

Liberal Use of Pectoralis Major Muscle Flap Reduces Incidence of Pharyngocutaneous Fistula Following Salvage Laryngectomy

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Abstract

Patients undergoing salvage laryngectomy following chemoradiotherapy are more vulnerable to develop pharyngocutaneous fistula. This is due to fibrosis and reduced vascularity that results in poor postoperative healing. We are presenting a simple technique that can reduce this distressing complication. In patients where primary closure cannot be achieved, myocutaneous flap to reconstruct the pharynx reduces the incidence of postoperative complications. Similarly, buttressing of the suture line with the pectoralis major myofacial flap has been shown to reduce the fistula rates. Needless to say that pectoralis major muscle flap is a robust flap with acceptable complication rates.

Keywords: Pectoralis major myocutaneous flap, laryngectomy, pharyngocutaneous fistula.

INTRODUCTION

Total Laryngectomy is the treatment of choice for the locally advanced laryngeal cancer which is beyond the confines of chemotherapy and radiation therapy or in patients of non-functioning larynx. Pharyngocutaneous fistulas (PC fistula)^{1,2} are one of the commonest problems after this surgery since Billoth of Vienna first performed it way back in 1873. In present era, laryngectomy is used increasingly as a salvage procedure post radiotherapy or post chemoradiotherapy. It is well accepted that the PC fistula rates are higher in patients undergoing salvage surgery.

Laryngectomy is a major surgery causing breach of two tracts, upper airway and the upper food passage. This is the area of constant contamination by the saliva imposing the pharyngeal suture line under constant threat of breaking down. Overall complications seen in different studies are in range of 30 to 40% following laryngectomy. Various factors which are found responsible for the fistula formation includes the complicated surgery requiring flap reconstruction, post tracheostomy surgeries, post radiotherapy surgeries, positive surgical margins. Patient factors like nutrition, postoperative hemoglobin, diabetes, liver disease and the stage of the disease are also important.¹⁻⁴ Patients undergoing salvage surgery are more prone to develop PC fistula, because the tissues in the neck including the mucosa are fibrosed and less vascular that

results in poor healing power. In the setting of salvage surgery, the fistula rates reported are as high as 70%.¹⁻⁴

Brief Overview

Various authors have advised numerous methods to prevent this problem. One publication suggested multilayered suturing to prevent the dehiscence of the suture line. However, most head neck surgeons believe that multiple sutures and layers may not offer significant protection. On the contrary, it may lead to decreased vascularity of the junctional mucosa and poor healing. Another study analyzed factors, such as number of layers, type of closure (extra-mucosal or mucosal), suturing technique (continuous or interrupted sutures) and did not find their correlation with fistula rates.⁵

Most important factor influencing the post-operative healing is the vascularity which, during salvage surgery, is deficient in the mucosa as well as adjoining soft tissues of the neck. Placement of vascularized tissue that was out of the field of radiation may improve the healing capacity in such settings. With this philosophy in mind, a free flap or a pedicled flap can be used not only to buttress or augment the neo-pharynx but also to bring vascularized tissue in the neck. In a study from Michigan University, pharyngeal interpositioned fascia grafts like free radial forearm,

anteriolateral thigh or lateral arm flaps which were used with microvascular techniques. They compared results with RTOG 91-11 trial results taken as standard. There overall PC fistula rate was similar between groups (29% vs 30%; Flap vs No flap). Major complications in flap group were minimal and all the fistulas in flap group were minor. However stricture rate was more in flap group (42% vs 25.9%). Thus free flaps were effective to reduce the magnitude of leaks and dreaded complications though fistula rates remained same with problems of stricture formation.⁶ Since free flap requires expertise and good infrastructure, most centers may not be able to offer it to their patients. Alternatively, various pedicled flaps have been used in this setting, such as sternomastoid flap (SCM flap), pectoralis major myocutaneous flap, etc. One study reported the use of sternomastoid flap (SCM flap) to reduce the incidence of fistula from 34% to 3.3%.^{7,8} Following radiotherapy, the sternocleidomastoid muscle is mostly unsuitable for reconstruction. The flap which has been widely used is pectoralis major flap. Described more than 25 years ago by Aryian it is still the “work horse” of reconstructive surgery. It is regarded as good “spare wheel” for cervico-facial surgeon in the cases of failure of microsurgical flaps.⁹ It has very good arc of rotation of almost 180°. It adds less time to surgery but gives good vascularity to the compromised tissue. Wherever primary closure can be achieved, PMMF is recommended to buttress the neopharynx. In those patients where primary closure cannot be achieved, a myocutaneous flap is used to augment the pharynx (Fig. 1).



Fig. 1: Intraoperative picture showing a pectoralis major myocutaneous flap in progress for pharynx augmentation following total laryngectomy with partial pharyngectomy

Review of Pectoralis Major Muscle Flap

A pectoralis major muscle flap is simple, easy to learn and robust flap.⁹ PM flap is found useful in other difficult clinical scenarios like protection of threatened great vessels, protection of free-flap vascular pedicles in situations of wound breakdown due to fistula or infection, closure of small pharyngeal defects and vascularized coverage of the mandible following debridement for osteoradionecrosis.¹⁰ A comparative retrospective study (n = 46) using PMMF flap for reinforcing the pharyngeal suture line in salvage laryngectomy patients showed no fistula in patients in which PMMF was used, as compared to 57% for those with primary closure.¹¹ A study from Memorial University showed that fistula rate reduced from 22.9% to 1% when PMMF was added routinely to salvage laryngectomies.¹² PMMF can not only add to primary closure but also to reinforce free tissue transfer used in pharyngeal closure. In a study from Vienna where PMMF was used to buttress free jejunal transfer in 8 patients who were post radiotherapy salvage hypopharyngeal carcinomas. They had no PC fistula with minimal morbidity which was of mild strictures. However, rapid rehabilitation was possible in these patients despite two flaps being used that improved the quality of life.¹³

Righini performed similar study where pectoralis major myofascial flaps were used in salvage laryngectomies. There was reduction in fistula rate from 50% to 23% in patients with pharyngolaryngectomy.¹⁴ In a Memorial Sloan-Kettering Cancer Center study, which compared patients who underwent primary pharyngeal closure alone (n = 69) and those where PMMF (n = 11) was used to buttress the closure in salvage laryngectomies, similar fistula rates (27% vs 24%) were seen.¹⁵ Another author used multipronged approach for closure following salvage laryngectomies in 11 patients that included three layered closure with no fistula formation in these patients. After two layered closure of the pharynx, third layer consisted of interposition muscle flap, commonly PMMF. The author also used other facets, such as broad-spectrum antibiotics, early gastrostomy, antireflux therapy, controlled diverting pharyngostomy for salivary diversion as ‘fistula reduction formula’.¹⁶

Technique

- Assess the width of the unstretched remnant pharyngeal mucosa following salvage total laryngectomy.
- If the width is less than 3.5 cm, patient requires a pectoralis major myocutaneous flap for reconstruction

of the pharynx. A primary closure in this setting has high chances of developing a fistula.

- If the width is more than 3.5 cm and primary closure is possible, perform a single layer closure of the pharynx with vicryl 2-0.
- Raise a pectoralis major myofascial flap and lay it over the above suture line. To retain the muscle over the suture line, few tagging sutures are required between the pectoral muscle fibres and the extrinsic muscles of the tongue.
- The two lateral edges of the muscle can be approximated (by 2-3 tagging sutures) to the pre-vertebral fascia so as to lateralize the carotid artery and the internal jugular vein. This may protect the carotid from salivary contents in case of minor fistula.
- Drains are placed and wounds are closed.
- Patient orally allowed between 7-10th day after assessment for any fistula. Ryles tube can be removed thereafter.

CONCLUSION

Various studies discussed above show advantage of the PM flap to reduce fistula rates.⁹⁻¹² We recommend, whenever the fistula rate is anticipated to be high, pectoralis major muscle flap can be judiciously utilized not only to reduce the fistula formation but also to prevent the fistula related dreaded complications. Needless to say that PM Flap is a robust flap with easy learning and minimal morbidity.

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