iodine symporter that also confers an increased ability for $^{131}$I concentration. It has been estimated that 24% of an administered dose of radioiodine is lost through the saliva, and concentrations of $^{131}$I in saliva range from 20 to 100 times the levels found in plasma.[2] As a result of exposure to this radiation, the parenchymal cells as well as the ductal mucosa experience acute and chronic inflammatory changes. The serous glands and acini are most susceptible; therefore, the parotid glands tend to be more affected than the submandibular glands. This inflammation of ductal mucosa leads to stricture formation and altered, more mucoid saliva. These factors contribute to ductal blockage and salivary stasis. As a result, patients experience pain, swelling, and xerostomia, which are characteristic of radioiodine-induced sialadenitis.[3]

Sialadenitis is now recognized as the most prevalent complication of $^{131}$I treatment, with up to 69% of post–radioiodine-treated patients showing scintigraphic evidence of salivary dysfunction, and anywhere from 10% to 60% of patients reporting symptomatic acute or chronic symptoms.[4,5] Sialadenitis may occur in the immediate posttreatment period within the first 48 hours after the administration of

**Table 1. Pretreatment Patient Characteristics**

| Variable | Total[a] (N = 11) |
|---|---|
| Age, mean (range), y | 51 (35-65) |
| Sex | |
| Male | 2 (18) |
| Female | 9 (82) |
| Thyroid pathologic diagnosis | |
| Papillary carcinoma | 7 (64) |
| Follicular carcinoma | 3 (27) |
| Graves disease | 1 (9) |
| Time from radioiodine to sialendoscopy, median (range), mo | 16 (3-272) |
| Cumulative radioiodine dose, mean (range), mCi (n = 4) | 250 (100-350) |
| Affected glands | |
| Parotid (n = 8) | |
| Unilateral | 2 (18) |
| Bilateral | 6 (55) |
| Submandibular (n = 1) | |
| Unilateral | 1 (9) |
| Bilateral | 0 |
| Both parotid and submandibular | 2 (18) |

[a]Values are given as number (percentage) unless otherwise indicated.

$^{131}$I or in a delayed fashion, with a typical onset 3 to 6 months from the time of treatment.[2,6] In one study, 21% of patients treated with $^{131}$I for thyroid cancer had symptoms of chronic pain, swelling, and xerostomia that persisted for more than 12 months after treatment.[7]

For years, the mainstay of management for sialadenitis due to radioiodine therapy has involved conservative treatment with adequate hydration, frequent salivary gland massage, sialagogues, warm compresses, steroids, and cholinergic medications. Antibiotics are administered when bacterial infection develops. Conservative medical management in these cases often fails; however, until recently, the remedy for failure of medical management was surgical removal of the gland. Sialadenectomy is undesirable given the risks of surgery on chronically inflamed glands

The use of sialendoscopy for the diagnosis and treatment of this condition is an attractive alternative to sialadenectomy and has recently been reported to yield successful outcomes in a few small case series.[1,4,5] All of these series have reported good symptomatic results from this treatment; however, there is a paucity of data on the long-term follow-up in these cases and on the duration of treatment benefit. Our objectives in this study were to describe our experience with sialendoscopy for recalcitrant $^{131}$I sialadenitis and to present our long-term follow-up on patient-reported clinical outcomes.

## METHODS

We retrospectively reviewed the medical records of all patients who underwent sialendoscopy in the Department of Otolaryngology–Head and Neck Surgery at the University of California, San Francisco, Medical Center between January 2005 and January 2011. All patients with a diagnosis of radioiodine-induced sialadenitis who underwent therapeutic sialendoscopy during this period were identified for inclusion in the study, yielding a group of 11 patients. All 11 patients had been referred for symptoms of sialadenitis that had been chronic in nature and refractory to standard conservative therapies. Data were collected on patient demographic and clinical characteristics, including age, sex, thyroid pathologic diagnosis, dose of radioiodine, interval from radioiodine treatment to sialendoscopy, prior conservative therapies, findings at sialendoscopy, complications, and patient satisfaction after surgery (subjective symptomatic improvement, duration of symptomatic relief, and need for subsequent treatment after sialendoscopy). Appropriate institutional review board approval was obtained from the Center for Human Research of the University of California, San Francisco, Medical Center before the collection of data.

All sialendoscopies were performed on an outpatient basis in the operating room with the patient under general anesthesia. The sialendoscopic technique involved serial dilation of the submandibular or parotid ductal papilla with the sialendoscopic and punctal dilators, followed by introduction of a diagnostic sialendoscope (Marchal Sialendoscope; Karl Storz). The ductal lumen was inspected thoroughly and continually irrigated with sterile saline solution via the irrigation channel of the endoscope. During inspection of the entire tract, the duct was flushed with copious amounts of saline, and parotid or submandibular gland engorgement was confirmed. Saline was cleared from the parotid and submandibular glands by massage of the glands before the patient was awakened from general anesthesia, with observation for fluid egress from the treated ducts. In the 11 patients included in the study, 23 parotid glands and 5 submandibular glands were successfully cannulated with the endoscope. One parotid duct was unable to be cannulated in 1 patient.

## RESULTS

Our cohort included 9 female and 2 male patients, with an average age of 51 years (age range, 35-65 years). Seven of our patients had been treated with radioiodine for papillary thyroid carcinoma, 3 for follicular carcinoma, and 1 for Graves disease. Five of our patients had undergone 1 previous radioiodine treatment; another 5 patients had undergone 2 separate treatments; and 1 patient had undergone 3 separate treatments. Data on the cumulative radioiodine dose for our study group were available for only 4 patients (average cumulative dose, 250 mCi). The median time from radioiodine treatment to sialendoscopy was 16 months. All patients in our study had previously attempted and failed conservative management of their symptoms with treatments such as salivary gland massage, warm compresses, aggressive hydration, sialagogues, oral steroids, and cholinergic agonistic medications. Also, 7 of the patients (64%) had been treated with a least 1 course of antibiotics for an episode of presumed bacterial sialadenitis. Symptomatic complaints at the time of sialendoscopy included pain and swelling of the parotid or submandibular gland, xerostomia, and exacerbation of symptoms with eating. **Table 1** summarizes the characteristics of our patient population before therapeutic sialendoscopy.

A total of 23 parotid glands and 5 submandibular glands were treated in our 11 patients. **Table 2** summarizes the results of our findings in each individual patient. Typical findings at the time of surgery included pale ductal mucosa, thick mucous plugs, ductal debris, and stenosis of the lumen (**Figure**). The average period of follow-up for all

**Table 2. Sialendoscopy Results by Patient**

| Patient No. | Gland | Findings | Result | Follow-up, mo |
|---|---|---|---|---|
| 1 | L parotid | PDM, debris | Complete resolution of symptoms | 23 |
| | R parotid | PDM, debris | | |
| | L SMG | Normal, pink duct | | |
| | R SMG | Normal, pink duct | | |
| 2 | L parotid | PDM, debris | No improvement, subsequent left parotidectomy | 7 |
| | L parotid (redo) | PDM, debris | | |
| 3 | L parotid | MP, debris | Partial improvement, decreased symptom frequency | 8 |
| | R parotid | Debris | | |
| 4 | L SMG | PDM, MP | Partial improvement, decreased symptom severity | 8 |
| 5 | L parotid | PDM, MP | Complete resolution of symptoms | 37 |
| | R parotid | PDM, MP | | |
| 6 | L parotid | MP | Complete resolution of symptoms | 3 |
| | R parotid | PDM, MP | | |
| 7 | L parotid | Failed endoscopy | Complete resolution of symptoms in all glands | 12 |
| | R parotid | Stenotic, PDM, MP | | |
| | L SMG | Stenotic, debris | | |
| | R SMG | Stenotic, MP | | |
| 8 | L parotid | Stenotic, debris | Partial improvement after initial surgery; further incremental improvement for 12 mo after redo | 25 |
| | R parotid | Stenotic, debris | | |
| | L parotid (redo) | Improved, MP | | |
| | R parotid (redo) | Stenotic, MP | | |
| 9 | L parotid | PDM, MP, debris | Complete resolution of symptoms | 13 |
| | R parotid | PDM, MP | | |
| 10 | L parotid | Debris | Complete resolution of symptoms | 20 |
| | R parotid | Stenotic, debris | | |
| 11 | L parotid | PDM, stenotic, MP | Partial improvement with decreased symptom severity and frequency after initial surgery | 3 |
| | R parotid | PDM, stenotic, MP | | |
| | L parotid (redo) | Clear saliva, ducts pink/less stenotic | | |
| | R parotid (redo) | | | |

Abbreviations: L, left; MP, mucous plug; PDM, pale ductal mucosa; R, right; redo, second procedure for persistent symptoms; SMG, submandibular gland.

patients in our study was 14 months (median, 12 months). In our series, 10 patients (91%) reported at least a partial improvement of symptoms after a single sialendoscopic procedure. Complete resolution of symptoms, with sustained benefit, was reported by 6 patients (54%) at a mean follow-up of 18 months (median, 16.5 months). Partial improvement of symptoms, with some persistent intermittent episodes of pain or swelling, was reported by 4 patients (36%). Of these 4 patients, 2 had not undergone any further treatment for their sialadenitis at the time of the most recent follow-up visit.

Three patients in our series underwent a second therapeutic sialendoscopy, and all of these procedures were performed within a 3- to 5-month interval from their initial treatment. Patient 8 (Table 2) experienced partial response to his first treatment that was sustained, and he subsequently elected to undergo a second procedure in an attempt to obtain further symptomatic relief. The incremental benefit from this second procedure lasted for 12 months before he had a relapse of symptoms. However, he continued to report some degree of improvement from his baseline before the initial sialendoscopy. Patient 11 also underwent 2 treatments, with partial improvement after the first procedure. Only 1 patient (9%) (patient 3) in our study reported no subjective symptomatic improvement after treatment. This patient underwent 2 sialendoscopy procedures, with an interval of 4 months between treatments. After the second treatment failed to result in improvement, a left parotidectomy was performed for symptomatic management.

**Figure.** Sialendoscopic image of one of our patients showing the characteristic findings of pale ductal mucosa and a thick mucous plug.

The only difficulty experienced in this patient series was a failure to cannulate 1 parotid duct in a single patient (patient 7). Our success with cannulation attempts represents a low rate (4%) of glands that could not be cannulated in our study group. No other patient complaints occurred in relation to any of the procedures in this study. **Table 3** summarizes the symptomatic results of treatment for our cohort as a whole.

**Table 3. Treatment Results**

| Symptom Response | Patients, No. (%) (N = 11) | Follow-up, mo | |
|---|---|---|---|
| | | Mean | Median |
| Partial improvement | 4 (36) | 11 | 8 |
| Complete resolution of symptoms | 6 (55) | 18 | 16.5 |
| No improvement | 1 (9) | 7 | 7 |

## COMMENT

With the increasing incidence of thyroid cancer in recent years as a result of improved detection, and reports indicating symptoms of sialadenitis at 12 months after treatment in more than 25% of patients treated with $^{131}$I, it is clear that $^{131}$I sialadenitis is a significant source of morbidity related to thyroid cancer treatment.[2,6,8-11] The median interval of 16 months from radioiodine treatment to sialendoscopy in our study indicates both the chronicity of the problem and the poor response of our patients' symptoms to multiple conservative therapies. The parotid glands were symptomatic in 10 patients (91%), with the submandibular glands affected in only 3 patients (27%). This distribution of affected glands is consistent with reports that the high concentration of serous glands in the parotid glands are more susceptible to toxic effects from radioiodine treatment than the mucous acini that are found in higher numbers in the submandibular glands.[2,6,8] Consistent with previous reports that multiple rounds of radioiodine treatment lead to a higher likelihood of symptomatic sialadenitis, more than 50% of our patients had undergone multiple treatments with $^{131}$I.[7] Although data regarding cumulative dosing were available for only 4 of our patients, the mean dose of 250 mCi in these patients is well above levels previously noted to cause significant salivary dysfunction.[1]

Standard conservative therapy for $^{131}$I sialadenitis has been reported to control symptoms satisfactorily in approximately 70% of patients; however, the remaining patients with refractory symptoms have previously been faced with resection of their glands as the only available option.[5] In 1990, the first report of the use of a flexible endoscope combined with an intracorporeal lithotriptor was published by Königsberger et al[12] for treatment of sialolithiasis of the major salivary glands. In 1994, Nahlieli et al[13] reported the use of a rigid endoscope for the diagnosis and treatment of salivary gland obstruction. As experience with this technology has grown, it has become a popular noninvasive diagnostic and treatment modality for patients with symptomatic sialolithiasis.[9] The recognition that sialadenitis after $^{131}$I treatment is principally of ductal origin has recently led surgeons to expand their use of this technology.[1]

A review of the literature revealed 3 small case series, consisting of 15, 6, and 12 patients, respectively, with $^{131}$I sialadenitis treated with sialendoscopy, all of which have been published since 2006. In 2006, Nahlieli and Nazarian[1] reported that 100% of their 15 patients with radioiodine-induced sialadenitis were symptom free after 1 treatment. Their study, however, did not provide specific data on the length of follow-up or how many glands and what locations were treated. In 2007, Kim et al[5] reported on their experience with sialendoscopy in 6 patients, with a 50% success rate for cannulation of the ducts. Follow-up in their study was limited to 8 to 10 months, with some improvement reported in all 3 cases in which sialendoscopy was possible. In 2009, Bomeli et al[4] reported on their experience with 12 patients, with a median follow-up of 6 months, and noted some improvement in the symptoms in 75% of the patients.

The results of our current study, in which 91% of patients received some improvement in symptoms and 55% of patients experienced complete resolution of symptoms, are similar to the success rates ranging from 50% to 100% that were reported in the above-mentioned studies. These benefits are likely a result of multiple mechanisms, including instrument dilation of the salivary papilla and ducts, saline hydraulic dilation of the ductal lumen, and flushing of debris and thick mucous plugs from the duct. Our data particularly emphasize the sustained duration of these benefits in the patients who reported complete symptomatic resolution during an average long-term follow-up of 18 months. Our study also yielded a lower rate of failure to cannulate the ductal lumen than these previous studies, with failure in only 1 of 28 glands. This improvement in the ability to perform the attempted procedure may be the result of differing severity of ductal stenosis among patient populations, which was not quantified and thus cannot be compared across studies.

Another notable finding in our study was that over the follow-up period only 1 patient had regression to worsening of symptoms after an initial posttreatment improvement. This patient was among the group of 4 patients who reported a partial improvement in symptoms after the initial sialendoscopy. After the patient underwent the second sialendoscopy in an attempt at further improvement of his symptoms, he experienced an incremental benefit for 1 year before having a relapse. The other 3 patients with partial improvement maintained that level of benefit throughout the follow-up period. Furthermore, no patient with complete resolution of symptoms reported a relapse in symptoms during a mean follow-up period of 18 months (median follow-up, 16.5 months). These findings suggest that in cases in which therapeutic sialendoscopy provides initial symptomatic improvement, this level of benefit is sustained in most patients.

Our study is subject to limitations that are similar to those of previous studies of this technique, including small sample size and retrospective design. Also, the continued lack of a validated objective measure of symptoms of sialadenitis make subjective reports of improvement a necessary limitation. Finally, differences in technique between the current study and previous case series, including the use of steroid irrigations and balloon dilation of stenotic areas of the duct, further contribute to the difficulty of direct comparison of data.[1,4,5]

In conclusion, sialendoscopy for radioiodine-induced sialadenitis of the major salivary glands is a viable and safe therapeutic option for patients with symptoms that are recalcitrant to conservative medical therapy.

It is highly effective in providing some degree of patient-reported improvement in symptoms in most patients (≥50%) at a mean follow-up of 18 months (median, 16.5 months) after treatment. Further experience with this treatment modality and additional long-term outcomes data will help to further delineate the benefits of sialendoscopy among this patient population.

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