Surgical Repair of Postlaryngectomy Pharyngocutaneous Fistulas

Goutam Guha · Somenath Saha · Indranath Kundu

Abstract

Pharyngo-cutaneous fistula is a common complication after laryngectomy, which increases both the morbidity and the hospital stay. The incidence rate varies from 8.7% to 24.8% in different institutions. The continuous salivary leak is very much troublesome for the patients. There are various predisposing factors out of which preoperative radiotherapy, diabetes, malnutrition is very important. Spontaneous closure occurs in most of the cases on conservative management and only a few need surgical closures. Surgical methods used are direct surgical repair in two layers inner mucosa and outer skin, single distant flap like DP or PMMC, double distant flap like DP and PMMC one for inner mucosa and another for outer skin. Post operative swallowing was satisfactory in all the cases and there was no recurrence of fistula in one and half year follow up.

Keywords Laryngectomy · PCF- pharyngo cutaneous fistula · Direct suture · DP–deltopectoral flap · PMMC – pectoralis major myocutaneous flap.

Introduction

Laryngectomy is now a very common operation in ENT department. Improvement in surgical skill, suture materials, early and timely surgical interventions, good postoperative care all have lead to improved surgical outcome with very low complication rate. Still we cannot avoid pharyngo cutaneous fistula, which is one of the common complication after laryngectomy particularly in post radiotherapy patients. This is a demoralizing complication not only for the surgeons involved but also for the patient and his family. On conservative management most of the salivary fistulas heal and the rest need surgical closure. Options are direct surgical repair in two layers, repair by local and distant flaps. The primary goal is to close the fistula without any tension.

Surgical anatomy

Larynx – the main part of the laryngeal skeleton is formed by the thyroid cartilage, which articulate with the cricoid inferiorly, which is the lower limit of the larynx. The epiglottis is attached to the thyroid prominence at the level of the vocal cords and forms the anterior wall of the laryngeal compartment. Ary-epiglottic fold forms the lateral wall of the upper laryngeal compartment. Articulating with the upper border cricoid cartilage are the arytenoids cartilage to which are attached the vocal cords.

Total laryngectomy Total laryngectomy includes resection of the hyoid bone, pre-epiglottic space, thyroid cartilage, cricoid cartilage, upper tracheal rings. The hypopharyngeal constrictors are sectioned from the lateral edge of the thyroid cartilage and cricoid insertions. After removal of the specimen, the trachea is sutured to the skin of the neck. The constrictor muscles are usually reconstructed in the midline to support one or two layer of mucosal closure to avoid fistula formation.

History of reconstruction

Czerny performed the first recorded pharyngoesophageal reconstruction in 1877 and Mikulicz performed the first

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successful cervical esophageal reconstruction in 1886. Both used local cervical skin flaps for reconstruction, as it was the earliest method of reconstruction of defects in this area. Multiple techniques of reconstruction have emerged from the turn of the century until the present. Wooke in the early 1940's came up with the standard reconstruction technique of the time by using the anterior neck skin in a staged procedure. Tissue transposition techniques were then popularized by the advent of the deltopectoral flap of Bakamjian in the 1960's. Aryian and Theogaraj in the late 1970's and early 1980's reported using pectoralis major myocutaneous flaps for the reconstruction of hypopharyngeal/cervical esophageal defects.

Most recently, fasciocutaneous free flaps have been developed for reconstruction. Harii in 1985 reported use of a tubed radial forearm free flap for reconstruction in this area. Subsequently, lateral thigh and scapular fasciocutaneous free flaps have also been developed.

Surgical principles of the flaps used

Deltopectoral flap: The deltopectoral flap runs horizontally across the anterior chest wall towards the shoulder tip from its base along the border of the sternum. The line of the clavicle forms its upper border; its lower border is at the level of the anterior axillary fold. The flap is raised deep to the investing layer of fascia and stripping the underlying muscle bare. It can be extended laterally almost as far as the mid lateral line on deltoid muscle and medially as far as just lateral to sternal margin. The secondary defect after raising the flap is skin grafted. The flap is attached to the margin of the defect at the anterior neck and is kept there for three weeks. After three weeks when the flap establishes its vascularity from the recipient site the excess portion of the flap is detached and returned to its original site.

This is a direct cutaneous axial flap, supplied by first three intercostal perforating branch of the internal mammary artery. It is a staged procedure, and as such, prolongs hospitalization and delays swallowing. Otherwise it is a technically easy procedure, thinness and good pliability of the flap allows easy manipulation and good cosmetic result. Pectoralis major myocutaneous flap: the vascular supply is from the pectoral

branch of thoracoacromial artery and veins. They emerge from the clavipectoral fascia 2 to 3 cm medial to the coracoid process where pectoralis minor is attached. The lateral thoracic vessel also contributes to the blood supply of the muscle reaching it lateral to pectoralis minor. The skin island is placed below and medial to the nipple about the level of 6th rib. Pivot point lies in relation to coracoid process which can readily be felt below the clavicle near the junction between its middle and outer third. The hilum lies 2 to 3 cm medial to coracoid process. The muscle pedicle is usually made as wide as the skin pedicle but if the vessel can be identified then the pedicle can be narrowed. The flap is elevated up to the coracoid process.

Combined DP & PMMC flap from the same side: here the DP flap incision is given first and the PMMC skin paddle incision is given at the lower end of the DP flap incision (Sketch 1) DP flap is elevated first, which exposes the underlying pectoralis major muscle, which is now elevated together with its skin paddle.

Materials and methods

In our institute during the last 3 years, we selected 5 cases of post laryngectomy pharyngocutaneous fistulas which did not respond to conservative management for 6 weeks.

The conservative management we followed was:

- Exclusion of residual tumour
- Prevention of saliva accumulation by regular small and repeated aspiration
- Removal of necrotic tissue by regular debridement
- Regular dressing
- Ryles tube feeding
- Antibiotics if there is infection otherwise unnecessary antibiotics should be restricted.
- Maintenance of good nutrition monitored by albumin level
- Keeping the Hb level above 10gm%.

The cases that did not respond to conservative management for 6 weeks were selected for surgical management:

Table 1 The fistulas were grouped according to their size, local wound condition and local skin condition.

No	Age/sex	size of	Pre	Local wound fistula	Local skin op. RT	Repair method condition
1	62/M	<0.5 cm	+	satisfactory	satisfactory	Type 1
2	59/M	1.5 cm	+	satisfactory	poor	Type 2 DP
3	72/M	1.5 cm	+	satisfactory	poor	Type 2 DP
4	57/M	2 cm	+	poor	poor	Type 2 PMMC
5	49/M	> 2 cm	+	satisfactory	poor	Type 3 DP+ PMMC

Age ranges of the patients were 49 to 72 and all were male. All the patients received preoperative radiotherapy. Both

the local wound conditions and the local skin conditions were considered separately before planning the operation.

Fig. 1
Postlaryngectomy
pharyngocutaneous
fistula.

Fig. 2 Combined DP
& PMMC Flap from
same side.

Local wound conditions: were considered to be:

Satisfactory When the wound was clean, without any foul smell and mucopurulent discharge except the salivary leak. There were good granulation tissue and the wound margins were healthy and showed good marginal healing.

Local skin conditions: were considered to be :

Satisfactory When the skin was soft, pliable with normal colour.

Poor when the skin was discoloured usually black in colour, firm to hard in consistency due to fibrosis and can not be pinched up by two fingers.

Patients were grouped according to the size of the fistulas:

Type 1: fistula size less than 0.5 cm.

Type 2: fistula size greater than 0.5 cm but less than 2 cm.

Type 3: fistula size greater than 2 cm.

Out of the 5 patients, type 2 fistulas were found in 3 patients and type 1 and type 3 fistula was found in one patient each.

Methods of repair used was also of three types:

Type 1: Two layers are repaired locally.

Type 2: One layer locally and one distantly. The distant flap may be DP or PMMC.

Type 3: Both layers repaired distantly. Here both DP and PMMC used from the same side

Type 1 repair: It was done in small type 1 fistula where both the local wound condition and local skin condition was satisfactory. After excision of the fistula margin both the pharyngeal mucosa and the skin are separated gently. Pharyngeal mucosa was repaired with interrupted 5-0 polyglactin (vicryl) over a nasogastric tube. Skin was undermined and repaired directly without tension with 5-0 prolene.

Follow up: After 5 days sips of water was allowed keeping the ryles tube in situ. After 10 days water was allowed by mouth and rest of the liquid diet by ryles tube, if there was no

leakage then the ryles tube was withdrawn after 2 weeks and liquid diet was continued for another few days and gradually normal diet was started.

Type 2 repair: These methods were done in type 2 fistulas. It can be done either by DP flap or by PMMC flap.

Type 2 DP: Where wound conditions were good but due to poor skin conditions undermining and direct repair of skin were not possible so a distant flap was brought to close the skin defect. Here after excision of the fistula margin the pharyngeal mucosa were separated from the skin and direct repair of the pharyngeal mucosa were done with interrupted 5-0 polyglactin (vicryl) over a nasogastric tube. DP flaps were brought to close the skin defects. It was a two-stage procedure and detachments of the flaps were done after 3 weeks.

Type 2 PMMC: Where both the wound and the skin conditions were poor and there was doubtful vascularity of the area, PMMC flap was used which was a myocutaneous flap with very good vascularity. It was a one stage procedure. Here after excision of the fistula margin the pharyngeal mucosa were separated from the skin and direct repair of the pharyngeal mucosa were done with interrupted 5-0 polyglactin (vicryl) over a nasogastric tube. PMMC flap was brought to close the skin defect.

Follow up: Where type 2 PMMC flap was used follow up protocol was same as type 1 repair. Where type 2 DP flap was used ryles tube feeding was continued for another 3 weeks till detachment of the flap. After detachment of the flap follow up protocol was same as type 1 repair.

Type 3 repair: This method was done in type 3 fistula where both the pharyngeal mucosa and the skin could not be brought into close proximity for direct repair. Here after excision of the fistula margin both the pharyngeal mucosa and the skin are separated gently. Both the PMMC and DP flaps were raised from the same side. PMMC flap was used to close the pharyngeal defect with the skin surface inside and DP flap was used to close the skin defect.

Fig. 3 1 year follow up after type-3 repair of fistula.

Sketch 1:

Combined DP and PMMC flap. DP flap raised exposing the pectoralis major. Shadowed portion is the skin paddle of PMMC flap. Arrow shows vascular axis of PMMC.

Follow up: DP flap was detached after 3 weeks. Ryles tube feeding was continued for 3 weeks till detachment of the flap. After detachment of the DP flap follow up protocol was same as type 1 repair.

Results

In our institute during the last 3 years we had 5 cases of post laryngectomy pharyngeocutaneous fistulas that did not responded to conservative management and surgical management were undertaken to close those fistulas.

Age ranges were 49 to 72 years and all the patients were males. All the patients received pre operative radiotherapy. Pre operatively local wound conditions were satisfactory in 4 out of the 5 cases (80%) and local skin condition was satisfactory in 1 out of the 5 cases (20%).

Type-1 fistula and type-3 fistula was found in 1 case each and type-2 fistulas were found in 3 cases. So, type-1 and type-3 repairs were done in one case each. Type-2 repairs were done in rest of the 3 cases of type-2 fistulas. Among the 3 type-2 repairs, DP flaps were used in 2 cases and in one case where there was doubtful vascularity with poor wound condition PMMC flap was used which has its own blood supply and brings the same to improve the local wound condition.

Postoperative complications were a few. In one case of type-2 repair (case 3) a very small fistula appeared which healed on conservative management. In another case of type-2 repair (case 2) there was a small gaping of the wound at one corner which was managed by secondary suture after 2 weeks. Postoperative swallowing were good in all the cases both for liquid and solid foods. In the case of the type-3 repair (case 5) there was some difficulty in swallowing at the initial stage

possibly due to oedema and the bulk of the double flaps pressing over the pharynx.

Cosmetic appearances were good where DP flaps were used due to thinness and pliability of the flap whereas PMMC flaps produced some bulkiness in front of the neck.

Discussion

The pharyngocutaneous fistula occur after laryngectomy when there is a breakdown of the pharyngeal repair resulting in a salivary leak. The principles of management of the fistulas are prevention by taking delicate techniques during repair without tension using proper fine suture materials and proper soft tissue respect. Risk factors like smoking, diabetes, chronic bronchitis, malnutrition, anaemia etc should be eliminated.

The two most common predisposing factors are pre-operative radiotherapy and residual tumour cells in surgical resection margins. The occurrence of fistula is typically heralded by the presence of erythema over the incision site, followed by skin breakdown and the seepage of saliva through the wound. The methyl blue swallowing test can give some clue in detecting early very small fistula. The majority of the fistulas appear between 7 and 13 post-operative days. The timing for surgical repair of a fistula is unclear. In different studies it is 40 post-operative days to 3 months but it is logical to optimize the surgical bed first before surgical repair. In our study the average time period for surgical repairs were 6 weeks. Type 1 repair with direct suture of both the pharyngeal mucosa and the skin was done in 1 case of a small fistula of less than 0.5 cm (Type 1 fistula). Type 2 repair with direct suture of the pharyngeal mucosa and skin closure by a distant flap (DP/ PMMC) were done in 3 cases of moderate fistulas, greater than 0.5 cm but less than 2 cm (Type 2 fistulas). Among the 3 cases of type 2 repairs DP flaps were used in 2 cases and

PMMC flap was used in 1 case where there was some doubtful vascularity. Type 3 repair with closure of both the pharyngeal and the skin defect by distant flaps, DP and PMMC of the same side, was done in 1 case of large fistula of greater than 2 cm (Type 3 fistula). Post-operative swallowing were good in all the cases for both the solids and liquids. In the case of the type 3 repair there was some initial delay in restoring the normal swallowing. Cosmetic appearances were good where DP flaps were used due to thinness and pliability of the flap whereas PMMC flaps produced some bulkiness in front of the neck.

References

- 1 Ariyan.S.(1979) : The pectoralis major myocutaneous flap: A versatile flap for reconstruction in the head and neck. *Plast. Reconstr. Surg.* 63:73.
- 2 Bakamjian V.Y, Ling M.D, Rigg B.R. (1971) : Experience with the medially based deltopectoral flap in reconstructive surgery of the head and neck. *Br J Plast Surg* 24:173,
- 3 Bootz F , Muller GH. (1990) : Repair of salivary fistula after laryngectomy. *Clin Otolaryngol.* 15:299.
- 4 Chee.N, Siow.J.K. (1999) : Pharyngocutaneous fistula after laryngectomy – incidence, predisposing factors and outcome. *Singapore Med.J.* 40:130.
- 5 Fabian R.L. (1988) : Pectoralis major myocutaneous flap reconstruction of the laryngopharynx and cervical esophagus. *Laryngoscope*;98:1227-1231.
- 6 Fradis M, Podoshin L, David JB. (1995) : Post-laryngectomy Pharyngocutaneous fistula- a still unresolved problem. *J. Laryngol Otolarynol .* 109:221.
- 7 Ian.A.McGregor. and Alan.D.McGregor. *Fundamental Techniques of Plastic Surgery and their surgical applications.* 9th Edition. New York. Churchill Livingstone. 1995:91
- 8 Klos.A., Globek. W., Morshed. K. (2003) : Methods of closure for pharyngocutaneous fistula after laryngectomy. *Otolaryngol.Pol.* 57: 59.
- 9 Mc.Gregor, and Jackson.I.T.(1970): The extended role of deltopectoral flap. *Br.J.Plast.Surg.* 23:173.
- 10 Myers EN. (1972) : The management of Pharyngocutaneous fistula. *Arch Otolaryngol* 1; 95: 10.
- 11 Parks J.S, Sako K, Marchetta F.C.(1974): Reconstructive experience with the medially based deltopectoral flap. *Am J Surg* 128:548.
- 12 Radaelli de Zinis LO, Ferrari L, Tomenzoli D. (1999) : Post laryngectomy Pharyngocutaneous fistula: incidence, predisposing factors and therapy. *HeadNeck*; 21:131.
- 13 Smith. T.J., Burrage. K.J., Ganguly. P.(2003) : prevention of postlaryngectomy pharyngocutaneous fistula : the Memorial university experience. *J.Otolaryngol.* 32 : 222