

Endoscopic Management of Branchial Fistula: Diagnostic and Therapeutic

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ABSTRACT

Recurrent neck abscess is a typical feature of a branchial anomaly. Open surgical excision has been the primary treatment modality for the past decades however several alternative treatment modalities such as endoscopic electrocauterisation have recently gained popularity and acceptance universally. This series aims to introduce endoscopic assessment as the first-line diagnostic and therapeutic management for branchial fistula. 5 patients underwent examination under general anaesthesia via direct laryngoscopy, endoscopic assessment, and cauterisation in our centre from 2016 to 2019. They were then followed up at our clinic to assess disease progression. Comparison between open neck surgery and endoscopic cauterisation of internal sinus tract opening as the primary treatment has reported a similar recurrence rate. Proposal of endoscopic assessment as the first-line investigation and diagnostic tool with the aim of therapeutic cauterisation at the same setting. MRI may be needed in scenarios such as failed endoscopic treatment or when open surgery is required.

Keywords

Fistula, congenital, Branchial cleft, Caution, Endoscopy.

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INTRODUCTION

Recurrent neck abscess in children is commonly associated with branchial arch anomalies. Branchial fistula and sinus are results of abnormal developments of branchial apparatus beginning from about the 4th week of gestation. These branchial apparatus typically obliterates during embryonic development and failure to do so results in the formation of cysts, sinuses, and fistulas which can be infected or simply presents with chronic persistent discharge. Such fistulas are rarely complete with the presence of external cutaneous opening. There are 4 types of the branchial cleft anomaly, differentiated by the location of its internal opening with type II being the most common at 90% while type III/IV is the least at only 1-4%.¹ Open surgical excision has been the primary treatment modality for past decades but alternative approaches such as electrocautery, laser, chemical and glue obliteration of these fistulas have gained acceptance and popularity in recent years.²⁻⁵

OBJECTIVE

This series consists of 5 cases of the branchial fistula which was referred to our centre and managed by the Department of Otorhinolaryngology, Head & Neck Surgery in the past 4 years (2016 – 2019). It is a continuation of the initial case series which encompasses cases from 2009 to 2015. The main objective of this series is to introduce endoscopic assessment as the primary definitive management for branchial fistula.

MATERIAL & METHODOLOGY

A retrospective review of case notes of all patients who received treatment for branchial fistula in the past 4 years at our centre. A comprehensive analysis was performed on aspects of demography, clinical presentation, disease progression, management, and outcome of those patients.

RESULTS

There are 5 patients reported in this case series (Table I & II). These cases have been treated at various centres in our country for recurrent neck abscesses before being referred to the ORL clinic for further management. They range from 2 years old to 9 years old and each of them had undergone incision and drainage (I&D) procedure at least once. The youngest age of manifestation in our series was 10 months old when the child first developed a neck abscess. MRI of 2 patients had visible fistula tracts but was not visible in the other patients. Four patients experienced prolonged wound healing after transcervical I&D of the abscesses. One of the four patients developed granulation tissue at the previous I&D site during the prolonged post-operative recovery phase upon which once removed exposing a fistula tract opening. All 5 patients had internal openings of the fistula at the pyriform fossa region but only one had an external opening at the neck. Examination of the oral cavity did not reveal any internal openings at the tonsillar region. They subsequently underwent examination under general anaesthesia via direct laryngoscopy and endoscopic assessment.

hidden by mucosal folds and adjacent structures (Figure 1). Once detected, mucus and pus are seen draining from the internal opening. Monopolar diathermy is used to cauterise the branchial fistula tract internal opening and surrounding mucosa to completely obliterate the openings after completed suctioning the discharge (Figure 2). These patients were discharged the next day with mild analgesia. None of the patients had recurrence when reviewed at 4 months to 3 years post-operative.

DISCUSSION

Branchial arch anomalies manifest into cyst, sinus, or fistula and often presents as recurrent neck abscesses in the first 2 decades of life.⁶ Second branchial arch derived anomalies are most common while third and fourth are the least. The third and fourth branchial arch anomalies are difficult to be differentiated from each other because both sinuses open into the pyriform sinus. The differentiation factor between the two pathologies lies in determining the relationship of the sinus to the superior laryngeal nerve, which can only be identified during intraoperative exploration.

Table 1: Demography and disease progression

Case	Age (years old)	Gender	Symptoms	Age when initial symptoms (years old)	Previous Incision & Drainage	Imaging
1	7	female	Recurrent neck abscess	1	Yes – 3 times	MRI – no tract is seen.
2	5	male	Recurrent neck abscess	3	Yes- 1 time	MRI- tract is seen from left pyriform sinus to subcutaneous region of the left anterior neck.
3	9	male	Recurrent neck abscess 8 years	1	Yes- 1 time	MRI- tract is seen opening superiorly at the pyriform sinus region.
4	8	male	Recurrent neck abscess	3	Yes -2 times	CT- multiple small abscess collection lateral to thyroid gland suggestive of a branchial cyst. No tract is seen.
5	5	female	Recurrent neck abscess	3	Yes – 2 times	MRI – scan shows abscess collection medial to pyriform sinus but sinus tract not visible due to inflammation.

Intraoperatively, Lindholm laryngoscope is inserted and suspended, followed by thorough examination with zero degree endoscope. A laryngeal spreader was used to facilitate detection of the internal opening as it is always

In relation to the superior laryngeal nerve, the third branchial sinus or fistula passes above it while the fourth branchial arch anomaly structures pass below the former. Management of abscess secondary to the

Table II: Management and follow-up

Case	Direct Laryngoscopy & intraoperative findings.	Neck	Procedure	Recurrence
1	Fistula opening was seen at left pyriform sinus apex without discharge	No external opening is seen. Well healed scar from the previous I&D seen.	Tract and internal opening cauterised.	No.
2	Fistula opening was seen at left pyriform sinus apex without discharge	No external opening is seen. Well healed scar from the previous I&D seen.	Internal opening cauterised.	No
3	Fistula opening seen at left pyriform fossa had pus discharge	No external opening is seen. Well healed scar from the previous I&D seen.	Internal opening cauterised	No
4	Fistula opening was seen at left pyriform fossa without discharge	No external opening is seen. Well healed scar from the previous I&D seen.	Internal opening cauterised	No
5	Fistula opening was seen at the left pyriform fossa without discharge.	Opening of tract seen externally at previous I&D site, obliterated by granulation tissue.	Internal opening cauterised. External granulation tissues excised and wound refashioned.	No

branchial anomaly is I&D. Probability of recurrence is as high as 94% and 89% in cases secondary to third and fourth branchial arch anomalies respectively.^{7,8} Conventionally, more definitive management is complete excision of the underlying branchial remnant via open neck surgery. In the last decade, endoscopic intervention has progressively become the preferred approach but certain centres combine both approaches. Electrocautery is the instrument of choice for the endoscopic approach compared to the CO₂ laser, silver nitrate, trichloroacetic acid, and glue as electrocautery is readily available in most centres and most cost-effective compared to the other options. A study reported 60% recurrence after initial endoscopic electrocauterisation of internal fistula opening². These cases required either a second re-cauterisation or transcervical surgical excision of the fistula tract that became sinus tract after the first cauterisation². 9% recurrence after initial endoscopic cauterisation was reported in another study.⁶ Combination of external excision of the fistula tract and endoscopic diathermy reported 100% no recurrence.⁹ Literature review of similar series demonstrated endoscopic electrocauterisation success rates ranging from 66.7% to 100%.¹⁰ Our series reported a 100% success rate. Comparison between open neck surgery and endoscopic cauterisation of internal sinus tract opening as the primary treatment has reported a similar recurrence rate of 15% and 15% to 18% respectively.^{7,8} Both approaches yield a similar success rate but open neck exploration surgery is associated with higher

morbidity such as surgical site infection, prolonged wound healing, and iatrogenic injuries. Therefore, endoscopic cauterisation of internal fistula openings should be the first line definitive treatment while recurrence to be managed by re-cauterisation or transcervical open neck surgery.

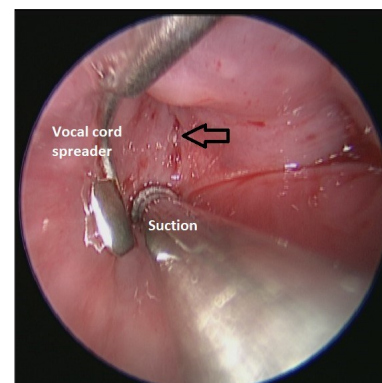


Figure 1: Black arrow indicating the internal opening of branchial fistula at left pyriform sinus.

Our preceding case series reported a significant number of recurrences within 6 months postoperative endoscopic electrocauterisation that warranted re-cauterisation unlike in our case series sequel². In this current series, the follow-up duration was extended up to 3 years to detect any recurrences given none seen in the 6-month postoperative period. No operative technicality or surgeon changes in between these 2 series. A larger sample size is better to gauge the outcome but the low incidence rate of these cases served as a limiting factor.

Diagnostic Imaging modalities utilised in our series included Computed Tomography (CT) scan and Magnetic Resonance Imaging (MRI) in which the latter is more superior to the former in terms of branchial tract identification. However, complete delineation of the fistulous tract is difficult as there small and collapsed. In our series, only 2 patients had positive branchial fistula tract identification with MRI, similar to other series at about 20%.^{2,9} CT is ideal during acute infection to assess the extension of the abscess.^{2,9} Barium swallow was previously a frequently utilised investigation tool but is losing popularity with the advancement of endoscopes and diagnostic imaging.^{7,8}

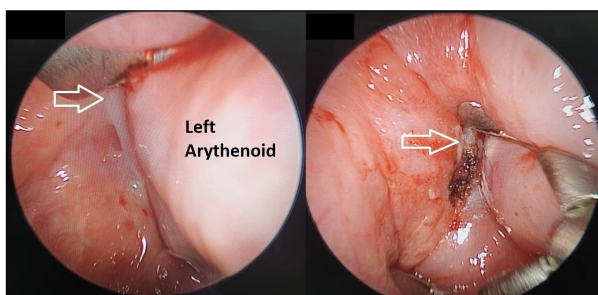


Figure 2: Discharge from the internal opening of branchial fistula at left pyriform sinus (*left arrow*) followed by the region after electrocauterisation with monopolar diathermy (*right arrow*).

CONCLUSION

Endoscopic management showed good potential as a first-line investigation and diagnostic tool for branchial fistula together with the aim of therapeutic cauterisation in the same setting. It is a less invasive and less morbidity approach compared to the typical open transcervical excision option. MRI may be needed in scenarios such as failed endoscopic treatment or when open surgery is required.

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