

Impact of Different Suturing Techniques used to form Neopharynx on Post Operative Pharyngocutaneous Fistula Development after total Laryngectomy

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ABSTRACT

Background: Laryngeal cancers are the second most common cancers in aero digestive tract. In advanced laryngeal cancers total laryngectomy is performed and it gives excellent results post operatively as the 5 year survival rate is 95%. One of the most common complication of total laryngectomy is formation of pharyngocutaneous fistula post operatively.

Aim: To compare interrupted vs continuous suturing technique in formation of neopharynx after total laryngectomy in order to find out which technique is better in terms of pharyngocutaneous fistula formation postoperatively.

Method: A total of 20 patients requiring total laryngectomy were selected. Patients were segregated into two groups. patients in group A underwent continuous suturing technique and those in group B underwent interrupted suturing technique in formation of neopharynx. Patients were then post operatively monitored for pharyngocutaneous fistula formation for 10 post operative days

Result: Mean age in group-a patients was 56.90±12.94 year and 54.60±9.31 year in group-b patients. Pharyngocutaneous fistula developed in 2(20%) patients with interrupted suturing technique and in 7(70%) patients with continuous suturing technique used for formation of neopharynx.

Conclusion: Hence it was concluded from our research that formation of neopharynx per operatively using interrupted suturing technique has less incidence of pharyngocutaneous fistula formation postoperatively then continuous suturing technique as it provides more strength to the wall of neopharynx and has less chances of dehiscence.

Keywords: Neopharynx , Laryngectomy , Pharyngocutaneous fistula

INTRODUCTION

Laryngeal CA is one of the second most common CA of the upper aerodigestive tract¹ of which squamous cell carcinoma is the predominant type. Squamous cell carcinoma accounts for 2.4% of the newly diagnosed cases and 7% of the total deaths per year occur due to laryngeal CA⁸. Development of laryngeal carcinoma is related to multiple factors. Among the main causes of laryngeal carcinoma smoking accounts for 90% of the causes⁹. Other factors involved are alcohol, pan chewing, plummer winson syndrome etc. There are about more than 12000 new cases diagnosed each year with a 70% 5 year survival rate making it one the most curable cancers of upper aerodigestive tract.

Among the laryngeal carcinomas glottic carcinomas are the most common cancer¹⁰. Glottic carcinoma have a low risk of lymphatic spread¹⁴ and therefore have a better prognosis than supraglottic or subglottic cancers. Glottic carcinomas also present early due to early voice changes¹⁵. Before the 1990s total laryngectomy with post operative radiotherapy was considered the gold standard of treatment for laryngeal cancers. However patients considered this procedure very taxing due to loss of voice. Since then many techniques for voice rehabilitation have been developed for improved standard of living of the patient. Also many new methods have been developed for treatment of laryngeal CA which are more conservative and non radical. This includes methods based on the subsite and local extent of the laryngeal CA. The two most common methods used are transoral laser microsurgery and transoral robotic microsurgery¹⁶. These methods help in excision of laryngeal CA and also preservation of functions of larynx like voice production, breathing and swallowing.

In recent years a number of organ preserving techniques had led to decreased number of total laryngectomy procedures, however it is still performed in advanced stages of laryngeal CA. Total laryngectomy, despite its high rate of morbidity and complication rate, is still adopted worldwide in advanced stages of

laryngeal CA. Many complications can occur after this procedure like pharyngocutaneous fistula formation, wound infection, chyle leakage and stomal recurrence etc

One of the most common non-fatal complication of this procedure is pharyngocutaneous fistula formation². Recovery of oral feeding is a crucial point in post operative patients in this case. Pharyngocutaneous fistula is the formation of a communication between the pharynx and the skin either at the incision site or less likely at the tracheal stoma site. Most of the researchers have used a methylene blue dye to observe the communication. Pharyngocutaneous fistula has severe impact on the patient¹¹ as it leads to prolonged hospital stay, nutritional deterioration of the patient and delay in the adjuvant radiotherapy.

So far it has been found the many factors have led to pharyngocutaneous fistula formation like preoperative radiation, duration of surgery, transfusion requirement, patient comorbidities, low albumin and hemoglobin and the technique of neopharynx formation etc¹⁷. All these factors can lead to increased chances of pharyngocutaneous fistula formation postoperatively.

This list further highlights special attention of the suturing technique used in neopharynx⁷ formation, as it is in the hands of surgeon to use appropriate technique per operatively to decrease chances of pharyngocutaneous fistula formation. Formation of neopharynx during total laryngectomy is a vital step in determining the success rate of the procedure and post operative standard of living of the patient. This is because a good technique used for its formation will help the patient in faster recovery and also will enable the patient to start the adjuvant radiotherapy quickly. Neopharynx is formed by suturing three layers i.e., mucosal, fascial and muscular. The technique used in stitching up the mucosal layer determines the strength of neopharynx.

There are two suturing techniques i) continuous suturing technique ii) interrupted suturing technique. The suturing technique is therefore one of the most important method in determining the formation of pharyngocutaneous fistula postoperatively.

Accordingly the purpose of our study is to assess the best method of neopharynx formation during total laryngectomy in order to decrease chances of formation of pharyngocutaneous fistula postoperatively.

Received on 11-01-2022

Accepted on 23-06-2022

METHOD

After permission from Hospital Ethical Committee a comparative study was conducted in the ENT Department, Jinnah Hospital Lahore which is a tertiary care hospital of government sector in Lahore, Punjab. All the patients were admitted thru outdoor patient department. Direct laryngoscopy and biopsy under GA was performed first for definite diagnosis of laryngeal CA and also to assess its proper extent of spread. Non purposive sampling technique was used to select 20 patients who were diagnosed cases of laryngeal CA and there age was in the range of 40 to 60 years. Those patients who were post radiotherapy or were unfit for surgery due to certain reasons were not included in our study.

Out of 20 patients 19 were male and one was female. Detailed preoperative workup of each patient was carried out which included physical examination, all baseline lab test, pulmonary function tests, cardiac evaluation, ct scan and 70 degree telescopy. The patients were randomly allotted into two groups, group A and group B. Informed consent was taken from the patients before including them in the study. It was properly explained to patients that what procedure was going to carry out and how no ethical or moral boundaries will be crossed during it.

Total laryngectomy under GA using glux Sorensen method was carried out including hemithyroidectomy and neopharynx formation. Neopharynx formation is carried out on 3 layers i.e mucosa, fascia and muscles. The suturing technique used in the closure of mucosal layer is of prime importance. Stoma for trachea was formed and trachea was stitched with the skin. Bilateral drains were placed.

In patients in group A first layer of neopharynx was formed using continuous suturing techniques and in patients in group B neopharynx was formed using interrupted suturing techniques. NG tube was passed per operatively.

Post operatively NG feed was started on 3rd postoperative day. First normal saline was given thru NG and patient was monitored for any leakage from the incision site. Gradually NG feed was started according to a specific dietary chart which included high protein food like eggs and meat stalk. Drains were removed as soon as the drain output was less than 20ml/24 hours. On the 5th day patient was allowed oral saline sips and monitored for any leakage from the incision site. For two days patient took NG feed and oral sips and was closely monitored. If no leakage at the incision site was found NG tube is removed on the 7th day and patient is allowed to take the NG feed orally for 2 weeks. On 21st postoperative day patient was examined for any PCF formation.

The above procedure was carried out for all the 20 patients and data was recorded in tabulated form. The data was then analysed using SPSS and results were formulated.

RESULTS

In group-A, there were 10(100%) males and 0(0%) female, while in group-B, there were 9(90%) males and 1(10%) female. Mean age in group-A patients was 56.90±12.94 year and 54.60±9.31 year in group-B patients. In group-A, 2(20%) were in <50 years age group, while 8 (80.0%) were in ≥50 years age group. In group-B, 3(30%) were in <50 years age group, while 7(70%) were in ≥50 years age group. In group-A, 2(20%) were diabetic, while 2(20%) were diabetic as well in group-B. According to development of PCF, in Interrupted suturing technique group, pharyngocutaneous fistula developed in 2(20%) patients and in 7(70%) patients with continuous suturing technique with a p-value of 0.025, which is statistically significant. Hence statistical analysis of the results showed that if patient has no other factor affecting the post operative recovery suturing technique plays a great role in healing. And the interrupted suturing technique is better than continuous suturing technique.

Table-1: Comparison of gender distribution between groups

Gender	Groups		Total
	Interrupted suturing technique	Continuous suturing technique	
Male	10(100%)	9(90%)	19(95%)
Female	0	1(10%)	1(5%)
Total	10(100%)	10(100%)	20(100%)

Table-2: Comparison of age distribution between groups

Age groups	Groups		Total
	Interrupted suturing technique	Continuous suturing technique	
<50 years	2(20%)	3(30%)	5(25%)
≥50 years	8(80%)	7(70%)	15(75%)
Total	10(100%)	10(100%)	20(100%)

Table 3: Comparison of diabetic distribution between groups

Development of PCF	Groups		Total
	Interrupted suturing technique	Continuous suturing technique	
Yes	2(20%)	2(20%)	4(20%)
No	8(80%)	8(80%)	16(80%)
Total	10(100%)	10(100%)	20(100%)

Table-4: Comparison of development of PCF between groups

Development of PCF	Groups		Total
	Interrupted suturing technique	Continuous suturing technique	
Yes	2(20%)	9(45%)	9(45%)
No	8(80%)	3(30%)	11(55%)
Total	10(100%)	10(100%)	20(100%)

P value 0.025

DISCUSSION

Carcinoma of larynx is an important malignancy in head and neck region. It accounts for 40% of all head and neck malignancies. Its incidence varies globally. In a study conducted in Pakistan, by Pstakian Medical Research Council and Cancer Registry Cell Sindh, laryngeal cancer along with other head and neck cancers has been listed in the top ten. The peak age of incidence in Pakistan is 50 years. Male to female ratio varies globally and lies between 2:9²⁰. There is an proven relationship between use of tobacco and alcohol and appearance of tumour. Histologically most of these tumours are squamous cell carcinomas. In our study all patients had squamous cell carcinoma.

The mode of treatment is based on clinical staging of tumour, its histologic type and general health of the patient. Other factors, which should be considered, are age of patient, ancillary facilities available and experience of surgical team.

Treatment of T3 N0 M0 laryngeal cancer is controversial. It is classified as stage III and recommended therapy for these cancers is both surgery and radiotherapy¹⁸. Some centers prefer radiotherapy alone and keep salvage surgery in reserve, whereas some centers prefer total laryngectomy alone or in combination with postoperative radiotherapy. Regarding the T4 N0 M0 laryngeal cancer, total laryngectomy followed by postoperative radiotherapy is generally accepted mode of treatment.

The most common complication after total laryngectomy is pharyngocutaneous fistula. Following total laryngectomy, most head and neck surgeons tend to withhold oral feeding for 7 to 10 days after surgery, providing adequate nutrition through a nasogastric feeding tube introduced intra-operatively. This practice is based upon the issue that early start of oral feeding might stress the suture line and result in PCF . On the other hand, according to Saydam et al., the start of oral feeding on the first post-operative day should not contribute to fistula formation. Nevertheless, the time after which it is safe to avoid the risk of PCF formation, following total laryngectomy, remains controversial.

In fact, although PCF is a complication that can be managed conservatively without surgical intervention¹⁹, it still represents a challenge for the head and neck surgeon, prolonging hospitalization, increasing patient morbidity and predisposing also for major neck vessel injury.

In our study pharyngocutaneous fistula was the most common complication. Organ-preserving methods for treatment for laryngeal carcinoma produce comparable survival outcomes to primary laryngectomy and postoperative RT with the benefit of preserving voice and swallowing in a significant number of patients. However, not all patients respond and some have disease recurrence after successful therapy. Surgical salvage for these patients requires total laryngectomy. The morbidity related to pharyngocutaneous fistula formation post operatively is not well documented in the literature. More importantly, patient and treatment-related variables that might help to predict the development of post laryngectomy complications have not been systematically analyzed. In our study we prospectively studied 20 patients after undergoing total laryngectomy for PCF formation. Many factors were observed which lead to formation of PCF but in our research it was found that suturing technique is one of the important factor in development of PCF³. Out of 20 patients 10 patients who underwent interrupted suturing techniques for neopharynx formation only 2 developed pharyngocutaneous fistula. In contrast 10 patients who underwent continuous suturing technique 7 developed pharyngocutaneous fistula. The two patients who developed PCF and underwent interrupted suturing technique had diabetes which played a important role in their pharyngocutaneous fistula formation. It was found out that interrupted suturing technique is better as each individual stitch provide strength to the wall of neopharynx separately as compared to the continuous suturing technique in which a single thread is used to stitch the first layer of neopharynx through and through. As a single thread is involved in stitching in the second method it has more chances of loosening also if it gets open up at one point the entire layer can get open and hence increase chances of pharyngocutaneous fistula formation¹².

It was also found in another research that interrupted suturing technique used in gut formation⁴ provides more strength rather than continuous. This correlates with the results of our research as well.

In another research it was found that patients who were diabetic had more chances of developing pharyngocutaneous fistula¹³ due to poor healing process and this factor was found consistent in our research as well. But still we selected less patients with diabetes as this would affect our results.

It was observed by some researchers that people having hypo albumenimia and low heamoglobin had greater chances of developing pharyngocutaneous fistula postoperatively. These factors depict malnourishment of the patients and so malnourished patients have decrease healing power regardless of the fact that which suturing technique is used. These factors were not studied in our study.

Age of the patient also played a great role in healing as younger patients had more healing power and low chances of PCF formation as compared to patients in older age group.

CONCLUSION

Pharyngocutaneous Fistula is one of the most important post operative complication patients undergoing total laryngectomy. Pharyngocutaneous Fistula formations significantly increases hospital stay and cause some life threatening complications⁶. In our research the main factor associated with formation of PCF is suturing technique in neopharynx formation peroperatively and it was concluded that interrupted suturing technique in formation of neopharynx is better than continuous suturing technique as interrupted sutures provide more strength as they are multiple in number. On the other hand in continuous suturing technique a single piece of thread is used to stitch the entire first layer of neopharynx and it has more chances of loosening and dehiscence.

Conflict of interest: All authors declare no conflict of interest.

Supporting agency: No supporting agency

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