Pharyngocutaneous Fistula Incidence After PMMC Patch Pharyngoplasty for Post Laryngectomy Defect Reconstruction – Predictive Factors, Our Experience at KMIO

Kamal Kishor Lakhera¹ · Ashok M. Shenoy² ·
P. Chavan² · K. Siddappa²

Received: 3 January 2015 / Accepted: 19 May 2015 / Published online: 12 June 2015
© Indian Association of Surgical Oncology 2015

Abstract To analyse pharyngocutaneous fistula, post Pectoralis major myocutaneous patch pharyngoplasty, and its association with various tumor, patient and treatment related factors. It is a retrospective study that included 48 patients who underwent laryngectomy and PMMC patch pharyngeal reconstruction from year 2009 to 2013. We studied the previously reported factors that could influence fistula formation such as age, gender, previous radiotherapy, previous tracheostomy, location of tumor, extent of tumor, tumor volume, tumor stage and surgical margins. Pharyngocutaneous fistula was observed in 13(27.1 %) cases. In 84.6 % ($n=11$) patients, fistula closure was achieved by conservative measures. No statistically significant association was found between tumor location, extent and size. There was no association between history of previous tracheostomy and postoperative microscopic margin status. Patients with T4 disease showed increased association (36.7 %) compare to T3 stage (11 %) (p value-0.0362). Postoperatively 6 patients presented with dysphagia out of which 4 patients (66.7 %) had history of leak. It also showed significant increase in post operative stay and delay in oral feeding in fistula patients. There is still no consensus regarding the most significant risk factors, our data showed that, most disease and treatment related parameters were not predictive for fistula occurrence. Probably a larger number of patient cohort need to be analysed for additional information.

Keywords Laryngectomy · Pharyngeal reconstruction · PMMC · Pharyngocutaneous fistula

Introduction

Pharyngocutaneous fistula can be defined as a dehiscence of the closure of the pharyngeal mucosa, resulting in leakage of saliva and communication with the skin [1]. It is one of the major postoperative complications after total laryngectomy and laryngopharyngectomy [2].

It was the Billroth who first reported pharyngocutaneous fistula as a complication, which occurs when there is a failure in the pharyngeal healing. It leads to increased morbidity, delay in adjuvant treatment, prolonged hospitalization, and increased treatment costs [3]. The reported incidence of pharyngocutaneous fistula is extremely variable in the literature ranging from 5 to 65 % [4–8] but rate between 12 and 30 % has been often reported.

The majority of literature data is more generalized on all laryngectomy patients, and only few selective studies for post PMMC repair are available. But the data can be interpolated in PMMC patients also, as except the reconstruction part other patient, disease and treatment related factors are similar. A variable number of contributing factors both patient and tumor related, have been described in laryngectomy literature, still there no agreement on the most significant factors [6–8]. Patient related factors included age, performance status, and comorbidities. Among the tumor related factors studied are stage, location, grade and margin status. Few treatment related factors as previous radiation exposure and surgical technical aspects also implicated [9].

Saki N et al. have showed that fistula formation was significantly more common in patients who received previous

✉ Kamal Kishor Lakhera
drkk.bhu@gmail.com

¹ Department of Surgical Oncology, Kidwai Memorial Institute of Oncology, Bangalore, India

² Department of Head and Neck Oncology, Kidwai Memorial Institute of Oncology, Bangalore, India

radiotherapy or who had positive surgical resection margins or had a systemic disease [10].

Rzepakowska A et al. have described previous radiotherapy, supraglottic location of the tumor, extension of the surgery to the pharynx and malnutrition of the patient as most significant risk factors for fistula formation, in there series [11].

Cavalot AL et al. in their review found the higher incidence of fistula in patients with comorbidities like diabetes, liver diseases, or anemia. The local factor that turned out to be statistically most significant for the development of fistula was preoperative radiotherapy [12].

Most of the available literature on post laryngectomy pharyngocutaneous fistula, do not selectively target post PMMC reconstructed patients, though it is an important subgroup of laryngectomy patients. So we aimed our study to find out more predictive information on this selected group.

Aims and Objectives

The objective of this report was to determine the incidence, predisposing factors, and outcome of post laryngectomy pharyngocutaneous fistula in patients who underwent PMMC patch pharyngoplasty, at our institute. We have tried to identify the factors which may have associated to fistula formation and to analyse our results in managing this complication. Tumor related factors which were not well addressed in previous studies were specifically stressed.

Patients and Methods

We retrospectively reviewed the medical records of 48 patients who underwent laryngectomy and pectoralis major myocutaneous flap patch reconstruction in the Department of head and neck oncology, from year 2009 to 2013. We studied the previously reported factors that could influence fistula formation such as age, gender, previous radiotherapy, previous tracheostomy, location of tumor, extent of tumor, tumor volume, tumor stage, positive surgical margins. Disease extent was divided in three sections according to extent in CT scan images. Upper 1/3 included tumor above the level of false cords, middle 1/3, the level between false and true cords and lower 1/3 below true cords. An approximate estimate of tumor volume was done by multiplying all three tumor dimensions in CT scan imaging, as a measure of tumor size.

P-values for each variable were calculated using chi square test and Fisher's exact probability test. Statistical significance was accepted as $P < 0.05$. Bi serial correlation test was also used. All analyses were performed using R software.

Results

A total of 48 laryngectomy patients who required PMMC patch for laryngectomy defect closure were studied. 46(95.8 %) patients were males and only 2(4.2 %) patients were females. The mean age of the patients was 57.2 ± 8.5 years with a range of 38 to 72 years. 46(95.8 %) patients were treated with primary surgery and only 2(4.2 %) patients were cases of salvage laryngectomy, who had received previous radiotherapy.

Most patients, 33(68.7 %) had carcinoma hypopharynx, and other 15(31.3 %) had laryngeal carcinoma. 18(37.5 %) cases were stage T3 and rest 30(62.5 %) cases were stage T4. 12(25 %) patients underwent emergency tracheostomy before definitive surgery due to airway obstruction.

Histopathological examination showed 31(64.6 %) patients with negative margins, 9(18.8 %) patients with close < 5 mm margins. 4(8.3 %) patients had positive margins and other 4(8.3 %) patients showed dysplasia at margin. Mean postoperative day for soft diet intake was 18.3 ± 8.75 (day $\pm$ SD), with range of 10 to 44 days. Mean postoperative hospital stay was 22.6 ± 12.0 days (range 12 to 75 days).

Pharyngocutaneous fistula was observed in 13(27.1 %) cases. Average day of detection of leak was 11.3 ± 4.32 day, (range 6 to 22 days). Soft diet was started on average 13.8 ± 1.8 days in patients without any leak in comparison to 30.2 ± 8.5 days, where patients had leak. Similarly without leak average postoperative stay was 18.5 ± 7.1 days, which was significantly increased to 33.4 ± 15.5 days in fistula patients. In 84.6 % (11/13) patients, fistula closure was achieved conservatively by prolonged nasogastric feeding, flap compressive bandage and local wound care. Only 2(15.4 %) patients required surgical closure of pharyngocutaneous fistula by contralateral PMMC flap.

Though increased fistula rate was seen in pyriform fossa tumor (31.3 %) in comparison to supraglottic tumor (21.4 %), but not statistically significant. (p value- 0.497) (Table 1) Similarly disease extending towards proximal end of pharynx was associated with increased leak rate, but statistically non-significant. (p value - 0.157) (Table 2) No association between tumor volume and leak was found (p value- 0.758) (Table 3). There was no association between history of previous

Table 1 Association of leak with location

Location	Yes		NO		Total
Supraglottis	3	21.4 %	11	78.6 %	14
Glottis		0.0	1	100.0	1
Pyriform sinus	10	31.3 %	22	68.8 %	32
Post cricoid		0.0	1	100.0	1
P-Value	0.497				

Table 2 Association of leak with extension of disease

Extension	Yes		NO		Total
Upper 1/3	2	66.7 %	1	33.3 %	3
Middle 1/3	1	33.3 %	2	66.7 %	3
Lower 1/3		0.0	1	100.0 %	1
U+M 1/3	8	33.3 %	16	66.7 %	24
M+L 1/3		0.0	8	100.0 %	8
U+ M+L 1/3	2	22.2 %	7	77.8 %	9
P-Value	0.157				

tracheostomy and increased leak rate (p value- 0.851). Even postoperative microscopic margin status and leak rate has not shown any relation (p value- 0.974) (Table 4).

One of two patients (50 %) who had received past irradiation, developed fistula and required revision surgery. Positive association with primary disease stage was found, where patients with T4 disease showed increased association (36.7 %) compare to T3 stage (11 %) (p value-0.0362) (Table 5) Postoperatively 6 patients presented with dysphagia out of which 4 patients (66.7 %) had history of leak. (p value-0.0358)

Results also showed significant increase in post-operative stay and delay in oral feeding with pharyngocutaneous fistula occurrence.

Discussion

The reported incidence of pharyngocutaneous fistula ranges from 5 to 65 % [4–8]. Its occurrence vastly increases the length of stay and consequently, the costs of treatment [5]. Additionally, this complication can lead to a delayed onset of adjuvant treatment [6]. It can also lead to stenosis and pharyngeal swallowing disorders, with large negative impact on quality of life for patients. Very rarely it can lead to sepsis, mediastinitis, pneumonia and death.

In past a variety of factors has been implicated for the increased fistula rate, which can be divided as, patient, disease and treatment related factors [7–9]. The proposed predictive

Table 3 Association leak with tumor volume(ml)

Volume (ml)	Yes		NO		Total
0–20	3	23.1 %	10	76.9 %	13
21–40	6	26.1 %	17	73.1 %	23
41–60	3	37.5 %	5	62.5 %	8
61–80	0	0.0	3	100 %	3
>81	1	100 %	0	0.0	1
P-Value	0.758				

Table 4 Association of leak with margin status

Margin	Yes		NO		Total
Negative	8	25.8 %	23	74.2 %	31
Close	3	33.3 %	6	66.7 %	9
Positive	1	25.0 %	3	75.0 %	4
Dysplasia	1	25.0 %	3	75.0 %	4
P-Value	0.974				

variables associated with pharyngocutaneous fistula development related to the patient are, gender, alcohol, smoking habits, American Society of Anaesthesiologists risk classification system (ASA scale), Haemoglobin and serum albumin level, and associated comorbidities. Similarly factors related to disease like stage, grade, location; extent of tumor has also been reported. In treatment related factors use of Preoperative RT, previous tracheostomy, status of surgical margins and surgeon experience have been studied.

In our series, pharyngocutaneous fistula rate was 27.1 %. This rate is in agreement with the data available in the international literature over the past few decades, according to which the rate varies from 12 to 30 % [10, 11].

A recent review by White HN et al. [13] showed pharyngocutaneous fistula overall incidence of 21 %. Their data confirmed previous radiotherapy and hypothyroidism, particularly in salvage laryngectomy patients, as important significant predictors of postoperative pharyngocutaneous fistula. The use of a postoperative barium swallow in these patients was not found to be sensitive enough in predicting who will develop a clinically evident leak and advised to be used with caution.

In our study we have stressed on few of the disease related factors which can be predictive during preoperative workup, as they may help in patient counselling for their probable risk.

We have found that advanced T4 stage was significantly associated with fistula formation. While statistical analyses showed no association with various tumor related variables like location, extent and tumor volume. Similarly, in treatment related variables, preoperative tracheostomy as well as post-operative margin status was not predictive for fistula formation.

Occurrence of fistula was also associated with significantly increased delay in oral feeding and increased hospital stay. Increased swallowing problems were seen in patients after

Table 5 Association of leak with T stage

Stage	Yes		NO		Total
T3	2	11 %	16	89 %	18
T4	11	36.7 %	19	63.3 %	30
P-Value	0.0362				

fistula healing. We have not observed any direct fistula related mortality.

Still majority of the patient with fistula can be salvaged by conservative approach, maintaining adequate nutrition. No investigation including barium studies has been found useful, so treatment guidance for patient management is mostly by clinical assessment.

Conclusion

We concluded that pharyngocutaneous fistula remains a troublesome postoperative complication after total laryngectomy. However, there is still no consensus regarding the most significant risk factors, our data showed that, most disease and treatment related parameters were not predictive except advanced tumor stage. Though the specific predictive factor are lacking in literature in selective PMMC patch pharyngoplasty patient, probably a larger patient data base and more comprehensive analysis may help in getting the answers.

Our experience confirmed that most fistulas can be successfully managed with conservative treatment with acceptable morbidity, even with the unpredictability of the risk.

References

1. Bresson K, Rasmussen H, Rasmussen PA (1974) Pharyngocutaneous fistulae in totally laryngectomized patients. *J Laryngol Otol* 88:835–842
2. Thawley SE (1981) Complications of combined radiation therapy and surgery for carcinoma of the larynx and inferior hypopharynx. *Laryngoscope* 91:677–700
3. Cousins VC, Milton CM, Bickerton RC (1987) Hospital morbidity and mortality following total laryngectomy. *J Laryngol Otol* 101: 1159–1164
4. Dedo D, Alonso WA, Ogura JH (1975) Incidence, predisposing factors and outcome of pharyngocutaneous fistulas complicating head and neck cancer surgery. *Ann Otol Rhinol Laryngol* 84:833–840
5. Lundgren J, Olofsson J (1979) Pharyngocutaneous fistulae following total laryngectomy. *Clin Otolaryngol* 4:13–23
6. Wei WI, Lam KH, Wong J, Ong GB (1980) Pharyngocutaneous fistula complicating total laryngectomy. *Aust N Z J Surg* 50:366–369
7. Arriaga MA, Kanel KT, Johnson JT, Myers EN (1990) Complications in total laryngectomy: incidence and risk factors. *Ann Otol Rhinol Laryngol* 99:611–615
8. Hier M, Black MJ, Lafond G (1993) Pharyngo-cutaneous fistulas after total laryngectomy: incidence, etiology and outcome analysis. *J Otolaryngol* 22:164–166
9. Gil Z, Gupta A, Kummer B, Cordeiro PG, Kraus DH, Shah JP (2009) The role of pectoralis major muscle flap in salvage total laryngectomy. *Arch Otolaryngol Head Neck Surg* 135(10):1019–1023
10. Saki N, Nikakhlagh S, Kazemi M (2008) Arch Pharyngocutaneous fistula after laryngectomy: incidence, predisposing factors, and outcome. *Iran Med* 11(3):314–317. doi:[08113/AIM.0013](https://doi.org/10.1007/s101030013)
11. Rzepakowska A, Osuch-Wójcikiewicz E, Ochal-Choińska A, Bruzgielewicz A (2011) Pharyngocutaneous fistula as a complication after total laryngectomy—clinical study and literature review. *Otolaryngol Pol* 65(5 Suppl):22–30
12. Cavalot AL, Gervasio CF, Nazionale G, Albera R, Bussi M, Staffieri A, Ferrero V, Cortesina G (2000) Pharyngocutaneous fistula as a complication of total laryngectomy: review of the literature and analysis of case records. *Otolaryngol Head Neck Surg* 123(5): 587–592
13. White HN, Golden B, Sweeny L, Carroll WR, Magnuson JS, Rosenthal EL (2012) Assessment and incidence of salivary leak following laryngectomy. *Laryngoscope* 122(8):1796–1799. doi: [10.1002/lary.23443](https://doi.org/10.1002/lary.23443)