Fourth Branchial Sinus Communication with the Esophagus: A Rare Occurrence
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ABSTRACT

Objectives:
1. To discuss relevant clinical and surgical findings of fourth branchial cleft anomalies.
2. To report a rare manifestation of fourth branchial sinus communication with the esophagus

Study Design: Case series

Methods:
Two patients were identified in a tertiary care level university practice. Patients were diagnosed based on clinical presentation and diagnostic imaging consistent with fourth branchial anomaly. Transcervical surgical excision of the lesion was performed in both cases without complication.

Results:
Patient 1 (male, age 25) and patient 2 (female, age 15) presented with recurrent neck infections. Patient 1 was noted to have a cystic neck mass with submucosal tract into the esophagus. Patient 2 was noted to have a cystic neck mass with an opening in the left piriform sinus, which communicated with the esophagus distally. The cystic neck masses were removed en toto, and the esophageal communication was repaired. Patients 1 and 2 resumed oral diet in 2 and 5 days, respectively. The recurrent laryngeal nerve was preserved during the course of dissection, and normal vocal fold mobility was maintained.

Conclusions:
Fourth branchial cleft anomalies are rare occurrences, which may present as recurrent neck infections. The sinus tract lies in close proximity to the recurrent laryngeal nerve. Care must be taken to identify esophageal involvement to ensure appropriate management at time of resection. Patients are able to resume an oral diet early in the recovery period.

INTRODUCTION

- Fourth branchial anomalies first reported in 1972
- Defined as anomaly originating in piriform sinus apex extending through cricothyroid membrane and inferior to superior laryngeal nerve
- Low prevalence with fewer than 500 reports representing 1 – 4% of all branchial anomalies
- Limited experience has made diagnostic and treatment guidelines difficult

Patient 1

A 25 year old healthy male presented with a 2 year history of recurrent right-sided throat infections with at least one associated abscess. Computerized tomography (CT) scan demonstrated a fluid-filled cystic lesion extending from the base of the right neck to the brachiocephalic artery and multiple vertebral anomalies (Figure 1). Modified barium swallow (MBS) demonstrated no overt esophageal communication. The differential diagnosis included branchial cleft cyst, esophageal cyst, or neuroenteric cyst.

The patient was subsequently taken to the operating room where a panendoscopy demonstrated no communication with the right piriform sinus, esophagus, or airway. A transcervical approach for resection with associated right thyroid lobectomy was performed. The lesion was removed en toto following decompression. The recurrent laryngeal nerve was identified and preserved. There was a noted submucosal esophageal communication, which was repaired. A feeding tube was placed for 2 days. Follow-up MBS demonstrated no extravasation, and normal diet was resumed. Final pathology demonstrated a cystic mass consistent with branchial cleft cyst.

The patient remains without evidence of recurrence at 12 months follow-up.

Patient 2

A 15 year old healthy female presented with a recurrent history of neck swelling and stiffness associated with upper respiratory tract infections. CT scan demonstrated evidence of a left sided hypodense lesion with air bubbles tracking inferior to the piriform sinus suggestive of branchial anomaly (Figure 2).

The patient was subsequently taken to the operating room where a panendoscopy showed a piriform sinus communication (Figure 3). The tract was cannulated and dilute methylene blue was injected for identification. Transcervical approach for excision was then performed with associated left hemithyroidectomy. The lesion was removed en toto. There was a direct esophageal communication which was ligated. The esophagus was repaired in two layers. A feeding tube was placed for 5 days. MBS performed on postoperative day 5 demonstrated no extravasation, and normal diet was resumed. Final pathology demonstrated evidence of a branchial cleft cyst.

The patient remains without evidence of recurrence at 2 months follow-up.

Discussion

- Fourth branchial anomalies typically present prior to third decade of life.
- Presentation usually associated with recurrent thyroiditis and/or deep neck abscess.
- Preponderance of lesions of occur on the left side, likely due to limited embryologic activity of fourth branchial apparatus on right.
- Workup includes history, physical, CT scan imaging and modified barium swallow to evaluate for aerodigestive tract involvement. Imaging may not be of help in quiescent periods.
- Intraoperative evaluation with direct laryngoscopy (special attention to the ipsilateral piriform sinus) and esophagoscopy is critical to identify lesion and aerodigestive tract involvement.
- Treatment may include endoscopic cauterization of sinus outflow tract or transcervical excision with ipsilateral thyroid lobectomy. Dilute methylene blue can assist in identification of the sinus tract.
- Caution must be paid to prevent injury to recurrent laryngeal nerve and resulting vocal fold paralysis.
- Surgery should be avoided, if possible, in cases of acute infection due to inflammatory changes, which predispose to cyst rupture and recurrent laryngeal nerve injury.
- Esophageal repair may be indicated with associated feeding tube placement.
- Complete excision, including thyroid lobectomy, results in a recurrence rate less than 8%. Incision and drainage alone with excision of the underlying branchial anomaly is associated with an 89% recurrence rate.

CONCLUSION

- Fourth branchial anomalies should be considered in patients with recurrent neck infections.
- Direct laryngoscopy is critical to evaluate the aerodigestive tract.
- Transcervical excision with ipsilateral thyroid lobectomy is an effective and safe treatment strategy.
- Esophageal involvement should be considered to ensure complete and safe excision of fourth branchial anomalies.

References: