Therapeutic Sialendoscopy for the Management of Radioiodine Sialadenitis

Brandon L. Prendes, MD; Lisa A. Orloff, MD; David W. Eisele, MD

Objective: To describe our experience with therapeutic sialendoscopy for radioiodine (iodine 131 [131I]) 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 131I 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.


Radioiodine (iodine 131 [131I]) 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 131I 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. 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 131I concentration. It has been estimated that 24% of an administered dose of radioiodine is lost through the saliva, and concentrations of 131I in saliva range from 20 to 100 times the levels found in plasma. 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.

Sialadenitis is now recognized as the most prevalent complication of 131I 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. Sialadenitis may occur in the immediate posttreatment period within the first 48 hours after the administration of...
sisted for more than 12 months after treatment.7

toms of chronic pain, swelling, and xerostomia that per-
period were identified for inclusion in the study, yielding a group
aladenitis who underwent therapeutic sialendoscopy during this
ary 2011. All patients with a diagnosis of radioiodine-induced si-
gology–Head and Neck Surgery at the University of California,
We retrospectively reviewed the medical records of all patients
scribe our experience with sialendoscopy for recalcitrant
ment benefit. Our objectives in this study were to de-
term follow-up in these cases and on the duration of treat-
series have reported good symptomatic results from this
ments of this condition is an attractive alternative to si-
surgical removal of the gland. Sialadenectomy is unde-
cently, the remedy for failure of medical management was
bacterial infection develops. Conservative medical man-
agement in these cases often fails; however, until re-
cently, the remedy for failure of medical management was
creased from the parotid and submandibular glands by mas-
sage of the glands before the patient was awakened from gen-
eral 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 pap-
illary 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 under-
goen 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 sialendos-
copy was 16 months. All patients in our study had pre-
viously attempted and failed conservative management
of their symptoms with treatments such as salivary gland
massage, warm compresses, aggressive hydration, siala-
gogues, oral steroids, and cholinergic agonistic medica-
tions. Also, 7 of the patients (64%) had been treated with
a least 1 course of antibiotics for an episode of pre-
xacerbation of symptoms with eating. Table 1 summa-
izes 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 mu-
cosa, thick mucous plugs, ductal debris, and stenosis of the
lumen (Figure). The average period of follow-up for all

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**Table 1. Pretreatment Patient Characteristics**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Totala (N = 11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (range), y</td>
<td>51 (35-66)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2 (18)</td>
</tr>
<tr>
<td>Female</td>
<td>9 (82)</td>
</tr>
<tr>
<td>Thyroid pathologic diagnosis</td>
<td></td>
</tr>
<tr>
<td>Papillary carcinoma</td>
<td>7 (64)</td>
</tr>
<tr>
<td>Follicular carcinoma</td>
<td>3 (27)</td>
</tr>
<tr>
<td>Graves disease</td>
<td>1 (9)</td>
</tr>
<tr>
<td>Time from radioiodine to sialendoscopy, median (range), mo</td>
<td>16 (3-272)</td>
</tr>
<tr>
<td>Cumulative radioiodine dose, mean (range), mCi</td>
<td>250 (100-350)</td>
</tr>
</tbody>
</table>

A Values are given as number (percentage) unless otherwise indicated.

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131I or in a delayed fashion, with a typical onset 3 to 6
months from the time of treatment.26 In one study, 21%
of patients treated with 131I for thyroid cancer had symp-
toms of chronic pain, swelling, and xerostomia that per-
sisted for more than 12 months after treatment.7

For years, the mainstay of management for sialadeni-
tis due to radioiodine therapy has involved conservative
treatment with adequate hydration, frequent salivary gland
massage, sialagogues, warm compresses, steroids, and cho-
linergic medications. Antibiotics are administered when
bacterial infection develops. Conservative medical man-
agement in these cases often fails; however, until re-
cently, the remedy for failure of medical management was
surgical removal of the gland. Saladenectomy is unde-
sirable given the risks of surgery on chronically in-
flamed glands

The use of sialendoscopy for the diagnosis and treat-
ment of this condition is an attractive alternative to si-
aladenectomy and has recently been reported to yield suc-
cessful outcomes in a few small case series.13 All of these
series have reported good symptomatic results from this
condition; however, there is a paucity of data on the long-
term follow-up in these cases and on the duration of treat-
ment benefit. Our objectives in this study were to de-
scribe our experience with sialendoscopy for recalcitrant
131I sialadenitis and to present our long-term follow-up on
patient-reported clinical outcomes.

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**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 si-
aladenitis 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 stan-
dard conservative therapies. Data were collected on patient demo-
graphic and clinical characteristics, including age, sex, thyroid
pathologic diagnosis, dose of radioiodine, interval from radioio-
dine treatment to sialendoscopy, prior conservative therapies, find-
ings at sialendoscopy, complications, and patient satisfaction af-
ter surgery (subjective symptomatic improvement, duration of
symptomatic relief, and need for subsequent treatment after si-
alenectomy). 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 anesthe-
sia. The sialendoscopic technique involved serial dilation of the
submandibular or parotid ductal papilla with the sialendo-
scopic and punctal dilators, followed by introduction of a di-
agnostic sialendoscope (Marchal Sialendoscope; Karl Storz). The
ductal lumen was inspected thoroughly and continually irri-
gated 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 sub-
mandibular gland engorgement was confirmed. Saline was
clipped from the parotid and submandibular glands by mas-
sage of the glands before the patient was awakened from gen-
eral 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.

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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.

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 2. Sialendoscopy Results by Patient

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

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

Figure. Sialendoscopic image of one of our patients showing the characteristic findings of pale ductal mucosa and a thick mucous plug.
it is clear that $^{131}$I sialadenitis is a significant source of mandibular glands. Consistent with previous reports, the parotid glands in the parotid glands are more susceptible to cause significant salivary dysfunction. 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 secretory acini in the submandibular glands are more susceptible to toxic effects from radioiodine treatment than the mucous acini that are found in higher numbers in the submandibular glands. 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. Although data regarding cumulative dosing were not 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.

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. In 1990, the first report of the use of a flexible endoscope combined with an intracorporeal lithotriptor was published by Konigsberger et al for treatment of sialolithiasis of the major salivary glands. In 1994, Nahlieli et al 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. The recognition that sialadenitis after $^{131}$I treatment is principally of ductal origin has recently led surgeons to expand their use of this technology.

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 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 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 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.

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.

### Table 3. Treatment Results

<table>
<thead>
<tr>
<th>Symptom Response</th>
<th>Patients, No. (%)</th>
<th>Follow-up, mo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(N = 11)</td>
<td>Mean</td>
</tr>
<tr>
<td>Partial improvement</td>
<td>4 (36)</td>
<td>11</td>
</tr>
<tr>
<td>Complete resolution of symptoms</td>
<td>6 (55)</td>
<td>18</td>
</tr>
<tr>
<td>No improvement</td>
<td>1 (9)</td>
<td>7</td>
</tr>
</tbody>
</table>

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. 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. As experience with this technology has grown, it is principally of ductal origin has recently led surgeons to treat stenotic areas of the duct, further contribute to the difficulty of direct comparison of data.

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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Author Contributions: Dr Prendes had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Prendes, Orloff, and Eisele. Acquisition of data: Prendes. Analysis and interpretation of data: Prendes. Drafting of the manuscript: Prendes. Critical revision of the manuscript for important intellectual content: Orloff and Eisele. Administrative, technical, and material support: Prendes. Study supervision: Orloff and Eisele.

Financial Disclosure: None reported.

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REFERENCES