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Pharyngcutaneous fistula after total laryngectomy: treatment modalities and our experiences

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ABSTRACT

Aim: The aim of this study is to share our experience and treatment modalities in pharyngocutaneous fistulas that can be seen after primary and post-radiotherapy salvage total laryngectomy.

Material and Method: The records of patients who underwent total laryngectomy in our clinic between February 2012 and December 2021 were reviewed retrospectively. The patients' age, preoperative radiotherapy history, postoperative fistula development, gastrostomy opening, treatment modality, and hospital stay were examined.

Results: A total of 115 patients, 81 of whom were primary and 34 of whom had a history of radiotherapy, were evaluated in the study. Pharyngocutaneous fistula developed in a total of 20 patients in 10 primary patients and 10 patients with a history of preoperative radiotherapy. The mean hospital stay was 10 days for patients who did not develop fistula. The mean hospital stay was 27 days between days 21 and 36 in primary patients with fistula, and it was 46 days between days 34 and 68 in patients with a history of radiotherapy who developed fistula. While only 1 of the primary patients underwent reconstruction with a pectoralis major muscle flap because the fistula did not close despite local dressing and local skin flaps, this number was 7 in patients with a history of radiotherapy.

Conclusion: The presence of a history of radiotherapy before total laryngectomy increases the risk of laryngocutaneous fistula development, increases the need for myocutaneous flaps, and increases the length of hospital stay, resulting in increased comorbidity. Pharyngocutaneous fistula development is neither an important comorbidity nor religion.

Keywords: Total laryngectomy, radiotherapy, salvage laryngectomy, pharyngocutaneous fistula

INTRODUCTION

About 0.8% of all new cancer cases in the world and 0.6% of all cancer deaths occur in patients with laryngeal cancer (1). The incidence of Laryngeal Cancer (LC) has been decreasing 2.4% each year for the last 10 years with the decrease in tobacco use (1). LC occurs more frequently with among men and advancing age. LC is 5 times more common in men than women. The median age of diagnosis for patients with LC is 65 years and the median age at death is 68 years. The major risk factor for laryngeal cancer is smoking; other risk factors include human papillomavirus infection, laryngopharyngeal reflux, alcohol and environmental or occupational exposures. The incidence of LC among women has increased with the increase in smoking in women over past decades. The role of human papillomavirus as a risk factor for laryngeal cancer in young nonsmokers is currently under investigation (2).

In addition to surgical treatment in laryngeal tumors, radiotherapy (RT) in early-stage tumors is an effective treatment method in the treatment of laryngeal cancers. When the literature is examined, it has been shown that the oncological results of RT and cordectomy are similar in the treatment of early-stage tumors (3). From a functional point of view, the presence of vocal ligaments, absence of tissue loss and better sound quality make radiotherapy advantageous (3).

Primary tumor recurrence or persistence of disease after radiation therapy must be detected as early as possible. The role of surgical salvage in the event of disease recurrence should be considered even before initial treatment is selected (4,5). The high risks of wound healing complications should be considered in the planning for any surgery of the larynx after radiotherapy relative to surgery in an unirradiated neck

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(5). Therefore, patients who have poorly functioning larynx, suggestive of extensive T3 or T4a disease, and those with a tumor penetrating through the thyroid cartilage into surrounding soft tissues are not suitable for larynx preservation treatment approaches and should be recommended to undergo total laryngectomy (4).

In a study the incidence of pharyngocutaneous fistula (PCF) was 19% among primary total laryngectomy (TL), while it increased to 28.6% and 30.3% for patients receiving salvage TL after radiotherapy and chemoradiotherapy (6). In advanced stage tumors, partial surgery (in selected cases), TL (for T4a tumors and selected T3 patients) is a standard treatment method (7).

MATERIAL AND METHOD

This study was approved by the University of Health Sciences Ankara Oncology Training and Research Hospital Clinical Studies Ethics Board (Date: 2022-03, Decision No: 70). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

The records of a total of 115 patients who underwent TL f(70.4%) primary and 34 (29.6%) salvage due to recurrence after radiotherapy, in the ENT clinic of Ankara Oncology Training and Research Hospital were retrospectively analyzed. Patients' age, preoperative radiotherapy history, postoperative fistula development, approach to fistula, modality of treatment applied, and length of hospital stay were examined. The number of female patients was very low, so female patients were excluded from the study in order to avoid gender differences. Patients with Diabetes Mellitus and Thalassemia minor were excluded from the study because they may delay wound healing.

The surgical technique was standardised among all surgeons. TL included standard removal of the hyoid bone and infrahyoid muscles, pharyngeal closure was always performed in a single layer with a "I" shaped suture line, using 4-0 vicryl sutures. All patients were fed through a nasogastric tube in the postoperative period. Oral feeding was started on the 7th postoperative day in patients who did not develop FCF. Post-operative CRP follow-up was performed in all patients. Patients with evidence of postoperative infection were examined by the infectious diseases department and treated with appropriate antibiotics. During the physical examination; In cases where there was hyperemia on the neck skin, the flap did not fit, serohemorrhagic fluid comes from the neck suture lines, saliva and/or food content was observed in the hemovac drains, or if all these examination findings were normal, in cases where the patient's CRP and WBC values were increased, it was thought that it may be PCF, and some of the neck skin sutures were removed and an open neck dressing was applied. If hematoma, formula content, infected seroma, and saliva were observed in this dressing, the patient was considered to have PCF and was dressed. Consultations were requested from infectious diseases. If oral feeding was started, it was stopped and the dressing was continued twice a day. During this dressing; The space under the flap was cleaned, dead tissues were debrided, and the surrounding tissues were scraped and bled to increase granulation. The vascularity of the tissue was improved by scraping subcutaneously on the anterior line of the fistula. With this procedure, it was aimed to bond the living skin tissue with the esophagoplasty. Rifamycin ampoule and Triticum Vulgare aqueous extract and cream-impregnated sponge containing ethyleneglycol were placed on and around the flap skin, fistula area, and replaced with a new one at each dressing. For reconstruction, only one or more of the techniques of dressing, primary sturation, repair with local flap and repair with myocunous flap were applied. Endoscopic gastrostomy (PEG) was performed by the relevant department for patients whose fistula closure was not expected recently.

The age of the patients, the development of FCF, the length of hospital stay, the duration of feeding with nasogastric tube, the gastrostomy opening, the treatment approach applied to the fistula were evaluated. The data analysis was performed using the Statistical Package for Social Sciences (SPSS) for Windows, version 15. Chi-square and Mann-Whitney U tests were applied as statistical methods. A p-value of less than 0.05 was considered significant.

RESULTS

FCF developed in a total of 20 patients, including in primary 10 (12.3%) patients and in 10 (29.4%) patients who underwent salvage TL due to a history of preoperative RT. The primary patients were between 39 and 79 years old, with a mean age of 61.3±3.9 years. The age of the patients who relapsed after RT ranged from 38 to 76 years, with a mean age of 60.6±4 years. Nasogastric tube feeding was started in all patients on the 1st postoperative day, and all patients were fed with a nasogastric tube until oral feeding or gastrostomy feeding started. The mean hospital stay was 10 days for patients who did not develop fistula. The mean hospital stay was between 21 and 36 days in primary patients with fistula, and 27 days on average, while it was 34-68 days, with a mean of 46 days, in patients with a history of radiotherapy who developed fistula. In 7 of the primary patients, closure of the fistula was achieved in 6-20 days, with an average of 12 days, with dressing and debridement, whereas in only 1 of the patients with a history of RT, it closed in 19 days.

The fistula mouth was opened to the skin due to partial necrosis of the neck skin of 3 patients who were applied

primary TL and could not be successful with local dressing. Localized random skin flaps prepared from the neck skin were applied to these patients (A single lobe skin flap made from the lateral neck was closed over the fistula as the epidermal surface as the anterior esophageal wall, a similar flap was also prepared from the neck for the patients in need.). Fistula closed in 2 of 3 primary patients who underwent local skin flap.

Local flap was not considered in 3 of 9 patients with ongoing fistula problem and a history of RT due to fistula location and size. Local flap was applied to 6 patients and fistula closure was achieved in only 1 of these patients.

Pectoralis major (PM) myocutaneous flap was applied to primary 1 patient and 8 patients with a history of RT. While preparing the PM flap, the size of the skin island was determined by measuring according to the defect size. A circumferential incision was made around the skin graft. The pectoralis major muscle was cut from the inferior medial and lateral sides, similar to the skin size. The PM muscle was separated from the pectoralis minor and sternocostal muscles by blunt dissection. During dissection, the thoracoacromial artery was recognized and preserved. A tunnel was formed between the skin with the clavicle, and the skinned muscle, which was supported, was passed through the tunnel and reached the defective site. The flap was stitched over the defective area. Despite PM reconstruction, fistula persisted in only 2 patients with a history of RT, and contralateral pectoralis major myocutaneous flap was applied to these patients. Thus, fistula healing was achieved in all patients. Gastrostomy was performed by the relevant department in 8 primary patients with pharyngocutaneous fistula and all 10 patients with a history of rt. While the presence of gastrostomy was 15-28 days and an average of 21 days in primary patients, this period was 34-68 days and an average of 44 days in patients with a history of RT. Our findings are summarized in **Table 1.**

Table 1. Our data

	Primary Patients	Post-RT Salvage Patients
Median age	61.3±3.9	60.6±4
Number of patients	81	34
Patients Developing FCF	10	10
Length of hospital stay in the presence of PCF	27	46
Patients who had gastrostomy	8	10
FCFs closed with wound care	7	1
FCFs closed with local flap application	2	1
Patients with Pectoralis Major flap	1	8

When our patients were evaluated, no significant age difference was observed between primary patients and patients with a history of RT (p=0.07). Pharyngocutaneous fistula development was significantly higher in the group with a history of RT (p=0.03). Patients with a history of RT stayed significantly longer in hospital (P<0.001). Eight of 81 primary patients and 10 of 34 patients with a history of RT had gastrostomy, and the rate of gastrostomy was significantly higher in patients with a history of RT (p=0.011). In patients who underwent gastrostomy, the duration of gastrostomy was significantly longer in the group with a history of RT (p<0.001). Salvage patients with a history of RT required significantly more pectoralis major myocutaneous flaps (p=0.044).

DISCUSSION

With the evolution of nonsurgical organ preservation protocols for treatment of laryngeal and hypopharyngeal squamous cell carcinomas like RT, TL is increasingly performed as salvage procedure. Wound complications and FCF are important complications. Wound healing complications can have a multifactorial origin including previous chemoradiotherapy, low albumin , anemia, neck dissection, tumour stage and site (8).

The development of a FCF represents an important complication of TL that is usually self-limiting. Its management is thus mainly based on careful conservative treatment; however, at times, this complication further surgery is required (6).

The role of radiotherapy in the genesis of FCF has been extensively described, and some authors report that there is no significant associations (9). In a recent meta-analysis, Paydarfar et al. (10) repoted that, although preoperative radiotherapy is a significant relative risk of PCF formation, there was also heterogeneity of effects among studies; in fact, other RT associated variables such as radiotherapy time and dose frame between the end of radiation and surgery, did not demonstrate an increased.

Choosing a surgical versus a nonsurgical approach as the initial treatment for LC depends on individual patient factors such as comorbidities and age, the subsite of the tumor, the volume and extent of the primary tumor, and the presence of lymph node metastases or the probability of metastases. The choice of treatment is also influenced by involvement of the tumor location such us anterior commissure and the ability to achieve adequate endoscopic visualization. The presence of surgical and radiation oncologic expertise, along with adequate rehabilitative services, are fundamental considerations (4).

Other important factors deciding on treatment include vocal cord mobility, fixation, or impairment pretreatment voice and swallowing function, patient desires and lifestyle needs as related to the morbidity of treatment, and patient compliance (11).

TL is the standard treatment for advanced stage laryngeal tumor for patients not amenable to organ preservation regimens posed by extralaryngeal spread, extensive thyroid cartilage invasion or multiple and severe comorbidities. TL removes the entire larynx, paratracheal lymphatics, strap muscles, and the ipsilateral thyroid lobe or total thyroid excision in some cases (12). TL usually offers the best chances for cure, the consequences are the loss of native voice and a permanent tracheostoma. The most common complications of TL are wound infection and FCF, occurring in up to 50% of previously radiated patients. Therefore, vascularized tissue flaps to cover the reconstructed pharyngeal closure during salvage TL may be advised to decrease the risk and severity of fistulas preservation, salvage surgery offers yet a chance for cure (4,12). Careful consideration of the potential of successful salvage surgery to achieve loco-regional control is necessary before any laryngeal preservation approach with radiation or chemoradiation can be considered a viable alternative to primary surgery. Complete resection may be accomplished by TL, open partial laryngectomy or transoral laser microsurgery. Despite all the advances, the functional results of rehabilitation after partial laryngectomy, such as supraglottic laryngectomy, continue to be poor in patients who have received radiation before. Likewise, the results of supracricoid laryngectomy in surgical salvage on ultimate decannulation and local control should be interpreted with caution as the role for secondary partial laryngectomy becomes more clearly determined (12).

Because of the critical role of the larynx in voice and swallowing, the goals in the treatment of patients with T1 and T2 stage laryngeal cancers are cure from disease and preservation of laryngeal function to maximize quality of life. Although an approach combining multiple modalities such as surgery and radiation therapy or chemoradiation may be warranted on oncologic grounds, it can be togother high cost of added morbidity, including compromised functional outcomes of the larynx. Therefore, carefully selected patients with favorable early stage tumors should be considered for a single modality of therapy whenever possible without decreasing the chance for cure. Such single modality options include partial laryngectomy, transoral laser microsurgery, or radiation therapy alone may be considered standard treatment for laryngeal preservation for patients (4).

Busoni et al. (6) showed that the rate of PCF was 19% in primary total laryngectomy patients and %30.3 in post-RT laryngectomies, and showed that the history of RT increased the rate of PCF development. They also found significantly longer hospital stays. Similarly, in our study, the rate of PCF development, length of hospital stay, gastrostomy application rate and hospital stay, and major flap (pectoralis major myocutaneous flap) application rate were found to be high in patients with a history of RT.

CONCLUSION

While arranging the modality of treatment in patients diagnosed with laryngeal cancer, the increased comorbidity risks that may develop as a result of possible recurrences that may develop after RT should be kept in mind in patients who have had a chance of radiotherapy treatment. We think that the patient should be informed in detail about the possible results while the treatment plan is being made, and that a joint decision should be made with the physician, taking into account the possible risks and comorbidities.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was approved by the University of Health Sciences Ankara Oncology Training and Research Hospital Clinical Studies Ethics Board (Date: 2022-03, Decision No: 70).

Informed Consent: Since the study was designed retrospectively, informed consent was not obtained from the patients.

Conflict of Interest Status: The authors declared that there was no conflict of interest in this study.

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