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Reconstruction of Complete Bilateral Maxillary Defects With Free Flaps

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Abstract: Reconstruction of complete bilateral maxillary defects (CBMDs) can be challenging due to the extensive loss of bone and soft tissues. This is a retrospective case series of 46 consecutive patients with CBMDs that were reconstructed with different micro-vascular free flaps. The authors aimed to evaluate the surgical outcomes and discuss the different reconstruction options in this case series. Thirty-six patients underwent reconstruction following ablation surgery for malignant tumors, 6 for benign tumors, 3 patients were treated for osteomyelitis, and 1 patient underwent free flap reconstruction for posttraumatic defects. Free fibula flap (n = 26) is the most commonly used reconstruction method in this case series, which was used in all defect types. This is followed by anterolateral thigh flap (n = 10), 5 rectus abdominis myocutaneous free flap, 3 radial forearm free flaps, and 2 composite free flaps. In this series, 44 free flaps survived, whereas only 2 flaps were lost. All patients could resume a soft diet postoperatively. Reconstruction of CBMDs with vascularized free flaps is a safe and reliable procedure.

Key Words: Complete bilateral maxillary defect, free flap, maxillary reconstruction

Extensive maxillary defects result from tumor resection and trauma often lead to significant facial disfigurement and functional deficits. Reconstruction of a complete bilateral maxillary defect (CMBD) with loss of entire maxillary alveolus and hard palate is technically challenging. Maxillary reconstruction with vascularized free flaps can inarguably achieve satisfactory out- comes[1–3]; however, thus far, the reported cases mainly included either unilateral maxillary defect or small bilateral defect. The purpose of this study was to evaluate the reconstruction outcomes of CBMDs with vascularized free flaps, and to discuss the relationship between the defect area and flap selection.

MATERIALS AND METHODS

We retrospectively analyzed 46 consecutive patients with CBMD who underwent reconstruction using microvascular free flaps at Peking University School of Stomatology from January 1999 to May 2021. The clinical and surgical details were collected from medical records. Detailed data including diet, speech, dental rehabilitation, and functional outcomes were obtained via outpatient review visits and telephone follow-up. The follow-up periods ranged from 1 to 97 months (mean 34 months).

Based on the Brown maxillary defect classification,[4] the CBMD was defined as a horizontal dimension c with any class in the vertical dimension.

This study received ethical approval from the Institutional Review Board of Peking University School and Hospital of Stomatology and was conducted according to the tenets of the Declaration of Helsinki, with the approval number PKUSSIRB-201949126.

RESULTS

The study included 29 men and 17 women aged from 16 to 77 years (median age: 50.2 years). All patients underwent preoperative aesthetic assessment to evaluate fitness for surgery. In this study, all patients had no history of radiotherapy to head and neck region and overall oncologic prognosis was positive. Thirty-six patients were diagnosed with malignant tumors, whereas 6 were diagnosed with benign tumors. One patient sustained posttraumatic defects and 3 patients were diagnosed with osteomyelitis. The most common type of malignant tumor

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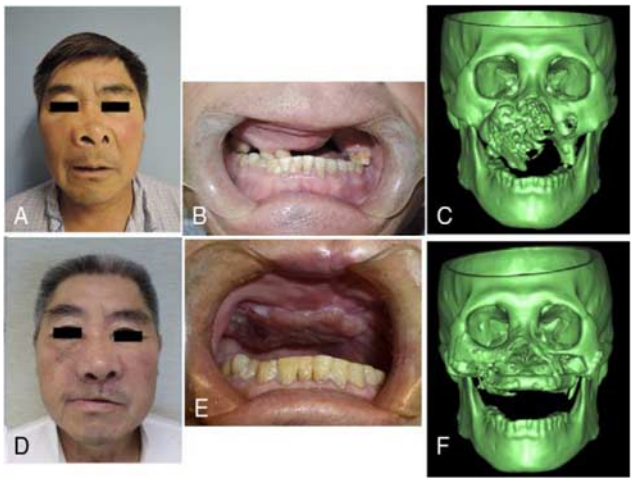

FIGURE 1. (A) Preoperative frontal view. (B) Preoperative intraoral view. (C) Preoperative computed tomography scan showing the extent of tumor. (D) Postoperative frontal view. (E) Postoperative intraoral view. (F) Postoperative three- dimensional computed tomographic scan.

was squamous cell carcinoma (14 patients, 30.4%), followed by adenoid cystic carcinoma, (8 patients, 17.4%), melanoma (7 patients, 15.2%). The benign tumors were ameloblastoma in 2 patients, ossifying fibroma in 2, and fibroma and odontogenic myxofibroma in 1 each.

Forty patients underwent primary reconstruction and 6 patients underwent secondary reconstruction. A total of 48 free flaps were performed including 44 cases of single flap and 2 cases of double flaps. The single flaps included 26 free fibula flaps, ten anterolateral thigh flaps, 5 rectus abdominis myocutaneous flaps, and 3 radial forearm free flaps. One of the double flaps was a combination of free fibula flap with radial forearm free flap, in which the radial forearm free flap was used to replace the unreliable skin paddle of the fibula. The other double flap comprised of 2 radial forearm free flaps for reconstruction of the hard palate and nasal floor, respectively. Figures 1 and 2 showed a patient with ameloblastoma who underwent bilateral maxillectomy and reconstruction with free fibula flap.

Adverse events were observed in 6 cases, in which 1 anterolateral thigh flap and 1 free fibula flap were lost due to venous congestion and replacement with a second free flap was required. One patient acquired surgical site infection on the recipient site, which resolved following incision and drainage and irrigation. One of the patients who received rectus abdominis myocutaneous flap developed abdominal wall hernia and recovered after using abdominal binder. Two patients who received free fibula flap required skin graft to cover the donor sites. One of them developed wound infection and sustained skin graft necrosis at the donor site, which was subsequently managed with surgical debridement and vacuum dressings. Primary closure can be achieved in all donor sites of the anterolateral thigh flaps and the rectus abdominis myocutaneous flaps.

Based on the different types of vertical defect as described in Brown maxillary defect classification, the maxillary defects were further classified into: Brown class II+I, 1 case (2.2%); class II +II, 27 cases (58.7%); class III+II, 16 cases (234.8%); and class III+III, 2 cases (4.3%). The distribution of free flaps depending on the classification of the defects was tabulated in Supplementary Digital Content, Table 1, http://links.lww.com/SCS/D593. The fibula flap was the most frequently used flap regardless of any classifications.

Follow-Up

Upon discharge from hospital, all 46 patients could resume an oral diet. Out of the 46 patients, 12 died due to primary diseases, 7 were lost to follow-up, and 27 were alive and tumor-free. Speech intelligibility was assessed in all surviving 27 patients (18 fibula flaps and 9 soft tissue flaps) through subjective assessment by the patients' family members. Five patients opted for implant-supported dental restoration. Overall aesthetic outcome was evaluated using 4-point scale (excellent, good, fair, and poor), in which 24 patients were satisfied with the cosmetic outcomes. Only 3 patients were dissatisfied with the overall facial aesthetics (poor). Among the 27 patients, 11 (40.7%) patients scored "excellent." In 18 patients who scored "excellent" and "good" using the 4-point scale, 14 patients received osseous flaps, 14 (77.8%), whereas 4 patients underwent reconstruction with soft tissue flaps.

DISCUSSION

Successful reconstruction of CBMDs following tumor ablation or trauma remains a demanding challenge due to the extensive loss of the midface framework and maxillary alveolus. Although it is difficult to maintain a patent nasal passage and to achieve adequate oronasal or oroantral separation, high level maxillectomy in some cases further complicates the reconstruction with osseous flaps. Reestablishing the nasal support and reconstruction of maxillary alveolus can be complicated due to the posterior position of anterior nasal spine following tumor ablation.[5] Furthermore, adequate reconstruction is crucial to restore the support to globe in cases with orbital involvement to prevent orbital complications.

In this study, we presented a large series of 46 patients with CBMDs, who underwent vascularized free flaps reconstruction and demonstrated acceptable reliability, functional and aesthetic outcomes. Other free flap options including radial forearm osteocutaneous "sandwich" free flap,[6] lateral-arm osteocutaneous free flap,[7] and deep circumflex iliac artery free flap[8] had been used in reconstruction of CBMDs with satisfactory results.

Free fibula flap was shown to have better reconstruction outcomes as fibula bone could provide stable bony support for the facial framework, as opposed to soft tissue free flap reconstruction, where significant soft tissue shrinkage is observed postoperatively. Additionally, reconstruction with fibula flap allows ideal rehabilitation with dental implants. In this study, free fibula flap was the only free flap used in all types of defect, its versatility in reconstruction of CBMDs was also reported in other studies.[5,9]

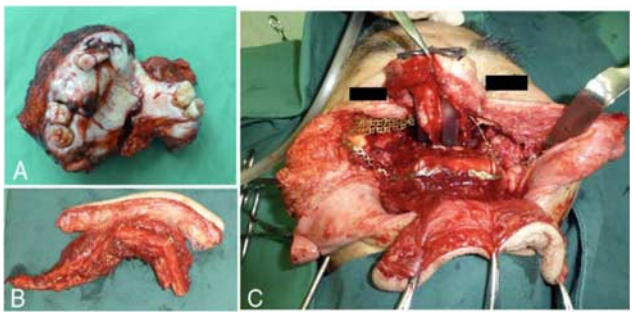

FIGURE 2. (A) Resected specimen. (B) Fibula osteomyocutaneous flap. (C) Intraoperative view of the maxillary reconstruction. reconstruction is crucial to restore the support to globe in cases with orbital involvement to prevent orbital complications.

In cases with advanced malignant diseases, reconstruction with soft tissue free flap is preferred as it aims to provide adequate oronasal and oroantral separation, which allow acceptable deglutition and speech functions. In contrast, osseous flap reconstruction is relatively more complex and time consuming and dental implants rehabilitation can be costly for patients.

Although radial forearm free flap can offer good oronasal or oroantral separation, it is insufficient to provide structural support to the midface due to the limited soft tissue volume. In this study, all 3 radial forearm flaps and 1 double radial forearm flap were chosen for reconstruction of Brown class II+II defects. However, in larger Brown II+II and III+II defects, rectus abdominis flap or anterolateral thigh flap is preferred, as it can offer sufficient soft tissue bulk for obliteration of the defects. Donor site morbidity of anterolateral thigh flap is typically less than that of rectus abdominis free flap, as there is no risk of abdominal hernia.[10] In this case series, the rectus abdominis free flaps were only used before year 2002, after which the anterolateral thigh flap became the first choice for soft tissue reconstruction if large soft tissue volume is required.

No single flap is sufficient to reconstruct all cases of CBMD. The extension of the defect is the key determining factor in selection of types of free flap, however, other factors such as patient's age, comorbidities, motivation, financial conditions, and other biological features of the primary diseases are also of great significance and must be taken into consideration.

CONCLUSIONS

Reconstruction of CBMD remains challenging clinically. Reconstruction of this extensive defect with free flaps is safe and reliable. Free flap selection is generally dependent on the extent of the defects; however, other factors should be taken into consideration. The free fibula flap and anterolateral thigh flap are the most common free flaps for head and neck reconstruction. Reconstruction of CBMD with fibula flap could achieve satisfactory results because it can provide stable bony structural support.

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Unrecognized Fracture of a Silicone Implant During Closed Rhinoplasty

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Abstract: Rhinoplasty via a closed approach is rarely performed due to provide limited exposure and inadequate operative field. Nevertheless, there are some cases in which closed approach is performed using L-shaped silicone implants. The authors recently encountered an interesting complication in a 33-year-old woman who had previously undergone rhinoplasty via a closed approach and who sought revision rhinoplasty at our institution. The authors accidently found a fractured silicone implant on lateral nasal x-ray. She had no nasal trauma history since previous rhinoplasty. The authors assumed that the silicone implant can be fractured as 1 of complications during the rhinoplasty via a closed approach.

Key Words: Case report, complication, fracture, rhinoplasty, silicone

Compared to Caucasians, Asian patients frequently undergo augmentation rhinoplasty with alloplastic materials such as silicone.[1] Although silicone implants are appropriate materials for augmentation rhinoplasty and provide long-lasting results and low complication rates, various complications, such as infection, displacement, protrusion, and scar contracture, have been reported following augmentation rhinoplasty with silicone implants.[2] Recently, we encountered an interesting complication involving a silicone implant: a fracture of the silicone material that occurred during rhinoplasty via a closed approach. We identified this finding through preoperative x-ray imaging.

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