Piriform Sinus Tracts in Children

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Objectives: To describe the various presentations and management of piriform sinus tracts in children and to provide a treatment algorithm.

Design: Case series.

Setting: Pediatric otolaryngology service in a tertiary care setting.

Patients: Eight pediatric patients diagnosed as having a piriform sinus tract between 1999 and 2005.

Interventions: Patients were treated with surgical excision, endoscopic cauterization, or observation.

Main Outcome Measure: Recurrence of neck infection.

Results: Three different modes of presentation were identified. Four patients presented primarily with an intrathyroidal abscess; 2 presented with recurrent deep neck infections requiring repeated drainage; and 2 presented with symptoms unrelated to the tract. Barium swallows identified the tracts in 5 of 8 patients, and telescopic hypopharyngoscopy identified the tracts in all 8 patients. Five patients were treated with complete excision of their tracts; 1 was treated with cauterization of the internal opening; and 2 were observed for symptoms related to the tracts. All 8 patients are currently asymptomatic.

Conclusions: Piriform sinus tracts are rare. Most patients with tracts present with recurrent deep neck infections. Telescopic hypopharyngoscopy is the diagnostic modality of choice. Endoscopic cauterization is recommended as the initial therapy in symptomatic patients, with complete excision reserved for recurrences. Observation is appropriate for asymptomatic patients.


Piriform sinus tracts (PSTs) are uncommon anomalies. Although they are a subject of some debate, they are generally thought to be remnants of the third or fourth branchial pouch. In 1972, Sandborn and Shafer first described the association between PSTs and recurrent neck abscesses. Since then, approximately 100 cases have been reported in the English-language literature. Recurrent neck abscesses in the pediatric population are unusual and generally have an underlying cause. Piriform sinus tracts most commonly present as neck masses, recurrent lateral neck infections, or suppurative thyroiditis. They are almost always left sided, which is believed to be the result of unequal development of the branchial derivatives. Misdiagnosis at initial presentation is common, and most patients undergo at least 1 incision and drainage of a neck abscess before definitive diagnosis.

Direct visualization of a sinus tract in the piriform fossa is diagnostic, although at least 1 case of an “occult” branchial cleft fistula that was found only at surgical exploration has been reported. The purpose of this article is to present our experience with piriform sinus tracts in children over a 6-year period and to bring attention to the presence of asymptomatic patients that have not been described in the literature to date. Also, we propose a new treatment algorithm based on our experience with these lesions.

METHODS

Between January 1999 and December 2005, the pediatric otolaryngology service of Memorial Hermann Children’s Hospital, Houston, Tex, treated 8 patients with PSTs. The medical records of the patients were reviewed for demographic information, presenting symptoms, diagnostic studies, medical and surgical therapies, pathologic evaluations, and postoperative courses.

RESULTS

Results from the retrospective chart review are summarized in the Table. There were 6 boys and 2 girls, with a mean age at diagnosis of 6 years (median age, 4 years). Three different modes of presentation were identified. Four patients presented primarily with an intrathyroidal abscess, 2 with recurrent deep neck infections...
requiring repeated drainage, and 2 with symptoms unrelated to the tract. Four of the patients had undergone incision and drainage before evaluation. Barium swallow tests and direct telescopic hypopharyngoscopies were performed in all cases. Five of the 8 tracts were visualized on barium swallow studies (Figure), and all were visualized on endoscopy. Five patients underwent complete surgical excision; 1 patient underwent cauterization of the internal opening of the tract with silver nitrate; and 2 patients are currently being observed. In the 5 patients who underwent surgical excision, there were no recurrences during a mean follow-up period of 27 months. Patient 6, who underwent internal cauterization, had no recurrence at the last follow-up visit, 10 months after the procedure. Patients 7 and 8, who are being observed, have been asymptomatic for 12 months.

Piriform sinus tracts, which were once thought to be rare anomalies, are now being identified with increasing frequency. They most commonly present with recurrent neck abscesses or suppurative thyroiditis. Although they are generally assumed to be a result of abnormal development of the branchial apparatus, their exact origin remains a subject of debate. Pathologic criteria, such as the presence of parathyroid or thymic tissue, have been used to link these anomalies to their pouch of origin. Two studies have suggested that the presence of calcitonin-positive C cells correlated with an ultimobranchial body origin. However, many published reports have not revealed conclusive pathologic findings to support that theory. Some authors have recommended that the diagnosis be based on the anatomical relationship between the tract and the superior laryngeal nerve identified at surgery. Consequently, an anomalous tract of the fourth pouch would travel caudal to the superior laryngeal nerve (a fourth arch derivative), whereas a third branchial pouch sinus would pass cranial to this structure. However, these embryologically based theories do not fully explain the course of these tracts as seen at surgery. In theory, a complete left fourth arch tract should travel a complicated course, hooking around the arch of the aorta. As yet, to our knowledge a complete fourth arch tract has not been described in published literature.

It is our opinion that the simpler term piriform sinus tract be used to describe these anomalies. The previously described embryologic nomenclature relies on elucidating the course of the tract at the time of surgery. With recent reports demonstrating the apparent success of endoscopic cauterization of the internal opening, the exact course of many of these tracts may never be known. As such, we believe that piriform sinus tract simplifies the nomenclature, while obviating the need for surgical confirmation.

Table. Summary of 8 Cases of Piriform Sinus Tracts

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>4 y</td>
<td>7 y</td>
<td>20 mo</td>
<td>14 mo</td>
<td>16 y</td>
<td>2 y</td>
<td>13 y</td>
<td>4 y</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Male</td>
<td>Male</td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Presentation</td>
<td>Neck mass</td>
<td>Thyroid abscess</td>
<td>Neck swelling</td>
<td>Thyroid abscess</td>
<td>Thyroid abscess</td>
<td>Thyroid abscess</td>
<td>Asymptomatic</td>
<td>Asymptomatic</td>
</tr>
<tr>
<td>No. of infections before definitive treatment</td>
<td>3 Episodes, with no drainage procedures</td>
<td>5 Episodes; 3 drainage procedures</td>
<td>3 Episodes with drainage procedures</td>
<td>3 Episodes, with 2 drainage procedures</td>
<td>1 Episode</td>
<td>1 Episode with drainage</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Barium swallow findings</td>
<td>Sinus tract noted in piriform sinus</td>
<td>No fistula noted</td>
<td>Normal</td>
<td>Complete fistula</td>
<td>Sinus tract noted in piriform sinus</td>
<td>Complete excision</td>
<td>Epithelium-lined fistula to skin</td>
<td>Tract from piriform sinus to left thyroid lobe</td>
</tr>
<tr>
<td>Treatment</td>
<td>Complete excision</td>
<td>Complete excision</td>
<td>Complete excision</td>
<td>Complete excision</td>
<td>Complete excision</td>
<td>Cauterization of tract</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Pathologic findings</td>
<td>Chronic inflammation</td>
<td>Epithelium-lined sinus tract</td>
<td>Epithelium-lined fistula to skin</td>
<td>Epithelium-lined sinus tract</td>
<td>Epithelium-lined sinus tract</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviation: NA, not applicable.

Figure. Barium swallow showing a left-sided piriform sinus tract.


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The traditional standard of care for PSTs has been complete surgical excision. Careful dissection of the PST avoids injury to the recurrent laryngeal nerve, which need not be identified at surgery. Dissection may be assisted by endoscopic insertion of a Fogarty catheter through the tract. In our experience, even when the entire tract cannot be cannulated, palpation of the catheter in the most proximal portion assists with identifying and ligating the tract. There have been no known recurrences using this surgical approach. Several recent studies have suggested that endoscopic cauterization of the internal opening is a minimally invasive technique for treating PSTs. A study of 16 patients treated with chemocauterization noted 4 recurrences over a mean follow-up period of 23 months. Seven of 10 patients treated with endoscopic cauterization in another study were symptom free after 3 years. While these results are promising, long-term follow-up will clarify the role of this approach in the management of PSTs. We used endoscopic cauterization in 1 case (patient 6), with no recurrence 10 months after surgery.

Evaluation of a pediatric patient who presents with recurrent lateral neck infections or acute suppurative thyroiditis should include investigations to rule out a PST. If drainage of the suppurative process is required, a hypopharyngoscopy should be performed. If the internal opening of a tract is identified, we recommend that it be cauterized. For those patients who are treated only with antibiotics, a barium swallow test is recommended 4 to 6 weeks later, when the inflammation has subsided. However, negative findings on barium swallow testing do not rule out a tract, and direct laryngoscopy should be performed if one is suspected. Our study demonstrates the need for direct visualization, as the results of barium studies were negative in 3 of our patients who had confirmed PSTs.

Our last 2 patients represented a management dilemma. How should patients with asymptomatic PSTs be treated? The tracts identified in patients 7 and 8 were purely incidental findings. The patients presented with symptoms suggestive of laryngopharyngeal reflux and swallowing dysfunction. The tracts were identified by barium swallow testing and confirmed by endoscopy. The prevalence of asymptomatic PSTs and their natural course is unknown, and, to our knowledge, there have been no cases previously reported in the literature. Therefore, the best course of management should be conservative, with both endoscopic cauterization and close observation being reasonable options. We opted for the latter approach, as compliance was not an issue and the surgical options were clearly explained to the patients' families. Long-term follow-up is needed to confirm the role of observation in these asymptomatic tracts.

The true incidence of PSTs is probably higher than is currently believed. We emphasize the need to rule out this anomaly in any child who presents with acute suppurative thyroiditis or recurrent neck abscesses. Although barium swallow studies can identify most tracts, telescopic hypopharyngoscopy remains the "gold standard" for diagnosis. Endoscopic cauterization may be curative in most symptomatic patients, and complete surgical excision should be reserved for recurrent disease. Observation with regular follow-up may be appropriate in asymptomatic patients in whom PSTs have been identified.

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Author Contributions: Drs Pereira and Davies had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Pereira and Davies. Acquisition of data: Pereira and Davies. Analysis and interpretation of data: Pereira and Davies. Drafting of the manuscript: Pereira and Davies. Critical revision of the manuscript for important intellectual content: Pereira and Davies.

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REFERENCES