

Post-laryngectomy pharyngocutaneous fistula – a still unresolved problem

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Abstract

Fifty-six total laryngectomy cases are presented with special reference to post-operative fistula formation. All these patients were operated upon at the Department of Otorhinolaryngology at the Bnai Zion Medical Centre by one surgeon over a 16-year period, from 1976–1992. The incidence of fistula was 12.5 per cent. This paper could not verify reports that any specific factors were significantly related to fistula formation, although there was a preponderance of fistulas in patients presenting with late stage tumours. No relationship was found with rate of infection, age, or between previous neck irradiation (ranging from 5500 to 7000 cGy) and fistula formation in the patient population.

If a fistula occurs, the administration of oral solid food keeping the nasogastric tube in place for administration of fluids may lead to spontaneous closure of the fistula, with no need for secondary surgical repair.

Key words: Laryngectomy, complications; Fistula

Introduction

The most common and troublesome complication in the early post-operative period following a total laryngectomy is that of a pharyngocutaneous fistula (Bresson *et al.*, 1974; Briant, 1975; Kent *et al.*, 1985). The pharyngocutaneous fistula prolongs the hospitalization and several operations may be required in order to close the fistula.

Briant (1975) reported that early removal of the nasogastric tube, the presence or absence of radiotherapy, the association with neck dissection, all played an important role in the aetiology of the fistula. Lavelle and Maw (1972) stressed the importance of the pre-operative haemoglobin level, Dedo *et al.* (1970) the extent of the tumour, Violaris and Bridger (1990) the role of prophylactic antibiotic treatment, and Kent *et al.* (1985) the importance of the operative technique.

In order to understand better the aetiology of pharyngocutaneous fistulas, we reviewed our total laryngectomy-operated patients, in which we tried to reduce the parameters to a minimum in an effort to contribute towards the solving of this problem. Therefore, this report reviews the experience of fistula formation following total laryngectomy performed by the same surgeon (LP), in the Department of Otolaryngology, Head and Neck Surgery at the Bnai Zion Medical Centre, Haifa. Special attention has been given to the percentage of patients developing fistula, their age, sex, tumour staging, infection rate, previous radiation treatment, and concomitant neck dissection.

Materials and methods

A retrospective review was carried out on 56 total

laryngectomized patients operated upon over a 16-year period, from 1976–1992. The data does not include patients who have undergone partial laryngectomies. The occurrence of pre-operative radiotherapy, staging of tumour, post-operative infection, and the performance of a combined radical neck dissection were noted.

All patients were operated upon only by one surgeon (LP) using the same operative technique. Fifty-three of the patients were male, three were female. Their mean age was 62.23 years. All patients were given prophylactic antibiotics using ampicillin 2.0 g up to 1982, and from then on cefapholine 1.5 g given parenterally at eight hours pre-operatively, and continued for a period of seven days post-operatively.

The pre-operative levels of haemoglobin were recorded and those patients with a haemoglobin level of 11.5–13 g per cent were operated upon. If the pre-operative level of haemoglobin was lower, a blood transfusion was administered in order to reach the desired haemoglobin level.

After the operation blood transfusions were administered until the post-operative level of haemoglobin rose to between 11.5–12 g per cent.

Surgical technique

An arcuate incision in the shape of a sideways U was used. A routine total laryngectomy was performed removing the larynx well below the tumour with two tracheal rings, the strap muscles of the affected side and the hyoid bone. The lobe of the thyroid gland on the affected side

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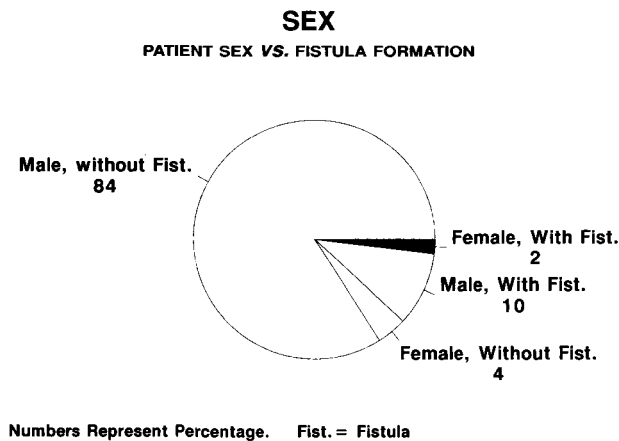


FIG. 1

The relationship of sex as a function of fistula formation.

was also usually removed. As a rule the mucous membrane was sutured with silk (4.0) by interrupted stitches and the pharynx was covered with a second layer of strap muscles from the unaffected side sutured with interrupted stitches of silk (4.0) as well. A nasogastric tube was placed *in situ* during surgery, and removed seven to eight days post-operatively.

The wound was drained by one or two rubber drains and in recent years by use of a vacuum drain (Hemovac). Continuous suction drainage was carried out for 48–72 hours. The drains were left in place for five to seven days.

No fluid or food was passed through the tube for 24 hours. During this time the fluid replacement was done through the intravenous route. Post-operative data relating to wound infection and to the occurrence of fistula were recorded: the day on which the fistula presented itself and its duration was also noted. If a fistula occurred, a fluoroscope examination was performed in order to assess the size of the fistula.

Where a pharyngocutaneous fistula developed, the antibiotics were stopped, the patient began to receive solid food, while fluids were given through the nasogastric tube which was kept in place. If the fistula developed after the nasogastric tube was removed, the tube was reintroduced and the same regimen was applied until the fistula closed spontaneously.

The data was analysed by the chi-square test (with

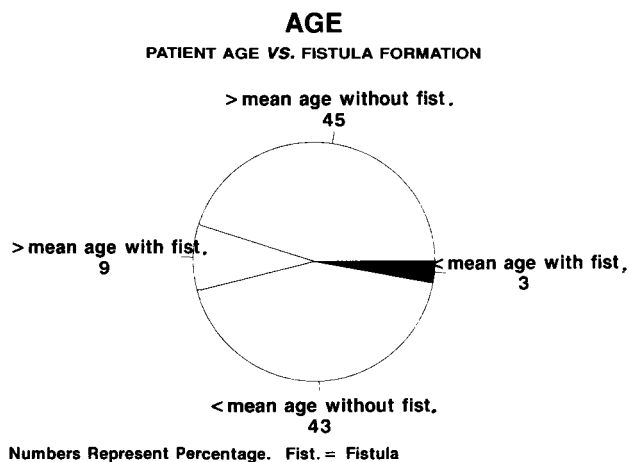


FIG. 2

The relationship of age to fistula formation.

Yates correction), the Fisher exact test and the Student's *t*-test.

Results

Out of the total of 56 patients who underwent total laryngectomy, all except two had a primary laryngeal carcinoma: one patient underwent laryngectomy because of a tumour (carcinoma) invasion to the larynx from the thyroid and the other because of a multifocal well differentiated liposarcoma. Out of the remainder, 10 patients had a well differentiated squamous cell carcinoma, 37 had a moderately differentiated carcinoma, and seven a poorly differentiated squamous cell carcinoma. The tumours were staged according to the UICC classification.

Pre-operative radiation was carried out on 26 of the 56 patients. Seven patients had received 5500 cGy prior to the operation as part of the protocol of treatment for laryngeal tumours (1976–1982). Eighteen patients received 7000 cGy prior to their laryngectomies which were salvage laryngectomies. The remainder of the patients had a laryngectomy as the primary treatment.

Of the 56 patients who underwent a total laryngectomy, nine patients had undergone a laryngectomy with a radical neck dissection. The radical neck dissection was performed for clinically positive nodes. No prophylactic neck dissection was performed. Out of the 56 patients, seven developed fistula (12.5 per cent). Figure 1 shows the relationship of sex as a function of fistula formation. No statistical evidence was found to exist between patient's sex and fistula formation. Figure 2 shows the relationship of age to fistula formation. No statistical evidence was found between fistula formation and patient's age.

Table I shows the relationship between the tumour staging and fistula formation. No statistical significance was found to exist between the tumour stage (TNM) and fistula formation. However, there was a greater incidence of a fistula in patients operated upon for stage IV as compared to stage III (18.7 per cent *versus* 10 per cent). Table II analyses the role of infection as a contributing factor to fistula formation. Of the total patient population, 11 patients (19.64 per cent) had a post-operative course complicated by wound infection. Only two of these 11 patients later developed fistula, whereas there were five patients who developed fistula without wound infection. No statistical significance was found to exist between wound infection and fistula formation (*p* = 0.61).

The relationship between fistula formation and pre-operative radiation is shown in Figure 3. Twenty-six patients received pre-operative radiation: of these three developed a fistula. Of the three irradiated patients who subsequently developed a fistula, two had received 7000

TABLE I
CLINICAL DIAGNOSTIC STAGING

Stage	TNM classification	Patients with fistula		Patients without fistula		Total
		No.	%	No.	%	
III	T ₃ N ₀ M ₀	4	7	31	55	35
	T ₃ N ₁ M ₀	0	0	5	9	5
IV	T ₄ N ₀ M ₀	3	5	9	16	12
	T ₄ N ₁ M ₀	0	0	4	7	4
Total		7		49		56

TABLE II
INFECTION RATE

	Patients without infection		Patients with infection	
	No.	%	No.	%
Fistula	5	9	2	4
No fistula	40	71	9	16

cGy and one 5500 cGy. There is no statistical difference between the patients who developed a fistula and those who did not ($p = 0.84$). Patients were also classified as to the type of operation (laryngectomy alone, laryngectomy combined with neck dissection, laryngectomy with thyroidectomy (see Table III and Figure 4). No significant difference between the type of operation and fistula formation was found.

The average stay in hospital for the patients without pharyngocutaneous fistulas was eight and a half days, whereas the length of hospitalization for patients with a fistula was 25.5 days. The fistulas appeared five to seven days after the operation; all of them were situated above the stroma. All the fistulas closed spontaneously without need for a second surgical intervention.

Discussion

The reported incidence of post-operative fistula varies within wide limits, from 7.4 to 65 per cent (Dedo *et al.*, 1970; Lavelle and Maw, 1972; Bresson *et al.*, 1974; Briant, 1975; Kent *et al.*, 1985; Violaris and Bridger, 1990). An obvious comment on these figures is that each series comprises the patients of many different surgeons, and there may be differences in initial treatment i.e. previous radiotherapy, operative technique, and post-operative management (Kent *et al.*, 1985). The application of variable criteria in the selection of patients for total laryngectomy may also account for the discrepancy in the incidence of fistula in different studies (Dedo *et al.*, 1970; Lavelle and Maw, 1972; Bresson *et al.*, 1974; Briant, 1975; Kent *et al.*, 1985; Violaris and Bridger, 1990). Many factors have been suggested as contributing to the formation of fistula.

Such factors include pre- and post-operative haemoglobin levels, pre-operative tracheostomy, operative technique and pre-operative irradiation. Other possible factors include early removal of the nasogastric tube, onset of oral feeding, tumour staging and infection (Dedo *et al.*, 1970; Lavelle and Maw, 1972; Bresson *et al.*, 1974; Briant, 1975; Kent *et al.*, 1985; UICC, 1987; Johannsen *et al.*, 1988; Violaris and Bridger, 1990; McCombe and Jones, 1993). The marked differences in the reported results interferes with an assessment of the relative importance, notably with regard to the role of radiotherapy on which there is no agreement whatsoever. Some authors find radiotherapy to be an important aetiological factor (Dedo *et al.*, 1970; McCombe and Jones, 1993), while others find the same frequency of fistula in irradiated and non-irradiated patients (Lavelle and Maw, 1972; Bresson *et al.*, 1974; Weingrad and Spiro, 1983). But when reviews combine the patients of different surgeons, their variation in operative technique, and general management, it is difficult to draw meaningful conclusions.

This paper presents the results of 56 patients operated upon by the same surgeon (LP) using a standard technique, and therefore it was felt that some true and accurate conclusions could be drawn as to the causes of fistulas. However, the number of fistulas was small (12.5 per cent), which precludes a statistically significant analysis of the results. Nevertheless, certain conclusions regarding fistula formation in this review are apparent.

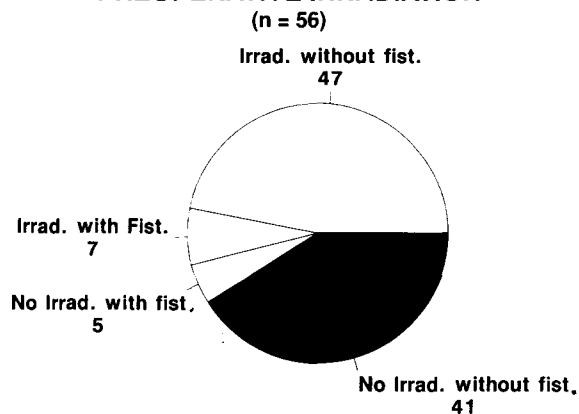
Histological differentiation could not be found to be a factor in the formation of fistula. However, there was a greater incidence of fistula formation in patients operated on for stage IV lesions, when compared to stage III lesions (18.75 per cent *versus* 10 per cent). This could be explained by the fact that late stage tumours require some of the pharyngeal wall to be excised, so leaving less for the pharyngeal repair (Dedo *et al.*, 1970).

The rate of infection could not be shown to be a factor in fistula formation. Of the 11 patients who had a post-operative course complicated by wound infection, two patients later developed fistula. However, from the group of 45 patients not having wound infections, five developed fistula, but the p -value was not statistically significant. No statistical correlation could be found in relation to age or sex. The mean patient age was 62.23 years with a range of 36 to 80 years. No significance was found between age, either below or above the mean, to indicate an increased risk for fistula formation.

There was also no significant statistical difference between laryngectomy alone or laryngectomy combined with more extensive surgery i.e. radical neck dissection. These results coincide with the findings of Bresson *et al.* (1974) and Kent *et al.* (1985).

A nasogastric tube was placed *in situ* at the time of

PREOPERATIVE IRRADIATION



Numbers Represent Percentage. Fist. = Fistula. Irrad. = Irradiation

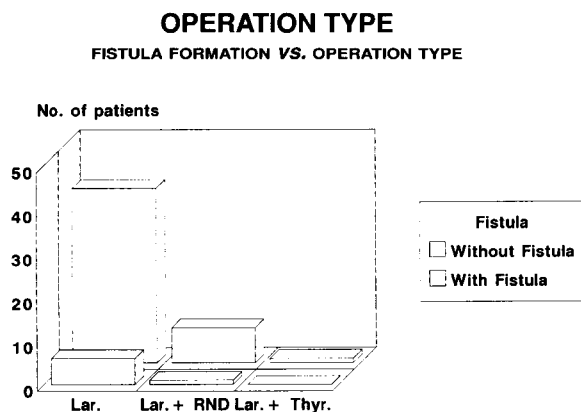
FIG. 3

The relationship between fistula formation and pre-operative radiation.

TABLE III

FISTULA FORMATION AS A FUNCTION OF TYPE OF OPERATION

Type of operation	Patients with fistula		Patients without fistula	
	No.	%	No.	%
Laryngectomy alone	6	11	40	71
Laryngectomy plus radical neck dissection	1	2	8	14
Laryngectomy plus thyroidectomy	0	0	1	2



Lar. = laryngectomy; RND = Radical neck dissection; Thy. = thyroidectomy

FIG. 4

The classification of patients as to the type of operation (laryngectomy alone, laryngectomy combined with neck dissection, laryngectomy with thyroidectomy).

operation in all patients and removed seven days after surgery. If a fistula occurred, the nasogastric tube was left in place, and the antibiotic treatment stopped. The patients were encouraged to eat solid food, whereas fluids were administered through the nasogastric tube. The idea of giving solid food orally to patients with a pharyngocutaneous fistula occurred 20 years ago. A post-laryngectomy patient with a pharyngocutaneous fistula that did not close spontaneously for a period of two weeks was scheduled for an operation to close the fistula surgically. The patient obstinately refused the operation and being in good condition and feeling always hungry, began to steal and eat solid food without our knowledge. After one week the fistula closed spontaneously. Since then we have given solid food to patients with a pharyngocutaneous fistula, with good results.

Following this case we reviewed the literature but did not find any report of giving solid food orally in pharyngocutaneous fistulas after laryngectomy. Recently we reviewed the literature once again, but still did not find any report of solid alimentation in post-laryngectomy pharyngocutaneous fistula. It is our opinion that giving the patient solid food encourages the development of granulation tissue on the fistula tract, and this eventually brings about a spontaneous closure of the fistula. However, we did not perform any pharyngoesophagoscopy in order to confirm our supposition. In none of our cases was a surgical closure of the fistula required, as all of them closed spontaneously.

Conclusions

Our study could not verify reports that any specific factors were significantly related to fistula formation, although there was a preponderance of fistulas in patients presenting with late stage tumours. Previous radiotherapy was not found to be a factor related to fistula formation. It seemed to us that a sound surgical technique, a prophylactic antibiotic therapy, and a high pre- and post-operative haemoglobin level were important ways with which to reduce the complication of fistula formation to a minimum. If a fistula occurs, the administration of oral solid food, while keeping the nasogastric tube in place for administration of fluids, may lead to spontaneous closure of the fistula, with no need for secondary surgical repair.

References

- Bresson, K., Rasmussen, H., Rasmussen, P. A. (1974) Pharyngocutaneous fistulae in totally laryngectomized patients. *Journal of Laryngology and Otology* **88**: 835–842.
- Briant, T.A. R. (1975) Spontaneous pharyngeal fistula and wound infection following laryngectomy. *Laryngoscope* **85**: 829–835.
- Dedo, D. D., Alonso, W. A., Ogura, J. H. (1970) Incidence, predisposing factors and outcome of pharyngocutaneous fistulae complicating head and neck cancer surgery. *Annals of Otology, Rhinology and Laryngology* **84**: 897–903.
- Johannsen, L. V., Overgaard, J., Elbrond, O. (1988) Pharyngocutaneous fistula after laryngectomy. *Cancer* **61**: 673–678.
- Kent, E. S., Liu, K. C., Gupta, A. R. D. (1985) Post-laryngectomy pharyngocutaneous fistulae. *Journal of Laryngology and Otology* **99**: 1005–1008.
- Lavelle, R. J., Maw, A. R. (1972) The aetiology of post-laryngectomy pharyngocutaneous fistulae. *Journal of Laryngology and Otology* **86**: 785–793.
- McCombe, A. W., Jones, A. S. (1993) Radiotherapy and complications of laryngectomy. *Journal of Laryngology and Otology* **107**: 130–132.
- UICC (1987) *TMN classification of malignant tumors*, (Herman, K. P., Sobin, L. H., eds.), Springer-Verlag, Berlin/London.
- Violaris, N., Bridger, M. (1990) Prophylactic antibiotics and post-laryngectomy pharyngocutaneous fistulae. *Journal of Laryngology and Otology* **104**: 225–228.
- Weingrad, D. N., Spiro, R. H. (1983) Complications after laryngectomy. *American Journal of Surgery* **146**: 517–520.

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