Post-Total Laryngectomy Feeding: Nasogastric Tube Feeding versus Early Oral Feeding

Systematic Review of the Evidence
For Partial Fulfillment of Masters Degree
In Otorhinolaryngology

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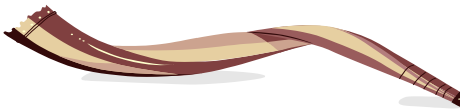

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بسم الله الرحمن الرحيم

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا

إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ

صدق الله العظيم

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List of Abbreviations

DPF	Deltopectoral flap
HBO	Hyper baric oxygen
NGT	Naso-gastric tube
PCF	Pharyngo-cutaneous fistula
PIG	Pharyngeal interposition graft
TEP	Tracheo esophageal puncture
TL	Total laryngectomy

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Introduction

Laryngeal carcinoma is the second most common head and neck cancer after skin cancer and accounts for 3% of total cancer risk ***(Silverberg et al., 1990).***

Optimal treatment of laryngeal carcinoma demands both tumor eradication and preservation of laryngeal function. In early laryngeal carcinoma (T1 and T2 lesions), both partial surgery and radiotherapy have a high degree of success with good functional results ***(Spriano et al., 1997).***

Since the first laryngectomy done by Billroth in 1873, total laryngectomy is still one of the effective modalities in treatment of cancer larynx ***(Maran, 2000).***

Development of pharyngo-cutaneous fistula (PCF) is the most common and troublesome postoperative complication following total laryngectomy. Billroth was the first person to report PCF as a complication ***(Saki et al., 2008).*** It follows total laryngectomy and can occur in the immediate post-operative phase (less than 30 days after surgery) or rarely, later ***(Sarra et al., 2009)***, there are reports regarding delayed fistula up to 42 days postoperative ***(McCombe et al., 1993).***

It creates a communication between the pharynx and cervical skin around the surgical incision or, less frequently, the stoma of the tracheostomy. Pharyngeal contents, usually saliva, flow through the fistula emerging from the cutaneous orifice ***(Sarra et al., 2009)***.

The first clinical sign of salivary fistula is wound erythema with cervical and facial edema. The pain in the

operative wound may be present, but its intensity is low, in general, regarding cervical paresthesia due to surgery. Some patients can present with fever, which will be particularly significant in some cases with purulent secretion through the fistula ***(Mäkitie et al., 2003, Genden et al., 2004).*** Despite the fever in the early postoperative period being frequently attributed to pulmonary injury ***(Friedman et al., 1999)*** reviewing 200 cases that underwent major surgeries of head and neck with the involvement of pharynx suture reconstruction, showed a great correlation between the presence of fever in the first 48 h and the development of pharyngo-cutaneous fistula. With the inflammatory evaluation process, we can observe dehiscence and necrosis of the skin patch and the adjacent soft tissue necrosis ***(Virtaniemi et al., 2001).***

In most cases, the occurrence of the fistula results in prolongation of hospital stay with increased burden on the patient, surgeon, and health care system ***(Eustaquio et al., 2009).***

These facts have an impact on patients' return to work and social life, as well as on the cost to the health system ***(Sarra et al., 2008).***

I. INCIDENCE

The reported incidence of PCF ranges from 7.6% up to 50% ***(Soylu et al., 1998).*** The Incidence of fistula formation was 15.8% (three of 19) for glottic tumors, 26.4% (five of 19) for supraglottic tumors, and 57.8% (11 of 19) for the sum of transglottic and subglottic tumors in the work of Nader Saki ***(Saki et al., 2008),*** **(table 1)** shows other reported incidence.

Table (1): Incidence of pharyngo-cutaneous fistula after total laryngectomy in the literature

Articles	No. of patients	No. of fistulae	%
Papazoglou et al. (1994)	310	28	9
Soylu et al. (1998)	295	37	12.5
Redaeli et al. (1999)	246	40	16
Virtaniemi et al. (2001)	133	20	15
Joseph et al. (2006)	187	37	19.7
Dedivitis et al. (2007)	55	7	12.7
Sharifian et al. (2008)	25	2	8
Saki et al. (2008)	146	19	13

II. PREDISPOSING FACTORS

The predisposing factors classified into: ***(Maran, 2000).***

A. Pre-operative factors

B. Operative factors

C. Post-operative factors

A. PRE-OPERATIVE FACTORS:

I. Patient features.

II. Previous irradiation.

III. Systemic diseases.

IV. Preoperative tracheostomy.

(A.I) PATIENT FEATURES

PCF is more common in males than females. Old age may increase PCF incidence due to poor healing activity and bad general condition of elder patients ***(Dedivitis et al., 2007).***

Table (2): Patient distribution according to demographic, clinical, and treatment characteristic and occurrence of PCF (number of patients 55) quoted from ***(Dedivitis et al., 2007).***

Variables	Category	Pharyngo-cutaneous fistula (%)	
		Yes	No
Sex	Male	7(14.0%)	43(86.0%)
	Female	0 (0.0%)	5(100.0%)
Age (years)	> 60	1(3.6%)	27(96.4%)
	≤ 60	6(22.2%)	21(77.8%)
Tumor site	Glottic	4(13.3%)	26(86.7%)
	Subglottic	0(0.0%)	3(100.0%)
	Supraglottic	2(13.3%)	13(86.7%)
	Piriform sinus	1(14.3%)	6(85.7%)
Tumor stage	T2-	3 (7.7%)	36(92.3%)
	T4	4(25.0%)	12(75.0%)
Neck dissection	No/other types	1(3.7%)	26(96.3%)
	Bilateral radical	6(21.4%)	22(78.6%)
Previous radiation therapy	No	4(9.8%)	37(90.2%)
	Yes	3(21.4%)	11(78.6%)
Previous tracheotomy	No	4(8.0%)	46(92.0%)
	Yes	3(60.0%)	2(40.0%)
Pre operative blood transfusion	No	4(8.7%)	42(91.3%)
	Yes	3(33.3%)	6(66.75)
Closure with stapler	No	6(12.2%)	43(87.8%)
	Yes	1(16.7%)	5(83.35)

(A.II) PREVIOUS IRRADIATION

The use of hyper-fractionated radiotherapy and the development of new linear accelerators have developed many organ preservation protocols. The radiotherapy has been described as a risk factor to develop Pharyngo-cutaneous fistula.

Radiotherapy is well known to produce many side effects. It is stated that the therapeutic ratio between the dose

required curing squamous cancer and the dose at which unacceptable morbidity occurs is small ***(Ferlito, 2000).***

The most commonly seen acute complications of radiotherapy for head and neck cancer are on the skin and mucosa. Skin reaction range from erythema and dry desquamation to moist desquamation and ulceration with necrosis, depending on the type of radiation, energy used, the area treated, doses and fractionation used. When orthovoltage (blow 300 kvp) or electron energy are used, erythema will appear with doses of about 3000 rads in 3 weeks, dry desquamation with slightly higher doses, and moist desquamation with 4500 to5000 rads. With cobalt-60, high energy x-rays (above 4 Mev), neutrons and electrons, subcutaneous fibrosis is frequently observed with doses over 5000 rads. With high doses of irradiation, severe ulceration and necrosis of the skin may be seen ***(Maran, 2000).***

Reaction in the oropharyngeal and laryngeal mucosa are related to damage of the germinal cell layer of the epithelium and to vascular changes. The acute phase of radiation reaction manifests by increased vascular permeability and interstitial edema with associated inflammatory changes. During the first 2-3 weeks erythema of the mucosa is followed by studded mucositis. At this point, the patient begins to complain of a sore throat. After 4000 rads, a patchy fibrinous exudates may be seen, becoming more confluent with doses of over 5000 rads ***(Maran, 2000).***

The mucosa undergoes a series of changes similar to skin when irradiated. First erythema occurs, and then a fibrinous exudate may form. This exudate, at first is not uniform and the

appearance is described as a patchy membranous reaction. Subsequently, it may involve the whole of the treated area and forms a confluent membranous reaction. The mucosal surfaces are also prone to develop Candida ***(Maran, 2000).***

After apparently complete recovery from acute effect has taken place, the stem cell pool of rapidly dividing tissues is often depleted. This means that the tissue in question is prone to subsequent damage by relatively trivial insults. For example, a biopsy of soft tissue in a previously irradiated area can lead to an area of localized necrosis which may not readily heal ***(Maran, 2000).***

The late effects of radiotherapy on skin and mucosa include: cosmetic changes and the disrupted vasculature may lead to problems with wound healing if subsequent surgery is required. This is why it could be only helped by the use of vascularized flap to repair the defects resulting from salvage surgery ***(Maran, 2000).***

The increased incidence of PCF after radiotherapy **(table 2)** can be explained by two main actions of radiotherapy; Firstly, its action on the cells by DNA damage, destruction of stem cells, inhibition of imminent mitosis followed by abnormal mitosis , disruption of the cells and damage to resting cells so that continued proliferation fails. Secondly, hyperemia of the blood vessels due to distention of capillaries that may be thrombosed or ruptured. It may be completely obliterated due to subintimal fibrosis and degeneration of elastic lamina, which lead to endarteritis obliterans and affects the ability of the body for neovascularisation; so, dermis and epidermis supplied by these vessels will show ischemic changes, atrophy and fibrosis.

Ischemia leads to formation of dense bands of collagen in the dermis; also, it increases susceptibility to infection. All these effects lead to delayed wound healing in previously irradiated areas ***(Walter and Israel, 1996).***

The incidence of PCF in non irradiated cases was 9.8% compared to irradiated cases the incidence was 21.4%; so, preoperative irradiation increase PCF incidence about 10% to 12%. This incidence associated with doses lower than 5000 cGy, but with higher doses from 6800 to 7200 cGy, PCF incidence may reach 80% ***(Keith et al., 1993).***

In biological terms, it is not the physical dose alone to the tumour that affects the incidence of PCF, but other factors should be addressed, which are: number of fractions, fraction size, and interval between fractions, overall time, volume treated and radiation quality e.g. photons or neutrons and beam energy. All these parameters in the pre-operative radiation therapy will influence the post-operative development of complications and specifically the development of PCF ***(Maran, 2000).***

(A.III) SYSTEMIC DISEASES

The systemic diseases of the patients like (Anemia, diabetes, liver diseases, cardiac failure, gastro-esophageal reflux disease, nutritional status, preoperative blood transfusion …etc.) are important preoperative predisposing factors for the PCF formation: