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Free flap reconstruction after surgical release of oral submucous fibrosis: Long-term maintenance and its clinical implications

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Summary *Background and aim:* Oral submucous fibrosis (OSF) is an insidious disease with progressive limitation of mouth opening and potential malignant change of the oral mucosa. Cancer surveillance is of utmost importance, but it is often limited by severe trismus. Surgical release and free flap reconstruction is effective but its long-term efficacy has not been completely established. This work aims to review our experience in the past 15 years in surgical release of OSF-related trismus followed by free flap reconstruction.
Methods: Patient's age, gender, smoking history, drinking history and betel-nut consumption history were retrieved. Surgical release and reconstructive procedures were detailed. Interincisor distances (IIDs) were measured preoperatively (PO-IID), intra-operatively after maximal release (IO-IID) and during the last follow-up (FU-IID). Subsequent development of oral cancers (oral squamous cell carcinoma, OSCC) and relevant details were documented. Potential predictors of long-term IID gain were analysed.
Results: A total of 92 patients were included in our study. There was a significant difference ($p = 0.000$) in PO-IID (13.8 ± 6.6 mm) and FU-IID (27.2 ± 8.8 mm) indicating the long-term efficacy of the release procedure. The mean long-term IID gain was 13.0 ± 7.5 mm. Bilateral coronoidectomy resulted in a greater degree of intra-operative gain in IID ($p = 0.025$). PO-IID ($r = -0.277$, $p = 0.001$) and intra-operative gain in IID ($r = 0.198$, $p = 0.001$) were found

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to be predictive of long-term IID gain. Ten patients (11%) developed OSCC during our study period.

Conclusions: Aggressive surgical release (with bilateral coronoidectomy if necessary) followed by free flap reconstruction is an effective treatment for OSF-related trismus. Our study has confirmed its long-term efficacy and its important role in cancer surveillance.

Background

First reported by Schwartz in 1952[1] and detailed by Pindborg et al., in 1966,[2] oral submucous fibrosis (OSF) is an insidious disease primarily affecting the oral mucosal and submucosal tissues. Clinically, fibrotic bands primarily affect the buccal mucosa. As the disease progresses, the surrounding tissues will gradually stiffen. Trismus invariably occurs and the process itself is progressive and irreversible.[2]

Khanna and Andrade developed a classification system for OSF[3]: Group I – Early disease with an inter-incisor distance (IID) > 35 mm; Group II – IID of 26–35 mm; Group III – IID of 15–26 mm with presence of intraoral fibrotic bands; Group IVA –Severe trismus with IID <15 mm and extensive fibrosis; and Group IVB – Advanced disease with premalignant and malignant changes throughout the mucosa.

Severe trismus often leads to significant compromise in quality of life due to its adverse effect on chewing, swallowing, articulation and oral hygiene. However, perhaps the most serious consequence of trismus in OSF is its limitation regarding proper cancer surveillance, especially in Group IV patients. OSF is a known premalignant condition. The 10-year risk of malignant change was quoted to be in the range of 1.9–7.6%.[4–7] Inadequate exposure of the intraoral cavity can compromise cancer surveillance and potentially delay appropriate management.

Various non-surgical regimens have been attempted to reduce trismus with generally disappointing results.[8,9] Simple surgical division of fibrous bands was ineffective in the treatment of scar contracture.[4] Extensive surgical release with coronoidectomy and masticatory muscle myotomy has been shown to be effective.[10]

Reconstruction of the resultant defects proved to be challenging. Use of skin grafts, fresh human amnion[11] and buccal fat pads[11] invariably yields poor results due to scar contracture. Intraoral local flaps are exposed to the same field change caused by betel-nut use and they can cause functional disturbance. Extraoral locoregional flaps are limited in the depth they can reach.

We believed that free skin flap transfer provides the optimal reconstruction for this type of defect.[12,13] In the past decades, our choice of donor sites has evolved as our experience has grown. However, irrespective of the site, all donor sites share the same advantages: minimal scar contracture, unaffected by the betel-nut-related field change, not affecting tongue/tongue base function, ability to cover large defects, ability to cover deep defects and acceptable (often minimal) donor-site morbidities.

Data on long-term maintenance of surgical release results are of utmost importance, but most studies in the current literature were limited by their small sample size (often <50 cases) and short follow-up period. The small sample size also limited the study regarding potential predictors of long-term release results.

This study aimed to review our experience in the past 15 years in surgical release of OSF-related trismus followed by free flap reconstruction. We report our long-term results of surgical release and investigate the results for potential predictors.

Methods

A computer-based and manual search was performed to identify all patients who had been treated at the Department of Plastic Surgery, Chang Gung Memorial Hospital, from January 1998 to December 2012 with histologically proven submucous fibrosis. All patients were referred to us for management of severe trismus. Only patients who received surgical release were included. Individual case notes were searched to retrieve clinical details. Cases were included only if data on long-term surgical release outcome were available.

Patients were excluded if they had a history of head and neck malignancy prior to release. They would also be excluded if the final pathological results of submucous release resection specimens indicated malignancy. All patients were routinely followed up with regular intraoral examination for cancer surveillance.

Data regarding patient's age, gender, smoking, drinking and betel-nut consumption history were retrieved. Surgical release and reconstructive procedures were detailed. Inter-incisor distances (IIDs) were measured preoperatively (PO-IID), intra-operatively after maximal release and mouth opening by passive force with the aid of Doyen's mouth gag (IO-IID) and during the last follow-up (FU-IID). Intra-operative IID gain (IO-gain), long-term IID gain (LT-gain) and postoperative loss (PO-loss) were calculated according to the following formulae:

$$\mathrm{IO-gain} = \mathrm{IO-IID} - \mathrm{PO-IID}$$

$$\mathrm{LT-gain} = \mathrm{FU-IID} - \mathrm{PO-IID}$$

$$\mathrm{PO-loss} = \mathrm{IO-IID} - \mathrm{FU-IID}$$

Subsequent development of intraoral squamous cell carcinoma (OSCC) and relevant details were documented.