

CASE SERIES AND REPORTS

A new lateral cervical approach for salvage total laryngo-pharyngectomy

Un nuovo approccio latero-cervicale per la faringo-laringectomia totale di recupero

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SUMMARY

Total laryngectomy with subtotal pharyngectomy is the standard treatment of persistent/recurrent laryngeal and/or pharyngeal cancer. Salvage surgery can be complicated by pharyngo-cutaneous fistula because of previous treatment. The aim of this paper was to verify the feasibility of salvage total laryngectomy with subtotal pharyngectomy with a minimally invasive technique through a lateral cervical approach using the same skin incision used for resection of primary, synchronous neck dissection and pharyngeal flap reconstruction. This approach allowed harvesting of the anterior-myocutaneous flap including skin, subcutaneous tissue, platysma, anterior jugular veins, sterno- and homohyoid muscle in order to preserve as much tissue not involved by the tumour as possible. This technique is feasible and safe; further studies should confirm its advantages in terms of reduction of complications.

KEY WORDS: Salvage total laryngectomy • Recurrent laryngeal cancer • Larynx • Cancer • Cervical approach

RIASSUNTO

La laringectomia totale con faringectomia subtotale rappresenta il trattamento di scelta per le persistenze/recidive dei tumori maligni laringei e/o faringei. La chirurgia di recupero può essere complicata da una fistola faringo-cutanea correlata ai precedenti trattamenti chemio-radioterapici. L'obiettivo di questo studio è stato quello di verificare la fattibilità della faringo-laringectomia di recupero mediante una tecnica mini-invasiva attraverso un approccio cervicale laterale utilizzando la stessa incisione cutanea per la resezione del tumore, lo svuotamento linfonodale del collo e la ricostruzione faringea. Questo approccio ha consentito l'allestimento di un lembo mio-cutaneo anteriore costituito da cute, tessuto sottocutaneo, platysma, vene giugulari anteriori, muscolo sterno- e omoioideo al fine di preservare il tessuto non interessato dalla neoplasia. Questa tecnica è fattibile e sicura; ulteriori studi potranno confermare i vantaggi in termini di riduzione di fistola faringo-cutanea.

PAROLE CHIAVE: Laringectomia totale di salvataggio • Carcinoma laringeo recidivato • Laringe • Cancro • Approccio laterale

Introduction

NCCN guidelines recommend total laryngectomy (TL) as the first option for patients with loss of physiological voice and T4-laryngeal cancer involving the skeleton, while an organ preservation protocol using concurrent chemo-radiotherapy is preferred for T3-laryngeal and hypopharyngeal cancers. TL is the only choice in case of persistent or recurrent cancer of the larynx and/or pharynx. Salvage surgery is technically more difficult than upfront surgery and is associated with a higher number of complications such as haematoma, oedema, suture dehiscence, subcutaneous abscess and tissue necrosis with consequent pharyngo-cutaneous fistula. A second surgical procedure for closing the pharyngo-cutaneous fistula may be necessary if wound

dressing and spontaneous healing are not adequate. Surgical pearls and suggestions have been proposed for preventing fistulas; nonetheless, pedicle or free flaps harvesting from non-irradiated areas is one of the most used techniques. Some authors have recently proposed endoscopic or transoral robotic-assisted TL, with the goal of sparing as much healthy tissue as possible compared to an external approach¹⁻³. In fact, dedicated equipment and extensive expertise are required in these minimally invasive techniques. Furthermore, patients with laryngeal recurrences are at high risk of nodal metastasis, and neck dissections are therefore recommended⁴. However, considering these minimally invasive techniques, neck dissections should be staged as a second surgical procedure after complete healing of pharyngeal tissues. In the early 20th century, lat-

eral pharyngotomy was described for limited resection of pharyngeal carcinomas⁵, but this approach has never been proposed for advanced pharyngeal/laryngeal carcinomas with nodal metastasis.

The aim of this paper was to verify the feasibility of salvage total laryngectomy with subtotal pharyngectomy (SPTL) using a lateral cervical approach through the same skin incision for synchronous neck dissection and pharyngeal flap reconstruction.

Materials and methods

Surgical technique

The patient was placed in the head extension position. Surgical procedure was performed under general anaesthesia, with orotracheal intubation. A naso-gastric feeding tube (NGFT) was inserted. A monolateral 8-cm neck incision was made at the level of the anterior border of the sterno-cleido-mastoid muscle. An anterior myo-cutaneous (AMC) flap including skin, subcutaneous tissue, platysma, anterior jugular veins and sterno- and homohyoid muscle was harvested to create a space between these two muscles and the sterno-thyroid and thyro-hyoid muscles (Fig. 1).

The second step involved performing an ipsilateral selective neck dissection (II-IV) through the same incision. Next, the thyroid isthmus was divided and the thyro-hyoid muscles were cranially separated from the inferior border of the hyoid bone (Fig. 2). The pre-epiglottic space was also dissected. On the contralateral side of the incision, the superior laryngeal pedicle was ligated and sectioned, the inferior constrictor muscle was incised at the level of the lateral margin of thyroid cartilage and the pyriform sinus was detached from the internal thyroid cartilage with blunt dissection to free the larynx on the side that did not involve the neoplasia. All these surgical steps were done through a single unilateral skin incision.



Fig. 1. Pictures of the lateral skin incision along the anterior margin of the sterno-cleido-mastoid muscle in lateral view.

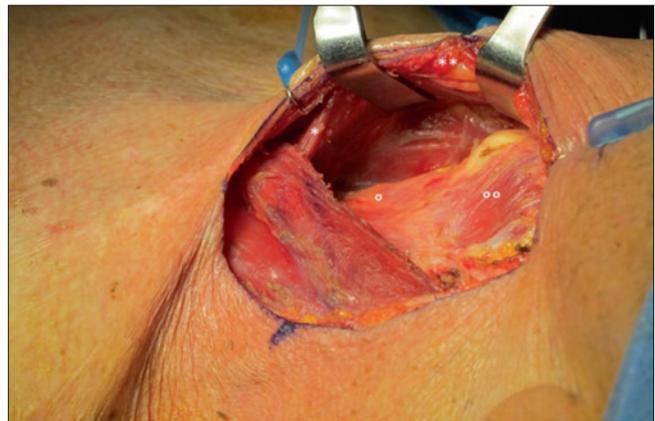


Fig. 2. Anterior myo-cutaneous (AMC) flap is harvested between the sterno- and homo-hyoid muscles and the sterno-thyroid and the thyro-hyoid muscles.

*white**:* sterno-hyoid muscle; *white*:* homo-hyoid muscle; *white°:* thyro-hyoid muscle; *white°°:* sterno-thyroid muscle.

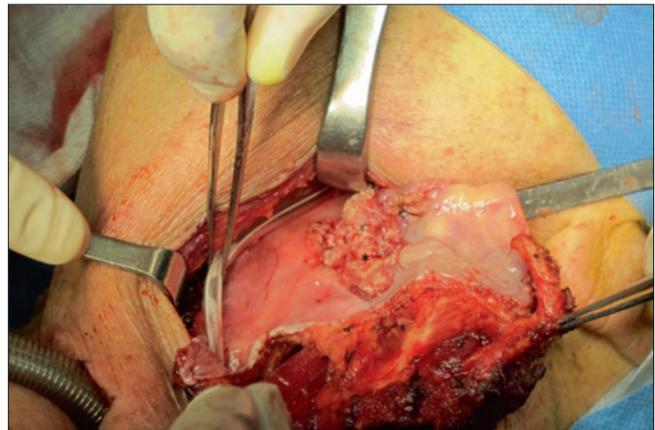


Fig. 3. The lesion involving the left pyriform sinus in vivo. *black*:* tumour of the left pyriform sinus.

The pharynx was opened through the vallecula and en-bloc resection was performed under direct vision. The surgical removal of the specimen extended from the posterior wall of the hypopharynx to the lower pole of the tonsillar fossa, including the omolateral thyroid lobe (Fig. 3). A second oval horizontal incision with a 3-cm diameter was made in the jugular area to perform a definitive tracheostoma and the respiratory tube was removed from the larynx while a new one was passed into the tracheostoma. Direct closure of the pharynx was not possible due to the small amount of residual pharyngeal mucosa (2-cm in width); as a result, a myocutaneous pectoralis major pedicle flap was used to close the defect and reconstruct the neo-hypopharynx (Fig. 4). A by-pass salivary stent was placed in which the NGFT was positioned. The pectoralis flap was sutured to the remnant mucosa using the lateral cervical incision without any limitations of visualisation during flap

insetting. Closure was completed once repositioning of the myocutaneous flap over the pectoralis flap took place.

Results

Case report

A 71-year old man, smoker, affected with squamous cell carcinoma of the hypopharynx involving the piriform sinus and the posterior wall, extending to the hemilarynx and the tonsillar fossa, staged cT3N1-G2, was treated with concurrent chemo-radiotherapy (total dose of 70 Gy + CDDP 30 mg/weekly for 6 weeks). The patient developed a loco-regional recurrence, stage yrT3N0 cancer after 1 year of initial treatment. MRI showed a recurrent lesion involving the same primary subsites (Fig. 5).

Biopsies confirmed recurrence, and salvage SPTL using a lateral approach was planned. Neck dissection, tumour resection and pharyngeal reconstruction with pectoralis major pedicle flap were performed as previously described. The total time of surgery was 185 minutes.

The postoperative period was uneventful and the cervical and thoracic drains were removed within 3 days. Oral intake of liquids started 2 weeks after surgery. The hospitalisation time was 20 days and the salivary stent was removed after 40 days in an outpatient setting.

The final pathology report showed ypT3N1 hypopharyngeal tumour with free margins.

No local complications or comorbidities were observed. The patient did not refer symptoms related to pharyngeal stenosis after stent removal.



Fig. 4. The myocutaneous pectoralis major pedicle flap is rotated into the neck over the residual pharyngeal mucosa.
*white**: pectoralis major flap.

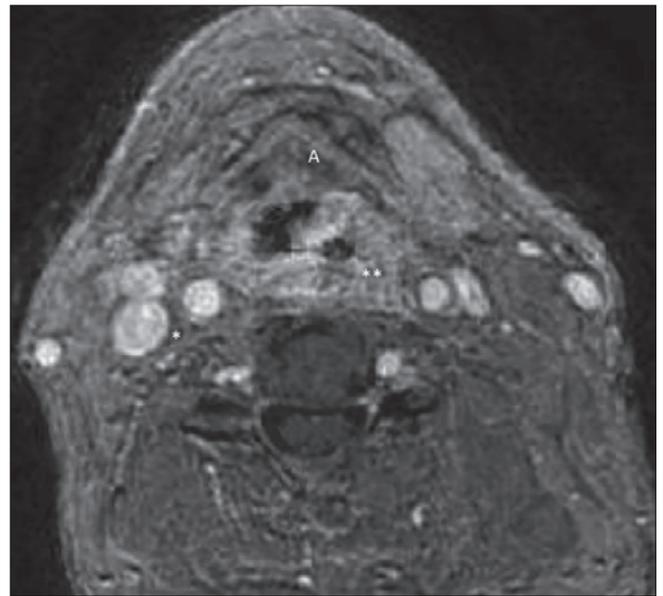


Fig. 5. Axial T1-weighted MRI with contrast after chemo-radiation treatment, showing the hypopharyngeal recurrence.
*white***: recurrence of tumour.

Discussion

Salivary fistulas may consequently occur in patients undergoing salvage surgery of laryngo-hypopharyngeal cancer after chemoradiotherapy. Radiotherapy and chemotherapy target cancer cells but, in spite of modern techniques, surrounding healthy tissue is irradiated as well. Tissue damaged by radiation must undergo repair. During the repair process, injured tissue may be replaced by normal functioning tissue. On the other hand, tissue repair mechanisms may cause replacement of normal tissue with fibrotic tissue. Tissues become noncompliant, contracted and atrophic resulting in altered function and significant symptom burden. Surgery represents a further insult that previously irradiated tissue may not sustain. After chemoradiotherapy, there is a time window (usually from 4-6 weeks after the end of treatment until 4-5 months of follow up) during which salvage surgery may be undertaken at limited or no extra morbidity. Afterwards, hypoxic and avascular irradiated normal tissues may not be able to further repair surgical damage. This aspect gives rise to complications such as suture dehiscence and subsequent fistulas.

Classic SPTL using a transcervical approach requires a wide exposure to stage the neck dissection. The common skin flap is a superior base “apron shaped” flap including the skin, the subcutaneous fat and platysma muscle which are detached from the cervical fascia. The anterior jugular veins as well as the strap muscles are resected and the hyoid

bone to which the larynx and suprahyoid muscles are attached causing the sacrifice of healthy tissues and ischaemia. Tissue trauma and the sequelae of the chemo-radiotherapy increase the risk of post-operative complications; therefore, some authors have proposed the interposition of a flap between the pharynx and the skin flap to prevent pharyngo-cutaneous fistula⁴. Furthermore, the extension of the resection involving the hypopharynx and simultaneous neck dissection increases the risks of complications. Lawson¹ using the Da Vinci system and Fernández-Fernández² adopting an ultrasonic device demonstrated the feasibility of the transoral salvage laryngectomy with sparing healthy tissue around the larynx. More recently, Funk confirmed in biological models the possibility of performing a transoral laryngectomy even with the Medrobotics flex system³. Lawson stated that one limitation in using the transoral technique is that the extension of the neoplasia limited to the laryngeal box. Furthermore, these transoral procedures need dedicated technologies, the ability to perform a single transoral pharyngeal suture and a second surgical step represented by therapeutic or elective neck dissection, mostly bilateral, when healing is completed.

The surgical technique of salvage SPTL with a lateral cervical approach presented herein represents one of the most challenging situations because of tumour extension in the hemilarynx, pyriform sinus and posterior hypopharyngeal wall. At the end of the resection, a myo-cutaneous pectoralis major pedicle flap was harvested to complete the circumference of the digestive tube because the pharyngeal mucosa was not sufficient for direct closure. In spite of this, all surgical steps (neck dissection, laryngopharyngeal resection and reconstruction) were performed through a single 8-cm cervical lateral incision. The AMC flap has the advantage of sparing healthy tissue not involved by the tumour. The preservation of the hyoid bone and its muscle insertions contributes to respecting tissue for covering the suture line. Another advantage could be represented by a better lateral cosmetic profile of the neck avoiding the posterior retraction of the classic TL.

This surgical procedure seems to be indicated in the laryn-

geal and hypopharyngeal tumours without anterior spread outside the external perichondrium and/or invasion of the hyoid bone or its inserted muscles, both as upfront and/or salvage surgery.

Conclusions

Salvage SPTL through a lateral cervical approach after chemo-radiotherapy failure is feasible. The key point of this technique is represented by harvesting of an AMC flap that spares healthy tissue in comparison to the classic technique. Neck dissection, tumour resection and reconstruction can all be performed through the same incision. Further studies are needed to confirm its advantages in terms of reduction of pharyngo-cutaneous fistulas compared to other techniques.

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Conflict of interest statement

None declared.

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