

Oral rehabilitation following fasciocutaneous free-flap reconstruction: A retrospective study

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Abstract

Aim: The aim of this study is to retrospectively, observe a consecutive series of patients with segmental mandibulectomy defects reconstructed with fasciocutaneous free flaps and mandibular resection prostheses, and to review treatment concepts for the management of such patients.

Settings and Design: Observational study done at Memorial Sloan Kettering Cancer Center, New York, NY, USA.

Materials and Methods: Records were reviewed of all patients who had fasciocutaneous free-flap reconstruction and fabrication of mandibular resection prostheses following segmental mandibulectomy between 2000 and 2017 at a tertiary cancer center. Mandibular resection prosthesis fabrication interval data, as well as follow-up interval data, were recorded.

Statistical Analysis Used: Descriptive statistics.

Results: Twenty-one consecutive patients had mandibular resection prostheses fabricated following segmental mandibulectomy and fasciocutaneous free-flap reconstruction during the study. The median time for mandibular resection prosthesis delivery following surgery was 9 months (range 4–41 months). There was a median of two-follow-up visits (range 0–4) within the first 90 days of mandibular resection prosthesis delivery.

Conclusions: Oral rehabilitation with mandibular resection prosthesis following segmental mandibulectomy and fasciocutaneous free-flap reconstruction is an attainable treatment goal for the oncologic patient. Reviewing the proposed course of care is helpful for patient management.

Keywords: Fasciocutaneous free flap, mandibular prosthesis, mandibular reconstruction, oral rehabilitation, segmental mandibulectomy, soft-tissue free flap


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INTRODUCTION

The surgical defects of the mandible can result in modification of facial contour, facial symmetry, as well as debilitation to speech, mastication, and deglutition.^[1,2]

These postoperative esthetic and functional limitations can greatly impact patient quality of life.^[3-5] Thus, the treatment of such defects often includes surgical reconstruction and oral rehabilitation with intra-oral prosthetics. The surgical reconstruction is done utilizing regional flaps, free flaps,

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or a combination of both depending on the patient and surgeon factors. Influencing factors may include the extent of the primary disease, peripheral diseases, cost of treatment, and patient preference.^[6,7] Osteocutaneous free flaps are commonly utilized for mandibular reconstruction as they can be shaped into the portion of the mandible that has been resected and present adequate osseous volume for the placement of dental implants. These free flaps have shown long-term stability and are considered the “workhorse” for mandibular reconstruction.^[5] However, in patients contraindicated for osteocutaneous free flaps such as patients with renal insufficiency, cardiopulmonary failure, severe osteoporosis, or other complicating comorbidities, a fasciocutaneous free flap can be considered.^[8,9]

Fasciocutaneous free flaps are selected based on the planned surgical defect and are intended to restore facial contours without the free transfer of bone. Following the use of a fasciocutaneous free flap for the reconstruction of an oral defect, the prospect of intraoral rehabilitation can be technically demanding due to postoperative altered anatomy and the resulting sensory deficits (i.e., loss of musculature and motor coordination of the residual mandible). To compensate for this, a mandibular resection prosthesis with or without a guide flange can be fabricated.^[10] A guide-flange resection prosthesis can assist the patient to achieve a maximum intercuspal position and thus assist in mastication.^[11-13]

Mandibular resection prostheses for patients with discontinuity defects of the mandible require commitment from both the patient and the provider to fabricate and at present, there is a paucity of information regarding the effort required for the fabrication of such prostheses. The purpose of this study was to retrospectively review a consecutive series of patients reconstructed with fasciocutaneous free flaps who had mandibular resection prostheses fabricated during a 17-year period at a tertiary cancer center and to review treatment concepts for the management of such patients.

MATERIALS AND METHODS

A retrospective review was completed (IRB #16-1132) of patients who underwent fasciocutaneous free-flap reconstruction of the mandible as well as successful fabrication of a mandibular resection prosthesis at a tertiary cancer center between 2000 and 2017. Pediatric patients (under 18-year-old) and patients who had mandibular continuity (native or reconstructed) were excluded from this study. Patient records were reviewed to obtain patient demographics, tumor data, treatment

data, and mandibular resection prosthesis interval data. To better quantify immediate postoperative follow-up after prosthesis delivery, the number of appointments during the first 90 days in 30-day interval were recorded. All the data was compiled and analyzed using Microsoft Excel (Microsoft Corp., Redmond, WA, USA).

RESULTS

During the study, 21 consecutive patients who had fasciocutaneous free flaps to reconstruct mandibular defects, as well as mandibular resection prostheses, were identified. Seventeen (81%) patients were male and four (19%) patients were female, with an average age of 66 years (range 46–84 years). Patient tumor and treatment data is presented in Table 1. About 76% ($n = 16$) of patients had a primary diagnosis of squamous cell carcinoma. Approximately 53% of patients ($n = 11$) had higher staged tumors (T3–T4), and approximately 33% of patients ($n = 7$) had nodal involvement.

The two most commonly used fasciocutaneous free flaps were pectoralis major myocutaneous free flaps 43% ($n = 9$) and rectus abdominis free flaps 38% ($n = 8$). Radial forearm free flaps, anterolateral thigh free flaps, and latissimus dorsi free flaps were used in the remaining patients 19% ($n = 4$).

The time to mandibular resection prosthesis delivery following primary surgery, as well as the time from the mandibular resection prosthesis delivery to last dental follow-up, is presented in Table 2. Following prosthesis delivery, the median number of follow-up appointments from 0 to 30 days was 1 visit (range 0–3), and the median number of follow-up appointments from 0 to 90 days was 2 visits (range 0–4).

DISCUSSION

This study reports a series of 21 patients with oral cancer, who underwent segmental mandibulectomy with reconstruction followed by fabrication of mandibular resection prosthesis. The goal of this treatment is to both reconstruct the surgical defect giving the superficial shape to the mandible as well as improve the quality of life of the patient by providing esthetic and functional mandibular resection prosthesis. This review reports the timing of care as well as the follow-up required postdelivery of the mandibular resection prosthesis. The median time to deliver the prosthesis from the time of surgery was 9 months. Following the delivery of the prosthesis, patients presented with a median follow-up of 1 visit within

30 days. Patients followed up 0 times between days 30–60 and 60–90. Within this cohort, it was unusual for patients to return for multiple follow-up appointments within the immediate 90-day period following prosthesis delivery. This information may be helpful in assisting both patients and clinicians to set expectations for the course of care for mandibular resection prosthesis fabrication and follow-up.

Careful evaluation is recommended following prosthesis delivery as oncologic treatment-related sequelae, such

Table 1: Patient demographics

Segmental mandibulectomy reconstruction with fasciocutaneous free flap and mandibular resection prosthesis (n=21)

	% (n)
Clinical T stage	
T1	9 (2)
T2	29 (6)
T3	5 (1)
T4	48 (10)
Not applicable	9 (2)
Clinical N stage	
N0	57 (12)
N1	9 (2)
N2	24 (5)
Not applicable	9 (2)
Pathology	
Ameloblastoma	5 (1)
Osteoradionecrosis	9 (2)
Osteosarcoma	5 (1)
Spindle cell carcinoma	5 (1)
Squamous cell carcinoma	76 (16)
Site	
Buccal mucosa	5 (1)
Floor of the mouth	9 (2)
Mandible	24 (5)
Mandibular gingiva	9 (2)
Oropharynx	5 (1)
Retromolar trigone	38 (8)
Tongue	9 (2)
Fasciocutaneous free flap	
Anterolateral thigh	9 (2)
Latissimus free	5 (1)
Pectoralis major	43 (9)
Radial forearm	5 (1)
Rectus abdominis	38 (8)
Postoperative radiotherapy	
Yes	71 (15)
No	29 (6)
Postoperative chemotherapy	
Yes	19 (4)
No	81 (17)
Dentition status (mandibular arch)	
Dentate	76 (16)
Edentulous	24 (5)

Table 2: Mandibular resection prosthesis delivery and follow-up

	Median (months)	Range (months)
Time from surgery to mandibular resection prosthesis delivery	9	4-41
Time from mandibular resection prosthesis delivery to last dental follow-up	14	1-81

as trismus, tissue fibrosis, xerostomia, altered intraoral anatomy, or other soft-tissue changes can create challenges in providing stable mandibular resection prosthesis. Following segmental mandibulectomy [Figure 1], it is not uncommon for the patient to experience deviation of the residual mandible toward the surgical defect^[14] [Figure 2]. This will create a malocclusion as the maxillary and mandibular arches will no longer be aligned and the patient will be unable to repeatedly achieve maximum intercuspation, and hence impair deglutition. Preoperative multidisciplinary planning with the surgical team may assist in assuring that mobility of the residual mandible is maintained and that adequate interocclusal, as well as vestibular space, is maintained for the fabrication of resection prosthesis. If the patient can be manually positioned into maximum intercuspation after completion of their oncologic treatment, the patient may be a candidate for the fabrication of mandibular resection prosthesis with a guide flange. Such prosthesis is retained by the remaining mandibular dentition and contains a vertical flange, usually either made of acrylic or metal. The flange engages the buccal surfaces of the maxillary dentition and on closure will guide the dentition into maximum intercuspation^[10] [Figure 3]. The goal of such a prosthesis is to improve masticatory function by enabling the patient to repeatedly achieve a position, in which occlusal contacts can be generated.^[11,15] These prostheses can be reliably fabricated by practitioners knowledgeable in the principles of removable prosthodontics often without the need for additional surgical procedures.

There were several limitations in this study. First, there is a relatively small group of patients in this cohort, as fasciocutaneous reconstruction is not the mainstay of mandibular rehabilitation at our tertiary cancer center. Collaborative studies from other centers would be helpful to better understand the generalizability of the results. In addition, this study was limited to patients that had mandibular resection prostheses fabricated at



Figure 1: Panoramic radiograph following left segmental mandibulectomy



Figure 2: Retracted view of mandible deviating toward the defect side following segmental mandibulectomy



Figure 3: Mandibular resection prosthesis with guide-flange assisting patient to achieve maximum intercuspation with occlusal contacts on remaining dentition

the Dental Service of Memorial Sloan Kettering Cancer Center. As a result, additional patients who had resection prostheses fabricated elsewhere were not included in this cohort. Moreover, as this was a retrospective review, patient-reported outcomes and prosthesis function data were unavailable for a review. Future studies may be able to assess the patient and physician perception of prosthesis performance.

CONCLUSIONS

Oral rehabilitation with mandibular resection prostheses with or without guide flanges following segmental mandibulectomy with fasciocutaneous free-flap reconstruction is an attainable treatment goal for the oncologic patient. Such prostheses, if collaboratively planned, may be reliably fabricated by the dental practitioner. Reviewing the proposed course of care is helpful for patient management before proceeding with prosthetic oral rehabilitation.

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Conflicts of interest

There are no conflicts of interest.

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