

Early Oral Feeding Following Total Laryngectomy

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Introduction: Pharyngocutaneous fistula is one of the most common nonfatal laryngectomy complications (7.6% to 65% of all total patients). Preoperative radiotherapy, advanced tumor stage, poor preoperative medical status, and concomitant pharyngectomy are usually accepted causative factors in fistula formation. Delay of oral feeding is a common practice used by head and neck surgeons to prevent the development of pharyngocutaneous fistula. In this article we analyze our experience with special emphasis given to the early start of postoperative feeding.

Patients and Methods: The postoperative records of 48 patients who had undergone total laryngectomy or total laryngopharyngectomy were reviewed. All patients were orally fed with water and clear liquids on the first postoperative day. The patients were closely observed at every feeding attempt, and if any sign of fistula was noted, a nasogastric tube was inserted. Preoperative radiotherapy, stage of disease, tumor differentiation, and pharyngectomy with total laryngectomy were statistically analyzed as potential risk factors contributing to fistula formation. The Fisher exact test was used to analyze the data.

Results: The overall pharyngocutaneous fistula rate was 12.5% in our series. The only statistically significant factor that increased the rate of fistula formation was resection of pharyngeal mucosa as an extension of total laryngectomy. Other parameters failed to show any statistical significance in development of this complication.

Conclusion: Evaluation of fistula incidence in our series indicates that initiating oral feeding on the first postoperative day does not contribute to fistula formation. Additionally, the relatively shortened hospital stay and elimination of the psychologic and traumatic side effects of tube feeding are benefits of this approach that should be studied in further prospective quality-of-life studies.

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Pharyngocutaneous fistula is the most common complication in total laryngectomy. The reported incidence is about 7.6% to 65%.¹⁻³ This complication must be avoided not only for medical but also for economic reasons. A salivary fistula prolongs hospital stay, predisposes for major neck vessel injury, and causes significant patient discomfort because of feeding by nasogastric (NG) tube. The factors commonly implicated in fistula formation are preoperative irradiation, poor preoperative nutritional and medical status, low postoperative hemoglobin levels, types of pharyngeal closure and suture material, tumor localization, advanced tumor stage, and presence of

positive tumor margins.⁴⁻¹⁰ Delay in oral feeding to prevent fistula development is a common practice among head and neck surgeons,^{5,6,11} but some studies don't recommend delaying it.^{1,12,13} The purpose of this study is to examine the impact of early oral feeding on fistula formation.

PATIENTS AND METHODS

We retrospectively reviewed the charts of 48 total laryngectomy or total laryngopharyngectomy patients who met the study-inclusion criteria. We excluded patients who had been surgically treated previously and patients who had been laryngectomized for intractable aspiration, locally invasive thyroid carcinomas, or postcricoid or cervical esophageal cancers. There were 46 males (95.8%) and 2 females (4.2%) who ranged in age from 35 to 77 years (median = 63 years). Excluding 1 case of adenocarcinoma and 1 case of pseudosarcoma, histopathologic diagnosis was epidermoid carcinoma in all cases. We used the TNM classification system revised by the

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American Joint Committee on Cancer in 1992 for tumor staging. Preoperative hematologic values and the nutritional status of the patients were considered within normal limits. Ten cases had previously received irradiation to the larynx and neck in doses of ranging 5,000 to 6,000 rads.

All of the patients were meticulously prepared for a major surgical procedure, including a thorough head and neck examination, preoperative endoscopies of upper respiratory and alimentary tracts, evaluation of all necessary hematologic and biochemical values, radiographs of chest and neck with use of computed tomography or magnetic resonance imaging studies as needed.

Forty-two patients underwent total laryngectomy, and another 6 had partial pharyngectomy in addition to total laryngectomy. We carried out unilateral or bilateral neck dissections in all cases—mostly standard radical neck dissections. Preoperatively, a single dose of 1 g ceftriaxone sodium was given intravenously. All operations were carried out by the same surgeon (LS). Larynx and neck specimens were removed enbloc in all cases. The pharyngeal mucosal defect was repaired in a single horizontal line by 4-0 polyglactin 910 suture material (Vicryl; Ethicon Inc, Somerville, NJ) using continous Connel-type suture technique. T-type closure was carried out only in laryngopharyngectomy cases. An inverting submucosal suture line to support the mucosal repair constituted the second layer. For cases in which adequate amounts of muscular remnants remained, we sutured the stumps of the pharyngeal constrictors at midline as a third layer. We did not introduce a nasogastric feeding tube. Primary tracheoesophageal puncture was not done in these patients. Intravenous fluid replacement to support the patient's metabolic status was continued until postoperative oral intake was considered adequate. On the first postoperative day all the patients were started on small sips of water. During the feeding attempts a physician observed the drains to detect any entrance of swallowed material into the suction system that would indicate fistula development. In the absence of any sign of fistula, clear liquids and then milk were added to the diet, usually on postoperative second and third days. Soft foods were started on the

TABLE 1. Histologic Differentiation and Fistula Incidence

Fistula	Differentiation (No. of Patients) %		Total
	Well	Moderate & Poor	
Yes	1 (16.7)	5 (83.3)	6 (100)
No	20 (47.6)	22 (52.4)	42 (100)
Total	21 (43.8)	27 (56.2)	48 (100)

fourth and fifth days. Intravenous fluids were stopped once the patient's oral intake was considered adequate. The amount and appearance of material collected in the hemovac system was carefully monitored until the drains were removed, usually on the fourth postoperative day.

If a pharyngocutaneous fistula was diagnosed, a NG tube was placed to maintain alimentation. Skin sutures were partially removed on the fistula side so as to divert the salivary flow from major neck vessels. We applied strips of gauze soaked with antibiotic ointment and boric acid powder into the wound cavity. Pressure dressings were changed twice a day. Parenteral antibiotic treatment was started to clear any local infection. All fistulas were successfully closed with this local wound care without surgical intervention. The data were analyzed by the Fisher exact test.¹⁴

RESULTS

Six patients developed pharyngocutaneous fistulas (12.5%). All fistulas closed spontaneously with local wound care in approximately 2 weeks. One of these 6 patients had well-differentiated tumors, and 5 were moderately or poorly differentiated. The nonfistula group consisted of 20 well-differentiated and 22 moderately or poorly differentiated tumors. Analysis of the tumor differentiation parameter revealed no statistically significant results ($P = .16$; Table 1).

All of the fistula patients had T3 or T4 tumors. In the nonfistula group, 3 patients had T1 or T2 tumors, and 39 had T3 or T4 tumors. The differences between these 2 groups were not statistically significant ($P = .66$; Table 2).

Three patients in the fistula group and 7 patients in the nonfistula group had previously received radiotherapy. Analysis of this

TABLE 2. Tumor Stage and Fistula Incidence

Fistula	Tumor Stage (No. of Patients)		Total
	T1-T2	T3-T4	
Yes	0	6	6
No	3	39	42
Total	3	45	48

NOTE. $P = .66$ by Fisher exact test.

parameter did not reveal statistically significant results ($P = .09$; Table 3).

The only factor demonstrated to be statistically significant was pharyngectomy ($p = 0.04$; Table 4). Four out of 6 patients in the fistula group and 9 patients in the nonfistula group had laryngectomy with partial pharyngectomy.

DISCUSSION

The reported incidence of postoperative fistula varies from 7.6% to 65% in different series.^{1,2,3} Several risk factors including prior radiotherapy, concurrent radical neck dissection, advanced tumor stage, poorly differentiated tumors, partial pharyngectomy with laryngectomy, low preoperative hemoglobin levels, and lack of surgical expertise have been reported in the literature.⁴⁻¹⁰ Among the factors that we analyzed in our series, only pharyngectomy was statistically significant. Boyce and Meyers in a study of a series of pyriform sinus tumors suggested that partial pharyngectomy with total laryngectomy carries a higher risk of fistula. In our study partial pharyngectomy with laryngectomy was the only significant factor contributing to fistula development. This result may be because the relatively higher tension on the suture line makes it more prone to disruption.

TABLE 3. Prior Radiotherapy and Fistula Incidence

Fistula	Prior Radiotherapy (No. of Patients)		Total
	Yes	No	
Yes	3	3	6
No	7	35	42
Total	10	38	48

NOTE. $P = .09$ by Fisher exact test.

TABLE 4. Pharyngectomy With Total Laryngectomy and Fistula Incidence

Fistula	Pharyngectomy With Total Laryngectomy (No. of Patients)		Total
	Yes	No	
Yes	4	2	6
No	9	33	42
Total	13	35	48

NOTE. $P = .04$ by Fisher exact test.

Preoperative radiotherapy has long been considered to be a risk factor in poor healing of tissue in the surgical wound, which theoretically may result subsequently in increased fistula incidence. Many studies in the literature support this thesis.^{6,7,15} Mendelsohn and Bridger¹⁵ reported prior high-dose radiotherapy >5,000 rads as the most significant risk factor for fistula development. In our series 3 of 6 fistulized patients had prior radiotherapy, whereas 3 had not. The statistical analysis of our results revealed that prior radiotherapy was not a significant factor in fistula formation. This result may be due to the relatively small number of our patient population or to the higher number of T1 and T2 patients in the group, which required much less pharyngeal mucosa excision.

We have analyzed tumor stage, another factor implicated in fistula development. Dedo et al⁶ reported a higher incidence of postoperative fistulas (16 to 17) in patients who had T3 or T4 tumors of the pyriform sinus. Contrarily, Lavelle and Maw⁷ reported that the incidences of fistula formation for T1 and T4 tumors did not exhibit any statistically significant difference. All of the patients who developed fistula in our series had T3 or T4 tumors, but this result was not statistically significant.

Histopathologic differentiation was not found to be a contributing factor to fistula formation in our study, a result consistent with that of Kent et al.¹⁶

Proposals that early oral feeding increases fistula formation in total laryngectomy patients are frequently found in the literature.^{5,6,11} Our fistula rate is comparable with those series in which NG tubes were used to

prevent fistula development. This fact led us to conclude that early oral feeding (first postoperative day) was not a contributing factor in this complication. We did not introduce an NG tube or percutaneous gastric tube feeding in any of our cases unless a fistula had developed. We began with small amounts of water on the first postoperative day. Water was our choice because it is relatively free of particle, and if a pharyngocutaneous fistula was present, the leaking material would not irritate the surgical wound. In the absence of any sign of fistula, other clear liquids and then milk were added to the feeding regime on the second and third postoperative days. We started semisolid foods after the hemovac drains were removed, usually on the fourth or fifth postoperative day. The caloric intake during the postoperative period was closely observed by our dietitians and meticulously kept at a daily 2,100 calories for men and 1,850 calories for women. In a few patients for whom alimentation was inadequate we carried out intravenous hyperalimentation for short periods.

It is well known that NG tube placement is not a problem-free mode of postoperative feeding. It may result in several complications, such as pneumothorax, aspiration pneumonia, gastroesophageal reflux, poor cosmetic appearance, and low quality of life.¹⁷ The NG tube has also been demonstrated to play a role as an ascending pathway for intestinal flora to reach the pharynx and cause wound sepsis locally.¹⁸ As has been reported previously, the local trauma on the fresh suture line created by the tube is actually a real cause of local tissue damage that subsequently results in fistula development.¹⁹ In addition, initiation of early oral feeding probably will result in a quicker restoration of the normal swallowing mechanism by promoting the different steps of deglutition.

Another aspect of early oral feeding is higher patient comfort owing to the elimination of psychologic stress and possible complications caused by the nasogastric tube's mechanical irritation. Patients feel more comfortable and confident. Early oral feeding also cuts hospital costs by eliminating use of the special tube-feeding material and reducing the hospitalization period.¹² For example, in our hospital the approximate cost of the en-

teral solution routinely used for nasogastric feeding purposes (Impact enteral solution, Novartis Nutrition GmbH, Germany) is \$ 750 US for 10 days. In our series hospitalization periods varied from 10 days to 34 days with a mean of 13.5 days. These relatively long periods of hospitalization were because most of our patients came from distant rural areas, and our primary goal was to avoid incidents of hospital return in the early postoperative period.

Fradis et al⁴ reported that beginning oral feeding, especially with solid foods, encourages granulation tissue formation along the fistula tract and eventually results in more spontaneous closure of the fistula tract. Consequently, it is plausible that our approach involving the early contact of food particles with the fresh mucosal repair line may also promote the wound-healing process.

In a recent case-controlled study Medina and Khafif²⁰ reported that early initiation of oral feeding (within 48 hours of the operation) was not a contributing factor in fistula formation. In contrast to our study, they excluded pharyngectomy cases and irradiated patients in their series of patients.

In conclusion, our experience indicates that early oral feeding does not contribute to pharyngocutaneous fistula formation after total laryngectomy. The psychosocial and economic benefits of this approach need to be evaluated with further controlled prospective multicenter studies.

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