

TITLE: Fat injection under local anaesthesia in the treatment of chronic post-surgical dysphagia: a case report

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## **Abstract**

**Background:** in this study we describe the first application of functional fat injection (FFI) performed under local anaesthesia in the treatment of chronic dysphagia secondary to head and neck cancer (HNC) surgery.

**Methods:** FFI was performed in a sitting position using a transcervical approach. At the same time, a trans-nasal flexible endoscopic examination was performed in order to control the depth and site of fat injection. The effect of surgery was evaluated using videofluoroscopy (VFS), Fiberoendoscopic Evaluation of Swallowing (FEES), and Eating Assessment Tool-10 (EAT-10).

**Results:** before the FFI the VFS and FEES revealed a moderate impairment of swallowing abilities with aspiration with liquid and semisolid textures. The EAT-10 scored 29. Twelve months after surgery the VFS demonstrated mild dysphagia, the FEES demonstrated aspiration only with liquids and the EAT-10 improved.

**Conclusions:** FFI under local anaesthesia could be useful in the treatment of chronic dysphagia in selected patients.

Key words: dysphagia, head and neck cancer, surgery, fat injection, local anaesthesia

## **TEXT**

### **Introduction**

Dysphagia is frequently encountered in patients with advanced head and neck cancer (HNC) and it might be related to the damage of the anatomical structures by the primary tumor itself or by its treatment [1]. Even if swallowing rehabilitation is considered the first choice in the treatment of dysphagia in HNC patients [2], when swallowing rehabilitation doesn't provide a positive effect, long-term and even lifelong feeding tube dependency is sometimes unavoidable [1].

In order to overcome this problem, some authors recently proposed a new treatment for dysphagia following surgery and/or chemoradiotherapy through polydimethylsiloxane or fat injections [2, 3]. In particular, Kraaijenga et al [3] reported their experience with lipofilling of the tongue base in the treatment of six HNC patients with chronic dysphagia secondary to surgery and/or chemoradiotherapy. Navach et al [4], reported satisfactory swallowing results after lipofilling of the tongue base in a patient treated with radiation therapy for a nasopharyngeal carcinoma and consequent severe post-radiation dysphagia. In this case report we present the first application of fat injection performed under local anaesthesia in the treatment of chronic dysphagia secondary to supracricoid laryngectomy. The underlying hypothesis is that local anaesthesia, by providing a "functional" display of the operative field (since the patient is awake and able to swallow), allows to monitor the effect of surgery on swallowing in real-time.

## **Case report**

The patient underwent horizontal supracricoid laryngectomy with crico-hyoidopexy in August 2015 (OPHL Type IIb [5]) for a T3N0M0 glottic laryngeal squamous cell carcinoma. At the time of the surgery he was 53 years old. Adjuvant radiotherapy was provided after the surgery and the subsequent oncologic follow-up was clinically and radiologically negative. After the surgery, even if the patient underwent behavioural swallowing therapy for several months, he developed pneumonia three times and experienced a weight loss of more than 15% (13 kg). He presented to our institution in January 2017 complaining chronic dysphagia. Videofluoroscopic (VFS) examination revealed moderate dysphagia with aspiration with different consistencies caused by ineffective airway protection (Dysphagia Outcome and Severity Scale [8], DOSS = 3) (see Figure 1). Fiberoendoscopic Evaluation of Swallowing (FEES) demonstrated a normal mobility of the arytenoids and an important tissue loss at the level of the vocal process of the left arytenoid (see Figure 2a). Volumes of 5 and 10 ml of solid, semisolid and liquid textures were tested. Constant intra-swallowing penetration and aspiration were demonstrated with liquid and semisolid textures (Penetration Aspiration Score [7], PAS = 6) (see Figure 2b), while no signs of aspiration were demonstrated for the solid texture.

Behavioural swallowing therapy was provided again, twice a week, for 3 months. but no substantial improvement in swallowing abilities were demonstrated on FEES examinations (performed monthly), although patient motivation and adherence to therapy were high.

The patient was offered a functional fat injection (FFI) under local anesthesia in order to improve his swallowing function. The aim of FFI was to correct the tissue loss by filling the region corresponding to the vocal process of the left arytenoid in order to prevent intra-swallowing aspiration. The procedure was performed in an operating room under local anesthesia on a day hospital basis. This study was carried out according to the Declaration of Helsinki and was previously approved by Institutional Review Board of our hospital. The patient gave his written informed consent. The surgeons clearly explained the whole procedure to the patient, whose active collaboration was necessary.

### *Surgical procedure*

In the first phase of the surgical procedure the liposuction in the sub-cutis of the peri-umbilical region was performed. Lipoaspirate concentration was achieved through centrifugation for 3 minutes at 3000 rpm per minute as described by Coleman [10]. The concentrated fat was placed in 1 mL syringes connected to 20 gauge with blunt tip cannula. Once this task was completed, the patient was put in a semi-seated position, the skin and subcutaneous tissues overlying the thyrohyoid notch were anesthetized with 1% lidocaine hydrochloride, and the flexible endoscope

was inserted trans-nasally in order to guide the FFI from an internal point of view. FFI was performed using a transcervical–thyrohyoid approach [11] with a centralized injection. Small aliquots of fat were transferred with multiple passes at different depths in order to obtain augmentation of the region corresponding to the vocal process of the left arytenoid. A total volume of 4 cc was injected. The flexible endoscope point of view was used to control the depth and site of injection since the injection cannula was maintained under the mucosa and maneuvered in order to reach the chosen areas to be augmented (see the asterisk in Figure 2a). In order to evaluate the effect of FFI on swallowing function, a FEES was performed intra-operatively using liquid and semisolid textures with volumes of 5 and 10 ml. Trace aspiration was detected only for liquids textures (PAS = 6 for liquids and PAS = 1 for semisolids) and residue was minimal.

### *Patient evaluation*

The patient was evaluated after 1, 6, and 12 months from the surgical procedure through VFS (after 1 and 6 months) and FEES (after 1, 6 and 12 months). During each of the post-operative medical examination information regarding the perceived swallowing disorder were collected using the Italian version of the Eating Assessment Tool-10 (I-EAT-10) [12]. The scores of the latter range from 0-40, with higher scores indicating more swallowing problems.

### *Results*

The patient well tolerated the surgical procedure and he did not complain any discomfort or pain during the procedure. No complications during or after the surgical procedure were reported (such as oedema in the neck or haemorrhage at the injection site or in the nose).

Before the surgery the VFS demonstrated moderate dysphagia (DOSS = 3) and also the FEES examination revealed an impairment of swallowing abilities (PAS = 6 for liquid and semisolid textures). The I-EAT-10 score before surgery was 29, suggesting perception of a severe swallowing impairment.

After 1 month, the VFS demonstrated mild dysphagia with trace aspiration of thin liquids only but with strong reflexive cough to clear completely (DOSS = 5) (see Figure 3). The FEES examination demonstrated aspiration only with liquids (PAS = 6) but not with semisolids and solids, (PAS = 1 for semisolids and PAS = 1 for solids) (see Figure 4). The I-EAT-10 improved up to 6. These results were stable also after 6 and 12 months. During the 12 months post-surgery a 8-kg increase in body weight was recorded and no pulmonary complications were reported.

## **Discussion**

In this study, we report the first application of FFI performed under local anaesthesia in the treatment of chronic dysphagia secondary to HNC surgery. The results here reported appear promising since the patient well tolerated the surgical procedure and no complications were reported. This datum could be related to the use of autologous fat. The latter causes less inflammation in the injection site because is less likely to cause an allergic reaction or local granulomatosis [13]. In addition, it might also assure the tissue regeneration which is related to the presence of stem cell included in the centrifuged autologous fat [14].

In addition, FFI seems to provide good results both in the short- and in the long-term period. Both the VFS and FEES examinations demonstrated a positive evolution of dysphagia, and the results obtained in the I-EAT-10 suggested a positive evolution of swallowing disorder perception after the surgery. The swallowing improvement might be related to the correction of the tissue loss provided by the fat injection in the region of the vocal process of the left arytenoid. By filling the defect, in fact, we facilitated the lateral slipping of the food, thus improving the airways protection.

In this study FFI was performed under local anaesthesia. In all the previous studies analysing the efficacy of fat injection in the treatment of oropharyngeal dysfunction following treatment for HNC, the surgical procedures were performed under general anaesthesia [2-4]. In our opinion, local anaesthesia might assure some important advantages, such as the “functional” display of the operative field since the patient is awake and able to swallow. In addition, the use of flexible trans-nasal endoscopy during FFI allows a fat injection tailored to the patient’s needs since it allows to monitor the effect of surgery on swallowing in real-time.

### **Conclusions:**

In conclusion, the FFI under local anaesthesia could be useful in the treatment of chronic dysphagia in selected patients with tissue loss secondary to HNC surgery.

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## TITLES OF FIGURES

Figure 1: Pre-operative videofluoroscopic (VFS) examination revealed moderate dysphagia (DOSS = 3) with aspiration due to tissue loss secondary to surgery.

Figure 2: Pre-operative Functional Endoscopic Evaluation of Swallowing (FEES). a) an important tissue loss at the level of the vocal process of the left arytenoid is visible; b) aspiration with semisolid texture is visible. \* = selected area for functional fat injection (FFI). Arrow = suspected mechanism causing aspiration. The arrow highlights the abnormal path of the bolus that passes into the airways.

Figure 3: Post-operative (after 6 months) videofluoroscopic (VFS) examination revealed mild dysphagia (DOSS = 5) without aspiration of semiliquids and solids.

Figure 4: Post-operative (after 12 months) results as seen during Functional Endoscopic Evaluation of Swallowing (FEES). The functional fat injection (FFI) minimized the existing defect at the level of the vocal process of the left arytenoid that was the cause of aspiration of the liquid and semisolid boluses, the additional volume improved airway protection.