



## Reconstruction design before tumour resection: A new concept of through-and-through cheek defect reconstruction



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### ABSTRACT

**Objective:** To explore a new method of reconstruction of through-and-through cheek defects and to evaluate this method's efficacy and patient prognosis.

**Materials and methods:** This retrospective study included 70 patients who underwent reconstruction of through-and-through cheek defects. The surgical approach, design of facial skin incisions, selection and design of flaps, postoperative quality of life and prognosis of patients were recorded and reported.

**Results:** Postoperative quality of life gradually increased over time, and the mean scores of University of Washington Quality of Life (UW-QOL) Questionnaire was more than 80 at 1-year postoperatively. The appearance, oral competence, chewing, swallowing, speech and other oral functions were well recovered in about 90% of patients at 1-year postoperatively.

**Conclusion:** This new idea of reconstruction before tumour resection, brings the effect of plastic and reconstructive surgery to a new height.

### Introduction

Oral cancer is one of the most common cancers in the world and accounts for nearly 3% of all cancers [1–4]. Because of the high prevalence of betel quid chewing and smoking, the incidence of buccal squamous cell carcinoma (BSCC), together with other cancers of the oral cavity, has been increasing in China and other regions and countries of Asia [5]. Surgery is still the most important treatment modality [5–8]. Due to the anatomic complexity of the oral commissure and cheek, the result of tumour excision in this area is a great challenge to plastic surgeons. It is especially challenging for reconstruction of through-and-through cheek defects after tumour resection of BSCC, which requires three-dimensional restoration of the missing tissue. The cosmetic effect needs to be considered, and both cheek skin and oral mucosal need to be reconstructed simultaneously. Furthermore, the excision of the oral commissure complicates the reconstruction [9]. Many methods of cheek defect reconstruction have been reported [10–12], but the reconstruction of through- and -through cheek defects after tumour excision is rarely reported [8,13]. Previous studies focused, for example, on how to choose the flap, how flaps form and how to improve the success of free flaps transplantation [14]. If we want to

get satisfactory results of through-and-through cheek defect reconstruction, the current reconstruction concept and method are not enough. With the buccal carcinoma operation being updated, through-and-through cheek defect reconstruction also needs to be updated.

In the past decade, we tried many methods of through-and-through cheek defect reconstruction. Our clinical experience indicates the design of through-and-through cheek defect reconstruction should be considered before tumour resection [8,13,15]. Facial skin should be cut off according to the aesthetic zones of the cheek. Tumour resection reference to unit resection buccal surgery (URBS) [5]. URBS is the latest concept of buccal carcinoma resection. It permits a more thorough removal of tumour cells to achieve the goal of radical treatment. The aim of this study was to develop a new concept of through-and-through cheek defect reconstruction. Here we report our experience with 70 patients who underwent meticulous reconstruction of through-and-through cheek defects with chimeric flaps pedicled with the lateral circumflex femoral artery (LCFA) from January 2011 through December 2014. This research may be helpful in the management of through-and-through cheek defect reconstruction.

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## Materials and methods

### Study design and setting

We designed and implemented a clinical observational study and a retrospective study to achieve the study's objectives. All patients in this study underwent through- and-through cheek defect reconstruction with chimeric flaps pedicled with the LCFA from January 2011 through December 2014 at Second Xiangya Hospital of Central South University (Changsha, China). The hospital's ethics committee approved the study, and all participants signed an informed-consent agreement. The present study followed the guidelines set forth by the Declaration of Helsinki.

The inclusion criteria included: 1) patients had to have been diagnosed with BSCC by pathologic examination before radical surgery; 2) patients had not received surgical treatment, radiotherapy, chemotherapy or other treatment before surgery; and 3) patients had through-and-through cheek defects. Patients were excluded from this study if they had distant metastases or other conditions that prevented them from tolerating surgery.

### Surgical technique

Tumour resections and postoperative defect reconstructions were performed by a single surgeon (Wu HJ). Resection of the tumour reference to URBS [5]. The skin incisions were designed according to the facial aesthetic zones and were consistent with the nasolabial fold, mentolabial sulcus and inferior border of mandibular body (Fig. 1). The transverse incision of neck dissection was also shifted upwards to the inferior border of the mandibular body and overlapped with the tumour removal incision. For large and complex defects, a template of the defect was prepared before the resection of facial skin to guide raising flaps and repairing defects (Fig. 2). All the flaps for reconstruction in this study were the chimeric flaps pedicled with the LCFA (Fig. 3). Vascular anastomosis methods in this study were traditional anastomosis (end-to-end or end-to-side) [16], or Ren anastomosis [14,17]. All the vascular anastomoses were performed under a microscope. The separated flaps were used to reconstruct the defects of the mucosa and facial skin. The vermilion flaps were harvested to reconstruct the oral commissure and vermilion defects (Fig. 4). Muscle tissue and fat flaps were used to fill the dead spaces and cover the titanium plates or cervical great vessels, if necessary. In all patients, mouth-opening exercises and buccal shape remodelling gymnastics (supplementary) were practiced postoperatively. The study's primary outcome was to test the function and aesthetic effect of this new method of through-and-through cheek defect reconstruction; the secondary outcomes were to verify the effect of chimeric ALT and ALT flaps for through-and-through cheek defect reconstruction and the safety of Ren anastomosis.

The basic information for all 70 patients, including the defect sites, flap size and pedicles, recipient vessels, donor and recipient complications and postoperative quality of life was recorded and assessed. Postoperative follow-up examinations were performed for 59 patients, and the follow-up period varied from 4 to 64 months.

### Statistical analysis

Statistical analysis was performed with SPSS 13.0 (SPSS, Inc., Chicago, IL, USA). Independent Student's *t*-tests were used to test differences in mouth opening and postoperative scores of University of Washington Quality of Life (UW-QOL) Questionnaire version 4 between groups. Statistical significance was defined as a *p*-value less than or equal to 0.05.

## Results

The patient cohort in our study included 70 patients: 46 males and 24 females, with an average age of 56.3 years (range 25–72).

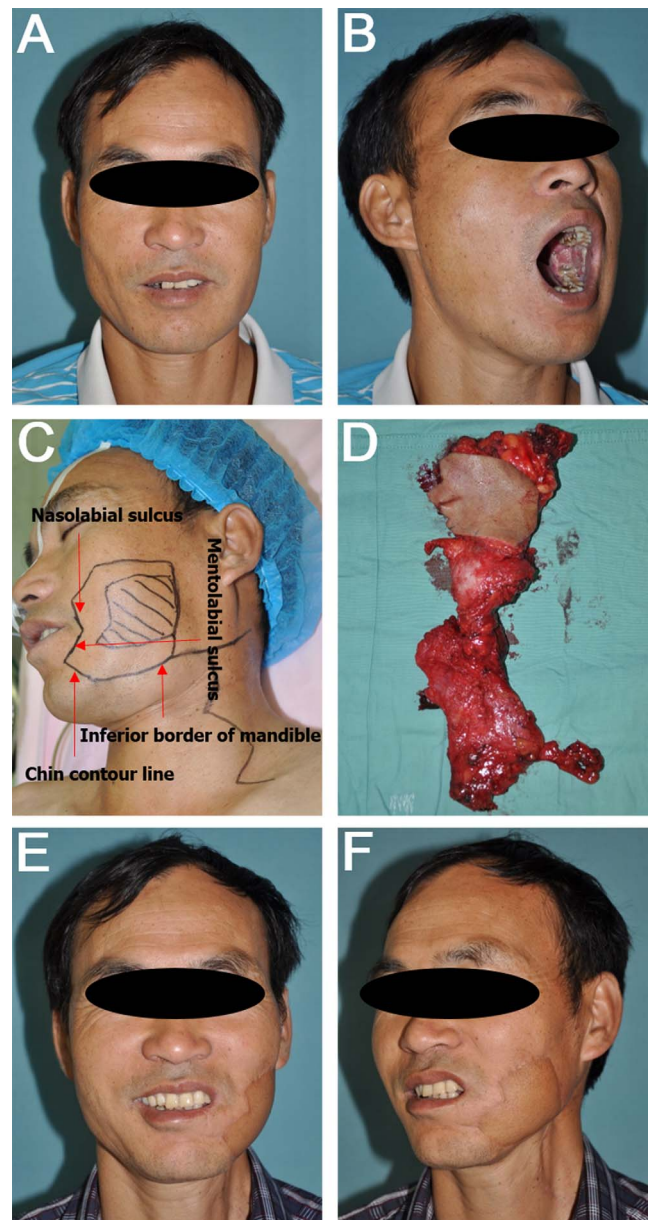


Fig. 1. Typical cases of through-and-through cheek defect reconstruction. (A) Patients with preoperative photos; (B) tumours located in the left posterior buccal mucosa; (C) skin incisions were designed according to the facial aesthetic zones and consistent with the nasolabial fold, mentolabial sulcus and inferior border of mandibular body; (D) tumour and neck lymph node specimens; (E and F) 8 months after tumour resection.

Characteristics of enrolled patients are shown in Table 1. Of the 70 through-and-through cheek defects, 54 were reconstructed with chimeric ALT and ALT flaps, and 16 were reconstructed with chimeric ALT and AMT flaps. All the flaps survived. The vermilion flaps were harvested to reconstruct the oral commissure and vermilion defects in 26 cases.

Resection of the tumour referenced to URBS [5]. All pathologic margins were negative. Four patients underwent postoperative radiotherapy, and two patients underwent postoperative chemoradiation.

Fifty-nine cases were followed for 4–64 months, and questionnaires, oral evaluation and other methods were used to assess patients' quality of life and obtain information about their appearance and oral functions. Postoperative quality of life gradually increased over time, and the mean scores of UW-QOL Questionnaire was more than 80 in 11 of the 12 items at 1-month postoperatively (Table 2, Fig. 5). Some patients were not satisfied with the colour difference between free flaps and

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