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Original article

Negative-pressure wound therapy for the treatment of pharyngocutaneous fistula



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ABSTRACT

Introduction: Pharyngocutaneous fistula is a well-known complication of head and neck cancer surgery. The purpose of this study was to determine the value of negative-pressure wound therapy (NPWT) for the treatment of these fistulas. NPWT is used in many fields of medicine, but its use in otorhinolaryngology has been rarely reported. NPWT is a cost-effective means to accelerate wound healing.

Patients and methods: A single-centre retrospective study was conducted on 7 patients with pharyngocutaneous fistula following surgery for squamous cell carcinoma between January 2011 and April 2013. These fistulas were treated by negative-pressure wound therapy (NPWT).

Results: This series comprised seven male patients with a mean age of 65 years and 9 months. The mean duration of treatment was 23 days (range: 11 to 42 days). Two patients had a history of radiotherapy for pharyngolaryngeal cancer. Negative-pressure wound therapy achieved cure of the fistula in all patients with satisfactory acceptability. Mean follow-up was 10 months (range: 6 months to 2 years).

Conclusion: Negative-pressure wound therapy represents a valuable treatment option in certain settings for the management of pharyngocutaneous fistula following head and neck cancer surgery.

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1. Introduction

Poor wound healing is a common problem in head and neck cancer surgery, generally observed in malnourished patients treated by radiotherapy and/or chemotherapy. The pharyngolaryngeal mucosa and neck tissues present altered trophicity and are submitted to the aggressive action of saliva or even gastro-oesophageal reflux.

Pharyngocutaneous fistula increases morbidity and mortality and prolongs the length of hospital stay. It is frequently located adjacent to the tracheostoma, making tracheostoma care more difficult and sometimes requiring redo surgery. Negative-pressure wound therapy (NPWT) is an alternative treatment option for the management of pharyngocutaneous fistula.

The use of NPWT was first reported by Fleischmann et al. in 1993 [1] and then in 1995 [2]. Many publications have subsequently described the use of NPWT for the treatment of sternal, sacral, upper and lower limb, perineal and abdominal wounds [3]. However, few publications have reported the use of NPWT in head and neck surgery. In 2006, Schuster et al. [4] reported the first successful

use of this therapy on a complex lesion of the face. In the same year, Andrews et al. [5] reported the treatment of complex head and neck injuries and, in 2008, they then demonstrated the value of NPWT for the treatment of pharyngocutaneous fistula in 2 patients with fistula closure in 6 days and 11 days, respectively [6]. In 2005, Rosenthal et al. [7] also used NPWT to treat complications of head and neck cancer surgery in 23 patients, including 4 patients with pharyngocutaneous fistula. The mean duration of treatment was 6.25 days for these 4 patients.

This article describes the use of NPWT to specifically treat pharyngocutaneous fistulas occurring after surgery for pharyngolaryngeal or oral cancer and the results obtained.

2. Patients and methods

A single-centre retrospective study was conducted from January 2011 to April 2013 on patients of the department of otorhinolaryngology and head and neck surgery of our institution with pharyngocutaneous fistula following partial laryngectomy, total laryngectomy transmandibular oropharyngectomy, treated by negative-pressure wound therapy.

Epidemiological data were collected from the patients' medical charts. Pharyngocutaneous fistula was defined as salivary leak in the neck. In doubtful cases, the fistula was demonstrated by

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Table 1
Negative-pressure wound therapy devices and manufacturers.

Name of the medical device	Manufacturers or distributors
ATMOS SO 41	ATMOS Médical, France
Engenex	Boehringer, Phoenix USA
Exsudex	Synergy Healthcare plc, Swindon UK
VAC therapy	KCI, San Antonio USA
RENASYS	Smith & Nephew, London UK
Venturi	Talley, Romsey UK
WOUND assist	HNE Medical, Limonest France

VAC: vacuum-assisted closure.

methylene blue test. No patient was concomitantly treated by hyperbaric oxygen therapy.

The course of wound healing was evaluated at each change of dressing, i.e. every 48 to 72 hours, until complete healing. The dressing was systematically changed by the surgeon or the intern at the patient's bedside. The dressing was maintained until complete healing of the fistula (no discharge visible when changing the dressing and/or negative methylene blue test). Subsequent management consisted of healing by secondary intention.

Several companies currently propose NPWT devices in France: RENASYS, VAC therapy (vacuum-assisted closure) and WOUND ASSIST (Table 1). In this study, we used the Smith and Nephew RENASYS system in continuous mode with negative pressures ranging from -100 to -125 mmHg. This device can be used according to various modes with intermittent or continuous pressure, and pressures ranging from -25 to -200 mmHg. Pharyngocutaneous fistulas require a relatively high pressure to achieve an occlusive seal [7].

Seven patients (7 males with a mean age of 65 years 9 months) with postoperative pharyngocutaneous fistula between January 2011 and April 2013 were included in this study. The following operations had been performed: one total laryngectomy, one total circular pharyngolaryngectomy, two partial laryngectomies, one transmandibular oropharyngectomy and two salvage total laryngectomies. Only these last two patients had a history of external beam radiotherapy for a previous head and neck cancer. Only one patient presented insulin-dependent diabetes.

3. Results

Seven patients were included in this study. The dressing was well-tolerated by all patients, both in the long term and at the time of dressing changes. The mean duration of NPWT was 23 days (range: 11 days to 42 days). All NPWT dressings achieved complete healing of the fistula.

The mean follow-up was 10 months (range: 6 months to 2 years). Early recurrence of a low-output fistula was observed at one week and resolved spontaneously after five days without the use of NPWT.

Patient 1, 77 years old, was treated by total laryngectomy and bilateral neck dissection for stage T3N2aM0 squamous cell carcinoma of the larynx. He developed pneumonia with deterioration of his general condition on postoperative day 3, requiring admission to the intensive care unit for 5 days.

On day 15, a salivary leak was observed in the neck, adjacent to the tracheostoma. Surgery was not proposed in view of the patient's poor general state and it was decided to treat the fistula by NPWT. Seven days after starting NPWT, it was difficult to obtain an airtight dressing due to the proximity of the tracheostoma and skin folds. Tulle gras dressing was then aspirated into the leaking zones to ensure an airtight dressing (Fig. 1). The fistula had closed after 18 days of NPWT. Healing by secondary intention with alginate packing was continued for 7 days until complete skin healing was



Fig. 1. Tulle gras placed in skin folds.

obtained. Two-year follow-up confirmed the absence of recurrence of the fistula.

Patient 2, 72 years old, a smoker and heavy drinker, was operated by transmandibular oropharyngectomy with ipsilateral functional neck dissection for stage T3N2bM0 squamous cell carcinoma of the right oropharynx. Early wound dehiscence and salivary leak were observed on postoperative day 6. The patient was reoperated for debridement and closure by a right pectoralis major myocutaneous flap.

On day 7, the patient developed cervical cellulitis that was treated medically, leading to the formation of another pharyngocutaneous fistula.

NPWT was installed on postoperative day 12 for 18 days. On day 26, air leaks related to the conformation of the wound and the proximity of the tracheostoma were also observed. This problem was resolved by the use of tulle gras dressing.

The fistula was closed on day 30 and NPWT was stopped. Complete healing was obtained on day 40. Clinical follow-up at 10 months did not reveal any signs of recurrence of the fistula.

Patient 3, 57 years old, an insulin-dependent diabetic with a history of squamous cell carcinoma of the larynx treated by radiotherapy (65 Gy) ten years previously, presented with a stage T3N0M0 carcinoma of the larynx. Salvage total laryngectomy was proposed. The initial course was satisfactory, with no healing problems despite difficulties controlling his diabetes.

On day 30, the patient suddenly developed an infectious complication with a neck abscess responsible for wound dehiscence and right pharyngocutaneous fistula directly adjacent to the tracheostoma. Attempted direct closure by mucosal suture under general anaesthesia was unsuccessful. A left pectoralis major myocutaneous flap was performed on day 39 and it was decided to install NPWT intraoperatively in view of the poor condition of the tissues. NPWT was designed to direct the fistula away from the tracheostoma in order to simplify subsequent dressing changes. Despite these precautions, low left cervical wound dehiscence was observed 3 days later. A second NPWT dressing was inserted on day 42 after the first operation. Closure of the two fistulas was obtained after 21 and 24 days of NPWT, respectively. Dressings were continued by alginate packing for 7 days after stopping NPWT, until complete healing. One-year follow-up demonstrated complete healing and absence of recurrence.

Patient 4, 65 years old, had a history of stage T2N0M0 squamous cell carcinoma of the larynx treated by external beam radiotherapy at a dose of 65 Gy three years previously (refusal of surgery). He presented with a stage T4N2M0 local recurrence requiring salvage

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