CASE REPORT

Feasibility of a bilateral regional sternocleidomastoid muscular flap in the closure of a persistent acquired tracheopharyngeal fistula

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SUMMARY

An acquired persistent tracheopharyngeal fistula secondary to an infected tracheopharyngeal voice prosthesis is a common cause of recurrent aspiration pneumonia in a postlaryngectomy patient. We report a case of a successfully treated tracheopharyngeal fistula whereby both the sternocleidomastoid muscles were used as muscular flaps to close the defect and its outcome.

BACKGROUND

A tracheopharyngeal or tracheoesophageal voice prosthesis is commonly used in the vocal rehabilitation of a patient who had undergone a laryngectomy usually due to laryngeal cancer, which was reported to have excellent outcomes¹ but it is not without its risks. Documented risk of a periprosthetic leak can rise up to 10% and may put the patient at risk for aspiration pneumonia.² Most fistulas have a tendency to heal spontaneously after the removal of the prosthesis but some may persist due to various factors such as an underlying comorbidity. This presents as a difficult clinical problem to manage and carries a high risk of mortality especially when affecting the elderly. We report a case of an acquired tracheopharyngeal fistula occurring after a failed voice prosthesis which was repaired using the sternal heads of the sternocleidomastoid muscle and its outcome.

CASE PRESENTATION

A 63-year-old man who had undergone a total laryngectomy and left selective neck dissection with adjunctive radiotherapy 3 years ago, presented to the otorhinolaryngology clinic with symptoms of recurrent vomiting episodes and milky discharge from his tracheostomy stoma site.

He had subsequently attempted for a tracheoesophageal voice prosthesis placement for vocal rehabilitation twice in the subsequent years but was unfortunately unsuccessful due to the presence of leakage from the prosthesis site. After the second removal of his voice prosthesis, he developed a non-healing fistula connecting the superior edge of the trachea and the neopharynx. Multiple attempts of fistula closure using primary suturing has been employed but had resulted in failure ([figure 1](#)).

He was then planned for the repair of the fistula using both his sternocleidomastoid muscles as a flap. The sternocleidomastoid was sutured on the

Figure 1 Preoperative picture of the tracheopharyngeal fistula with scar site marked. Note the sutures which had broken down due to the failed reclosure using non-absorbable sutures.

2 cm defect using multiple layers to scaffold the defect. The edges of the tracheopharyngeal fistula were also refashioned to encourage healing after the scaffolding was carried out. Multiple biopsies were performed intraoperatively which revealed no evidence of tumour recurrence. He was subsequently weaned-off from the enteral feeding tube after the confirmation of fistula closure by a barium swallow study postoperatively.

INVESTIGATIONS

Two weeks after the initial sternocleidomastoid flap repair, the patient was scheduled for a barium swallow study to detect any leak evidence. The patient does not have any evidence of leak radiologically and clinically, indicating a successful defect closure postoperatively.

TREATMENT

The procedure was performed under general anaesthesia with the head slightly extended. The patient was cleaned and draped as per operation theatre protocol. Incision sites were marked and local anaesthesia (bupivacaine+epinephrine 1:100 000)

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was administered surrounding the stoma site and the incision site (figure 2). An incision was made at the mucocutaneous junction of the stoma site and extended laterally for greater exposure (figure 3). The trachea was then separated from the underlying fistula on the neopharynx (figure 4) and oesophagus. We then measured the approximate size of the fistula. Both the sternal heads of the sternocleidomastoids were harvested (figure 5), transposed and sutured in multiple layers to cover the underlying defect using absorbable sutures (polyglactin 3/0). Refashioning of the fistula on the trachea defect was performed and sutured above the flap. A leak test was subsequently carried out using methylene blue to test for intraoperative leak before skin closure. After skin closure, a nasogastric tube was inserted and the patient was provided nutrition through the nasogastric tube and transperenteral nutrition until the wound healed completely. Barium swallow study is carried out 2 weeks postoperatively to look for any remaining leak (figure 6).

Figure 2 Incision site marked and local anaesthesia was infiltrated. Major blood vessels may be pulled to the stoma due to the contractures formed after his initial surgery.

Figure 3 The wound extended laterally and the surgical site is exposed.

Figure 4 The trachea is separated from the neopharynx and fistula tract.

Figure 5 Right sternal head of the sternocleidomastoids are being harvested.

OUTCOME AND FOLLOW-UP

At follow-up 6 months after the fistula closure, the patient had recovered well and is currently seeking other methods of voice rehabilitation. The fistula had closed up well and he has had no episodes of aspiration since (figure 7).

DISCUSSION

Acquired tracheoesophageal and tracheopharyngeal fistulas made by a surgeon after laryngectomy are used mainly for the purpose of voice rehabilitation. This is achieved by a puncture made in between the trachea and oesophagus or pharynx and is subsequently kept open by a one-way valved prosthesis.³ This allows air to be directed into the oesophagus and hence producing voice quality similar to those found in an oesophageal speech. Since the prosthesis is a one-way valve, this prevents secretions from the neopharynx from reaching the trachea hence preventing aspiration. Many brands of voice prosthesis are available in the market (eg, Provox, Blom-Singer) but the principle remains the same.

Despite its advantages, a voice prosthesis is not without its short comings. Complications such as bleeding, pain, infection

Figure 6 Barium swallow study performed 2 weeks after surgery showing no evidence of postoperative leak from the closure site.

Figure 7 Postoperative picture taken 5 months after surgery showing complete closure of the fistula.

and periprosthetic leak are among the common problems faced as a result of the procedure.⁴ Periprosthetic leak may predispose the widening of the fistula and hence the dislodgement of the prosthesis into the lungs.² Complications may arise as a result of many factors such as comorbidities (diabetes and

immunosuppression), poor wound healing due to previous irradiation, previous neck dissections and poor technical application of the device. Hence it is imperative that proper patient selection and planning should be carried out prior to the placement of a voice prosthesis. This involves closer follow-up, education and medical management (eg, antireflux) to prolong the prosthesis life.⁵ Many methods have been employed for the repair of a non-healing tracheopharyngeal fistula. The usage of a surgical flap has been widely employed and described in the literature. Flaps originating from the pectoralis major,⁶ sternocleidomastoid,⁷ deltopectoral⁸ and free forearm flaps⁹ have been described in the past with varying success rates.

In our technique, we have employed the usage of both the sternal heads of the sternocleidomastoid after the separation of the trachea from the oesophagus. The muscle functions as a scaffolding while the fistula heals by itself. This technique is advantageous because it does not employ much bulk onto the oesophagus, hence leading to a lower chance of dysphagia and narrowing of the stoma. Furthermore, this technique is a fairly simple procedure to perform as it employs the usage of the sternocleidomastoid which is just adjacent to the stoma site. Overall, this results in better wound healing and better post-operative cosmesis due to the smaller bulk of muscle used to scaffold the defect. However, it should be noted that in order for the flap to be successful, recurrence of a malignancy should always be ruled out. Hence a biopsy around the fistula site is recommended.

Learning points

- ▶ The usage of the sternal heads of the sternocleidomastoid flap as a scaffolding for the healing of a tracheopharyngeal fistula is a feasible option for repair as it is less likely to cause dysphagia and stoma stenosis.
- ▶ A malignant recurrence should always be ruled out before attempting a repair of the tracheopharyngeal fistula as it may lead to the failure of the flap later.
- ▶ Proper patient selection, education and postoperative care are required to reduce the chances of a periprosthetic leak.

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