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RESEARCH ARTICLE

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HEAD AND NECK SURGERY RECONSTRUCTION WITH FIBULA FREE FLAP

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ABSTRACT

Introduction: Although considered a “gold standard” procedure for surgical reconstruction of segmental resection of the mandible due to neoplasia, the fibula flap still represents a great challenge from the reconstructive point of view, and there are few studies with descriptions of the surgical results observed in large centers, particularly in developing countries. **Objectives:** To describe the evolution and surgical outcomes of cancer patients undergoing segmental mandibulectomy with mandible reconstruction using a fibula flap. **Method:** A longitudinal and retrospective study that analyzed the data of 16 patients who underwent mandibulectomy with fibula free flap reconstruction, treated between 2014 and 2020, at the head and neck surgery service of the University Hospital of the Pontifical Catholic University of Campinas, Brazil. **Results:** The patients’ mean age was 46.7±18.0 years, of whom 75% were male. The type of neoplasm with involvement of the mandible was squamous cell carcinoma in 10 (62.5%) cases, ameloblastoma in 3 (18.7%) cases, and chondrosarcoma, primitive neuroectodermal tumor, and delayed reconstruction after oncologic surgery – each with one case. There were local complications in the postoperative period in 9 cases and, in two, there were complications in the donor area. Two patients died in the immediate postoperative period due to infectious complications. The surgical success rate was 87.5%. **Conclusion:** It was observed that the rates of local complications and flap survival, as well as complications in the donor area in this group of patients are similar to those of specialized centers for reconstructive head and neck surgery. The complexity of the procedure reinforces the need to increase the number of services in order to contribute to a better evaluation of outcomes and to advance in the learning of the technique and contribute to knowledge in the area.

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INTRODUCTION

Malignant oral cavity tumors are the fifth most common tumor among men and the thirteenth among women, according to estimates by the Brazilian National Cancer Institute in 2020 (Instituto Nacional Do Câncer, 2020). In the presence of malignant tumors in the oral cavity (lip, gums, cheeks, hard palate, tongue, and floor of the mouth) surgical procedures are indicated, sometimes characterized by resections that are extensive, mutilating, and cause dysfunctions, due to the invasion of adjacent structures by the tumor, regardless of their size (Alicandri-Ciuffelli, 2013). Thus, extensive ablative surgeries of the oral cavity, with segmental resections of the mandible become a challenge for its reconstruction. Over the years, segmental defects of the mandible, associated with resection of oral cavity tumors, were reconstructed without an adequate mandibular repositioning appliance to support the bone, with the most used being the deltopectoral (Bakamjian, 1965), pectoralis major myocutaneous flaps (Ariyan, 1979) trapezius (Demergasso, 1979) and pectoralis major myofascial

Later, the use of fibula free flaps emerged as a viable strategy for the reconstruction of segmental defects of different sizes (Chen, 1983 and Hidalgo, 1989), which allowed less involvement of the donor area, with good results and low morbidity (Meagher, 2002 and Politi, 2022). Performing such a complex surgery requires adequate costs and technological resources, as well as a large prepared multidisciplinary team. Thus, it is observed that the challenge for developing countries, such as Brazil (among other countries), conducting these procedures in a routine service is still a hard challenge (Nakarmi, 2012). Thus, the aim of this study was to describe the evolution and surgical outcomes of cancer patients undergoing segmental mandibulectomy with mandible reconstruction using a fibula flap.

METHODOLOGY

Clinical and surgical data of all patients treated at the head and neck

University of Campinas, from January 2014 to January 2020, who underwent segmental mandibulectomy with reconstruction using a fibula flap, with a tumor site in the oral cavity or a primary tumor of the mandible. The PUC-Campinas University Hospital, located in the city of Campinas, São Paulo, Brazil, is a reference center for oncological surgeries with highly complex microsurgical reconstruction in the surgical area of the head and neck. Clinical history, surgery data and the presence of postoperative complications were evaluated. Clinical data from the Hospital charts were consulted. Jewer's classification was used to describe the involved mandibular segments. The histological types of tumors were confirmed by the anatomopathological study in the cases. All surgical procedures were performed by the following authors - FRM, DARP, LABF, WMQA, and JLBA. The research ethics committee of PUC-Campinas (No. 3627333) approved the research project.

RESULTS

This study included 16 patients with a mean age of 46.7 (\pm 18.0) years, 75% of whom were male, who were being treated in the hospital and underwent mandibular reconstruction with a fibula free flap and microsurgical anastomosis between January 2014 and January 2020. The clinical characteristics, the anatomopathological data, the time of surgical reconstruction, the presence of complications and the clinical evolution are shown in Table 1.

Table 1. Clinical characteristics, anatomopathological data, surgical reconstruction time, presence of complications and clinical evolution

Type of disease involvement	N,%, or SD
Squamous cell carcinoma	10 (62.5%)
Primitive neuroectodermal tumor	1 (6.2%)
Chondrosarcoma	1 (6.2%)
Ameloblastoma	3 (18.7%)
Sequelae previous surgery	1 (6.2%)
Surgical time	
Mean - hours (\pm SD)	10.9 \pm 2.7
Minimum/maximum (hours)	7/16
Surgical reconstruction	
Immediate	15
Late	1
Location of the mandibular defect	
Central arch	4 (25%)
Right side	3 (18.7%)
Left side	1 (6.2%)
Right hemimandible	2 (12.5%)
Left hemimandible	4 (25%)
Bilateral	2 (12.5%)
Local complications	
Salivary fistula	5 (31.2%)
Salivary fistula/infection	2 (12.5%)
Flap loss due to arterial thrombosis	2 (12.5%)
Clinical evolution	
Retail loss	2 (12.5%)
Retail survival	14 (87.5%)
Death	2 (12.5%)

The most common type of neoplasm was squamous cell carcinoma with involvement of the oral cavity and with involvement of the mandible. Patients with squamous cell carcinoma were assigned to the T4a category, according to the criteria of the American Joint Committee on Cancer, undergoing neck dissection. No other case required this procedure. In 15 cases, reconstruction was concomitant with resection and occurred in a single surgical procedure, and only one case of squamous cell carcinoma required reconstruction in a second procedure (Figure 1). Local surgical complications occurred in 9 cases and salivary fistula was the most frequent complication. There was loss of the flap due to arterial thrombosis in two cases, and in both cases a correction was performed with a pectoralis major myocutaneous flap, however, there was a satisfactory result in only one case, the other case had flap necrosis, leading to infectious complications and eventual death.

- Flap survival occurred in 14 cases, which characterizes a success rate of 87.5%.
- In the late postoperative follow-up, it was observed that 3 patients died due to other causes unrelated to the head and neck surgical procedure (neoplasm in another location, n=1 case; urinary or pulmonary focus sepsis, n=2 cases).
- Table 2 shows the data on the location of the tumor, the presence of local complications and in the donor area, as well as the survival of the flap in the 16 cases.

DISCUSSION

This study described a series of 16 cases undergoing reconstruction with a fibula free flap in head and neck surgery treated at the PUC-Campinas University Hospital, in the city of Campinas, São Paulo, Brazil, from January 2014 to January 2020. The scientific head and neck surgery community has focused on the reconstructive method that, together with adequate oncological resections, can provide the best preservation of the facial contour and the primordial functions of the involved area for the maintenance of the individuals' quality of life (Machiels, 2014). Our sample consisted mostly of men, with a male/female ratio of approximately 1:3, which is consistent with the description in the literature of a higher prevalence of oral cavity cancer in men. The mean age was 46.7 (\pm 18.0) years, which is consistent with data from the literature (Camuzard, 2017). The most frequent location of the neoplasms was the floor of the mouth, and with an initial diagnosis, the disease was already in an advanced stage. Studies conducted in developing countries show that tumors in the floor of the mouth are the most common type of head and neck tumors (Effiom, 2008), which emphasizes the importance of access to healthcare for early diagnosis of lesions. In our sample, most procedures were performed with reconstruction at the same time as the resection (immediate reconstruction), as performed by most major reconstructive surgery centers identified in the literature, with a rate of around 80% (Sieg, 2002). Regarding the location of the defects, we used Jewer's classification to identify the resected mandibular segment, most were type-C defects (central - from parasymphysis to parasymphysis), followed by lateral-type defects. Comparing the data with the literature, we can see that lateral-type defects are more prevalent, around 45% of defects. Only one study described a sample similar to ours, with most defects being in the central arch (Lonie, 2016). However, in none of the studies did the location of the defect define higher complication rates.

In our study, we obtained a rate of local complications of 56.2%, with salivary fistula being the most prevalent. Studies have shown similar values of local complications, with values between 15% and 70% (Lonie, 2016 and Sugiura, 2018). As for the success rate, we had a rate of 87.5%, with flap loss due to arterial thrombosis in two cases. In a meta-analysis evaluated in the literature, this rate corresponds to a mean value of 93%, ranging between 45.5% and 100% (Lonie, 2016). Thus, our results are comparable with the literature and reveal an adequate flap survival rate (Lonie, 2016 and Sugiura, 2018). Regarding the complications of the donor area, the data from our study is in line with the literature (Ling, 2012).

We know that the reconstruction of segmental defects of the mandible with a free fibula flap promotes a better facial contour and adequate maintenance of function, as described in the literature. The constant evaluation of these results guides the path we should follow for a better understanding, not only of the technique, but of the approach to the patient as a whole, aiming at care in a global way. Our study shows satisfactory results comparable to the literature and allows us to demonstrate a promising future in microsurgical reconstructions (Warshavsky, 2019). We conclude that flap complication and survival rates, as well as donor site complications, are remarkably similar in relation to large, specialized centers dedicated to reconstructive head and neck surgery.

Table 2. Tumor location, local and donor site complications and flap survival in the 16 cases

Case	Tumor location	Combination of flaps*	Local complications	Donor site complications	Flap survival
1	Anterior floor of the mouth	No	SF+LI	IF	Yes
2	Anterior floor of the mouth	No	SF	No	Yes
3	Left floor of the mouth	No	SF+ EX	No	Yes
4	Tongue	No	SF	No	Yes
5	Recurrent - floor of the mouth	Yes	SF	No	Yes
6	Right ameloblastoma	No	No	No	Yes
7	Right floor of the mouth	No	No	No	Yes
8	Recurrent - tongue edge	No	No	No	Yes
9	Right floor of the mouth	No	PN	No	Yes
10	Primitive neuroectodermal tumor - left	No	SF+LI	WD	Yes
11	Complication of mandibulectomy	No	No	No	Yes
12	Anterior floor of the mouth	No	TN	No	No
13	Left ameloblastoma	No	No	No	Yes
14	Left ameloblastoma	No	No	No	Yes
15	Anterior floor of the mouth	No	No	No	Yes
16	Chondrosarcoma	No	TN	No	No

*: Pectoralis major myocutaneous flaps; IF: Infection; SF: Salivary fistula; LI: Local infection; EX: plate extrusion; TN: total necrosis; PN: Partial necrosis; WD: Wound dehiscence.

With this analysis, it is possible to understand the stage of this difficult journey we are in, to technically progress, favoring the patient and increasing our knowledge in the area.

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