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Head and Neck Oncology

A videofluoroscopic study comparing severe swallowing disorders in patients treated surgically or with radiation for oropharyngeal cancer

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Abstract. The aim of this study was to analyze the causal mechanisms of severe swallowing disorders after the treatment of oropharyngeal cancer. Twenty-six patients with severe swallowing disorders at ≥ 12 months after treatment for oropharyngeal cancer were analyzed retrospectively using videofluoroscopy. Fourteen patients (54%) had been treated with surgery (\pm postoperative radiotherapy), while 12 patients (46%) had been treated with (chemo)radiotherapy. Videofluoroscopy analysis showed a localized alteration in the surgical excision area resulting in impaired tongue root retraction in the surgical group ($P = 0.012$), while general impairment of the pharyngeal, laryngeal, and upper oesophagus sphincter was found in the non-surgical group. Aspirations in the surgical group most often occurred after swallowing, while in the non-surgical group, they occurred during and after swallowing ($P = 0.039$). This analysis by videofluoroscopy provides important insights into the mechanisms giving rise to swallowing disorders after the treatment of oropharyngeal cancer.

Key words: deglutition; deglutition disorders; quality of life; oropharynx; head and neck cancer.

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The preservation of function strongly conditions post-therapy quality of life and is one of the current challenges in the treatment of oropharyngeal cancer.^{1,2} Along with cancers of the oral cavity and hypopharynx, cancers of the oropharynx are

those that have the greatest impact on deglutition,³ significantly impairing patient quality of life, including social aspects, when oral feeding is partially or completely replaced by enteral nutrition. Furthermore, respiratory complications

can also occur and the prognosis for survival may be endangered due to aspirations or denutrition.^{4,5}

Current treatment modalities, whether surgical or non-surgical, allow equivalent cancer control, thus explaining the lack of

consensus regarding therapeutic indications. Since the 1980s, non-surgical treatment (radiotherapy or chemoradiotherapy) has been preferred to surgery because of its ability to spare the anatomy while ensuring a comparable rate of loco-regional control.^{6,7} However, it has now been proven that this anatomical preservation does not signify functional preservation.⁸ In turn, surgical techniques have improved markedly since the advent of reconstruction techniques using free micro-anastomosed flaps.⁹ Hence, it is difficult nowadays to claim that one therapeutic modality is superior to another in terms of preservation of function.

The purpose of this study was to analyze and clarify the causal mechanisms of severe swallowing disorders after the treatment of oropharyngeal cancer, by comparing a group treated with surgery and a group treated with radiotherapy or chemoradiotherapy. The swallow study was conducted by videofluoroscopy, which is the reference method for studying deglutition disorders of the oropharyngeal time, because it can reveal anomalies (stasis and aspiration) and their physiopathological mechanisms (lack of pharyngeal propulsion, failure of airway closure, failure to open the upper oesophageal sphincter (UOS)).¹⁰

Materials and methods

Patients

Twenty-six patients treated for squamous cell carcinoma of the oropharynx between 2000 and 2012 with a clinically severe swallowing disorder at ≥ 12 months after the end of their cancer treatment, and who had undergone a videofluoroscopic swallow examination, were included in this retrospective study. Fourteen patients had undergone surgery, either alone ($n = 1$), or followed by radiotherapy ($n = 2$) or chemoradiotherapy ($n = 11$). Twelve patients had received medical treatment with radiotherapy alone ($n = 4$) or chemoradiotherapy ($n = 8$).

A severe swallowing disorder was defined as severe dysphagia or aphagia requiring mainly or exclusively enteral nutrition, or contraindications to oral feeding because of major aspiration. The reason for consultation, the presence of malnutrition (defined as a body mass index $< 18 \text{ kg/m}^2$), carrying a gastrostomy tube, and the presence of pneumonia secondary to aspiration were analyzed. Patient (age, gender), cancer (TNM stage, date of diagnosis, subsite in the oropharynx), and treatment data were collected. These are summarized in Table 1.

Group 1 comprised the patients who had undergone surgical treatment ($n = 14$).

The American Joint Committee on Cancer (AJCC) tumour stages in this group were 20% stage I–II and 80% stage III–IV. Thirteen of the 14 patients received adjuvant radiotherapy alone ($n = 2$) or chemoradiotherapy ($n = 11$).

Group 2 comprised the patients who had undergone non-surgical treatment ($n = 12$). The AJCC tumour stages were 10% stage I–II and 90% stage III–IV. Treatment was radiotherapy alone for four patients (33%) and concurrent chemoradiotherapy for eight patients (67%).

Therapeutic protocols

Patients in the surgical group all underwent surgical resection such as trans-mandibular oropharyngectomy with neck dissection. Ten patients (71%) had undergone reconstruction, five with a pectoralis major muscle flap, three with an ante-brachial fasciocutaneous free flap, and two with a free vascularized bone graft.

Conformal radiotherapy was performed using a thermoformed mask made during the computed tomography (CT) scan simulation. The target volumes were contoured, allowing the achievement of three-dimensional dosimetry within the coverage constraints of these volumes and the dose constraints of the organs at risk. The dose was delivered by high-energy photons (6 MV) using a linear accelerator. The dose was 70 Gy in 35 fractions over the macroscopic tumour volume, 66 Gy in 33 fractions over the microscopic volumes, and 50 Gy in 25 fractions over the areas to be treated prophylactically. Patients were followed up by a radiation therapist once a week during treatment to detect side effects and were followed up regularly after treatment. During exclusively medical treatment, radiation was potentiated with cisplatin and 5-fluorouracil (5-FU) days 1, 22 and 43. Postoperatively, the concomitant chemotherapy to radiotherapy consisted of infusions of cisplatin 100 mg/m^2 at weeks 1, 4, and 7 of radiotherapy.

Analysis of videofluoroscopic records

All patients underwent examination by videofluoroscopy or assessment and management of their swallowing disorder. First, a flexible fibre-optic examination was performed systematically to eliminate neoplastic recurrence as the cause of the swallowing disorder. It was also used to explore the presence of pharyngo-laryngeal mucosal oedema, the amount and appearance of saliva, and the mobility and sensitivity of the pharynx, the soft

Table 1. Characteristics of the two study groups.

	Group 1: Surgical treatment	Group 2: Non-surgical treatment
Number	14	12
Sex, <i>n</i> (%)		
Male	12 (86%)	12 (100%)
Female	2 (14%)	0
Age, years, mean (range)	61 (33–80)	62 (45–73)
Follow-up, months, mean (range)	28 (12–132)	62 (12–192)
AJCC stage		
I	1	0
II	2	1
III	3	3
IV	8	8
Tumour subsite		
Tonsillar fossa	6 (43%)	8 (67%)
Lingual junction area	5 (36%)	2 (17%)
Root of the tongue	2 (14%)	1 (8%)
Vallecula	1 (7%)	1 (8%)
Reconstruction		
MCPMF	5	
FCFF	2	
FVBT	3	
Non-surgical treatment		
Radiotherapy	2	4
Chemoradiotherapy	11	8

AJCC, American Joint Committee on Cancer; MCPMF, musculo-cutaneous pectoralis major flap; FCFF, fasciocutaneous free flap; FVBT, free vascularized bone transfer.

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