ANNALS OF DENTAL SCIENCES

MIDITERRANEAN JOURNALS

2022, Volume 1, ID 594
Case Report
DOI: 10.55085/ads.2022.594

Screw-Retained Implant Supported Protheses on a Coronally Positioned Free Fibula Flap after Ameloblastoma Resection: A Case Report

Guillermo Bernal [a*], Oscar De León [b], Luis Eduardo Bermúdez [c], Laura Ruiz [d]

[a] Private Practice, Bogotá, Colombia.
[b] Hospital San Ignacio, Maxillofacial Department, Pontificia Universidad Javeriana, Bogotá, Colombia.
[c] Hospital San Ignacio, Plastic Surgery Department, Pontificia Universidad Javeriana, Bogotá, Colombia
[d] Private Practice, Bogotá, Colombia.

ABSTRACT

A detailed multidisciplinary approach for managing a patient with a mandibular defect caused by ameloblastoma will be discussed using three fibula flap blocks and a fixed screw-retained implant-supported prosthesis. Diagnosis, treatment planning, surgical and prosthetic protocols are described, as well as clinical and radiographic results after six years.

Keywords: Case Report, Ameloblastoma, Free Fibula Flap Reconstruction, Skin Flap, Screw Retained Prosthesis.

Received: 19 Nov 2021
Revised: 27 Jan 2022
Accepted: 04 Feb 2022
Published: 16 Feb 2022

Academic Editor: Dr. Anas Shamala

Correspondence: Guillermo Bernal, Private Practice, Bogotá, Colombia.
Email: gbernaldds@gmail.com

Cite this article as: Bernal G, De León O, Bermúdez LE, Ruiz L. Screw-Retained Implant Supported Protheses on a Coronally Positioned Free Fibula Flap after Ameloblastoma Resection: A Case Report. Ann Dent Sci. 2022;1:594. [https://doi.org/10.55085/ads.2022.594]

Authors' contributions
The participation of each author corresponds to the criteria of authorship and contributorship emphasized in the Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals of the International Committee of Medical Journal Editors. Indeed, all the authors have actively participated in the redaction, the revision of the manuscript, and provided approval for this final revised version.

Acknowledgments
None.

Funding
No funding was received from any organization to conduct the present study.

Conflict of interest
The authors declare that there is no conflict of interest regarding the publication of this article.

INTRODUCTION

Ameloblastoma plexiform is a locally aggressive benign tumor frequently reported in the mandible with a high local recurrence rate as well as a possibility of metastasis in rare cases [1,2]. A common clinical sign is progressive deformation of facial contour associated with tumor development. Being the molar region is the most affected site [3], the proposed treatments for this entity range from curettage or surgical enucleation [4,5] to radical resection in aggressive cases [6].

Regarding reconstruction, different alternatives such as iliac crest free osseous grafts with osteosynthesis plates [7]; osteomuscular-cutaneous flaps [8], reconstruction of the mandibular contour with osseous transport techniques based on distraction osteogenesis [9], as well as the use of free micro vascularized flaps from different sources such as the radial bone, scapula, iliac crest, and fibula, have all been proposed as methods [10]. However, free flap from the fibula is the most popular therapeutic alternative due to its effectiveness [11], predictability, the possibility of 3D planning (design of cutting guides, fabrication of well-adapted osteosynthesis plates, and predictable flap position to aid in better prosthodontic rehabilitation), cost efficiency and probability of using osseointegrated implants [12], restoring efficient masticatory function throughout time [13], although, it's been reported an incredible difficulty for oral rehabilitation with fixed implant-supported prostheses when the defect size requires more than two free osseous flaps blocks for mandibular reconstruction [14].

This clinical report aims to present a detailed multidisciplinary approach for the management of a patient with a mandibular defect caused by ameloblastoma, including diagnosis and treatment planning, as well as surgical protocol for mandibular reconstruction with three blocks free vascularized fibula flap and oral rehabilitation with a screw-retained implant-supported fixed partial prosthesis; complications and care provided during a six-year follow up are included.

CLINICAL REPORT

A 53-year-old Caucasian female (MR) with the chief complaint of not being able to chew or speak, previously diagnosed ameloblastoma in 2010, partial mandibulectomy was performed; between 2010 and 2014, she received four failed mandibular reconstructions with two anterior and two posterior iliac crest grafts.

Clinical and radiographic evaluation showed asymmetry and disproportion of facial thirds with alteration of the left mandibular and submandibular contours and an ipsilateral depressed zone; the severe transversal collapse of the mandibular arch and mucosal dehiscence. Osseous grafts placed during the last surgery were exposed. With recession and mobility, a dental implant in the first lower left molar position was present. Radiographic evaluation showed osteosynthesis plaque, bone discontinuity, and failed dental implants (Fig. 1a,1b,1c).

(a) (b) (c)

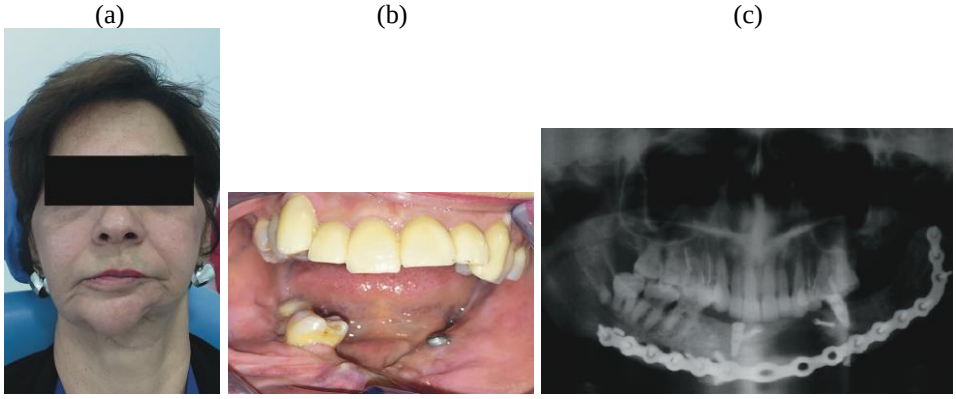

Figure 1: Initial facial (a), intraoral (b) and radiographic findings (c).

Computed tomography (CT) images were used to assess the bone defect, simulate the reconstruction, and obtain the cutting guides for a precise surgical approach to the left fibula.

The patient was taken into surgery, and a free flap of the left fibula with its cutaneous island was harvested and attached with a previously modeled osteosynthesis plaque (Fig. 2). This allowed securing the osseous flap to each mandibular segment, locating them in a more cephalic position regarding the mandibular basal edge as well as the positioning of the skin island in the big soft-tissue defect at the floor of the mouth that served as coverage of the osseous flap as well as a witness of the perfusion. A healing period of 90 days was determined [15]. The scar was covered with a skin graft at the donor site, allowing better healing with a moderated scar defect. The patient experienced walking difficulties for two weeks but recovered after 30 days.

Figure 2: Osseous flap secured to each mandibular segment with an osteosynthesis plaque.

After healing, intraoral clinical findings showed an asymmetric maxillary occlusal plane, and mandibular molars were lingualized with a reverse articulation and growth of the vertical volume of the cutaneous island flap. A decrease of the vertical dimension and severe posterior overclosure were observed. Clinically, no great discrepancy between native bone and the fibula blocks was found (Fig. 3).

Figure 3: Intraoral clinical findings after healing period.

Leveling of the maxillary occlusal plane at the expense of replacing the existing maxillary anterior crowns was done with lithium disilicate crowns (IPS e.max Ivoclar Vivadent). Based on a new CBCT, seven (7) surface treated tapered implants (#'s 19, 20, 22, 23, 26, 27,28) with tri-channel internal connection (Replace Select, Nobel Biocare™) were placed with primary fixation torque values above 35Ncm and Osstell values (Osstell-WH) between 70 and 85 in resonance frequency units (Fig. 4a, 4b).

(a) (b)

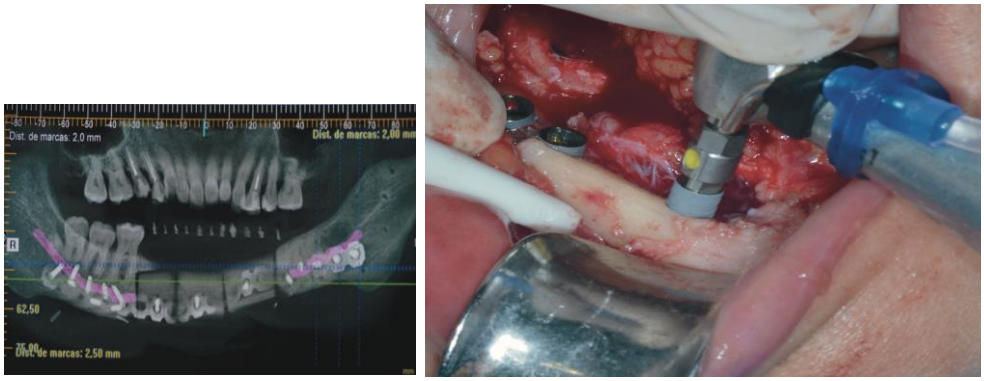

Figure 4: Tomographic image of the osseous flaps for implant analysis and insertion of mandibular implants.

Before surgery, a mandibular final impression was taken to fabricate an occlusal rim to determine the vertical dimension of occlusion, centric relation records, and teeth selection. An immediate mandibular implant-supported screw-retained interim prosthesis was fabricated and picked up over transmucosal abutments to aid with the fixation of the micro vascularized graft by being splinted in a cross-arch stabilization.

Five days after, the patient assisted with halitosis and superficial necrosis of the distal portion of the skin island. This was managed with 0.12% chlorhexidine irrigation and the topical application of silver nitrate. Two (2) weeks later, the patient presented a total resolution of the clinical scenario and complete healing of the soft tissue; suture was removed. One (1) week later, the patient reported discomfort in the two (2) most distal implants on the right side (#'s 27,28). Percussion and mobility tests showed micromovement of these implants. This determined removal of the implants, interim prosthesis and placement of healing covers on the transmucosal abutments of the remaining implants.

After two (2) months, a CBCT was performed, and a new implant (#28), as distal as possible, was inserted at 50Ncm, and a healing abutment was placed. After one (1) month of healing, granulation tissue was observed over two transmucosal abutments and surgically removed. After two (2) months of healing, the temporary cylinder of the new implant was captured within the existing mandibular implant-supported screw-retained interim prosthesis.

Two (2) months later, a final impression was taken, and a mandibular occlusion rim was fabricated to determine the new vertical dimension of occlusion and centric relation.
A computer-aided-design/computer-aided-manufacturing (CAD-CAM) mandibular metal-ceramic screw-retained fixed partial prosthesis was designed, fabricated, and screwed as a final restoration. Adequate embrasures were designed in order to facilitate access and hygiene. After the restitution of the vertical dimension, the remaining mandibular molars were left out of occlusion, hoping that the passive eruption phenomenon would take them to

an occlusal contact with the opposing dentition [16]. Prosthetic screws were screwed in at 15 Ncm and screw access sealed with Teflon® tape and composite resin Filtek Z 350 (3MESPE). An occlusal device was programmed (Figure 5).

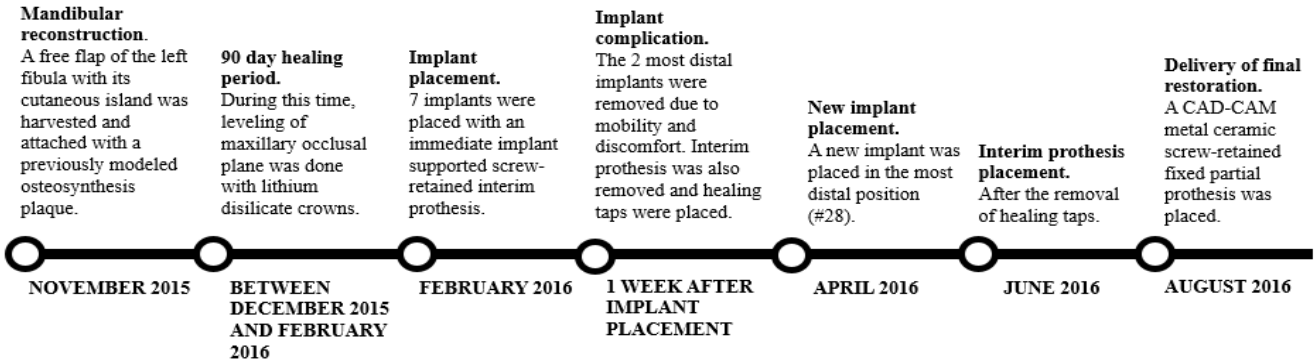

Figure 5: Surgical and prosthetic timeline.

After multiple speech therapy sessions, the patient achieved an optimal level of communication without any effort, improved management of lip competence, enhancement of her self-esteem, and quality of life.

Periodontal and prosthodontic control sessions were programmed every six (6) months, including dental, periodontal, implant, and prosthetic evaluation, with dental prophylaxis and supra-gingival scaling [17]. During the next six (6) years of follow-up, two (2) episodes of granulomatous tissue growth of peri-implant mucosa of one of the implants (#22) were present and managed by removing the prosthesis allowing surgical removal of the soft tissue. No other type of additional prosthetic or surgical complication had been presented during the follow-up span (Fig. 6a, 6b, 6c). Written informed consent was obtained from the patient to publish the case report and the use of clinical photographs.

(a) (b) (c)

Figure 6: Clinical and radiographic follow up after 6 years.

DISCUSSION

The rehabilitation of a patient with a sequela of surgical recession included explicitly in this clinical report of ameloblastoma is a multidisciplinary challenge. Literature has presented varied results and where a series of factors intervene. It has been described that the majority of cases with unilateral defects reconstructed with one or two blocks are feasible to restore with fixed implant-supported prostheses with high success rates [13]. Contrary to this, defects including anterior mandibular segments reconstructed with more than two (2) osteotomies cannot be rehabilitated. Few can only be done with the removable prostheses, which reports a higher maintenance rate incidence as hyperplasia associated with implant-supported overdentures [18,19]. This clinical report showed a case based on an adequate CAD-CAM surgical and prosthetic approach that considered a more cephalic placement of the blocks, something innovative that allowed a successful fixed implant-supported restoration without affecting the peri-implant soft tissue.

In addition, the use of a skin island was ideal in managing the extensive soft tissue defect and preventing complications like soft tissue dehiscence, possibly affecting the osseous flaps and implants [20]. Free gingival grafts taken from palatal mucosa can improve the quality and quantity of the tissue [21]. Still, they can result unpredictably in such extensive cases since the palate cannot provide such large quantities of keratinized tissue. Even though it showed signs of superficial necrosis and the fact that it can aesthetically contrast unfavorably, the use of a skin island for reconstructing the soft tissue is an acceptable alternative that can be posteriorly complemented with other mucogingival techniques if necessary.

Furthermore, a screw-retained fixed metal-ceramic restoration that was passively screwed in over transmucosal abutments helped compensate for the height discrepancy generated because of the reconstructive process of the fibula flap. It also improved occlusion and masticatory efficiency and the maintenance of peri-implant soft tissues by preserving stability in the interfaces and allowing adequate access for hygiene. Ultimately, as seen in this report, this type of reconstruction and rehabilitation improves the quality of life for this category of the patient when the prognosis of the tumor is favorable, and life expectancy is adequate [22].

CONCLUSION

The resection and reconstruction of large tumors is not an easy task. The proposed approach had few complications at the donor and recipient sites. Improved function, quality of life, and adequate maintenance were seen in this case report by showing stability through six years, making this type of management a good treatment option for this category of patient. It may be a viable technique in rehabilitation planning to improve the quality of life of our patients.

REFERENCES

[1] McClary AC, West RB, McClary AC, Pollack JR, Fischbein NJ, Holsinger CF, et al. Ameloblastoma: a clinical review and trends in management. Eur Arch OtorhinoLaryngol. 2015; 273(7): 1649–61. DOI: 10.1007/s00405-015-3631-8

[2] Almeida Rde A, Andrade ES, Barbalho JC, Vajgel A, Vasconcelos BC. Recurrence rate following treatment for primary multicystic ameloblastoma: Systematic review and meta-analysis. Int J Oral Maxillofac Surg. 2016 Mar;45(3):359-67. DOI: 10.1016/j.ijom.2015.12.016

[3] Kreppel M, Zöller J. Ameloblastoma-Clinical, radiological, and therapeutic findings. Oral Dis. 2018; 24(1-2): 63–66. DOI: 10.1111/odi.12702

[4] Hong J, Yun PY, Chung IH, Myoung H, Suh JD, Seo BM, et al. Long-term follow up on recurrence of 305 ameloblastoma cases. Int J Oral Maxillofac Surg. 2007 Apr;36(4):283-8. DOI: 10.1016/j.ijom.2006.11.003

[5] Carlson ER, Marx RE. The ameloblastoma: primary, curative surgical management. J Oral Maxillofac Surg. 2006 Mar; 64(3): 484-94. DOI: 10.1016/j.joms.2005.11.032

[6] Becelli R, Morello R, Renzi G, Matarazzo G, Dominici C. Treatment of recurrent mandibular ameloblastoma with seg- mental resection and revascularized fibula free flap. J Craniofac Surg. 2011; 22(3):1163-5. DOI: 10.1097/scs.0b013e318210bc34

[7] Carlson ER, Marx RE. Mandibular reconstruction using cancellous cellular bone grafts. J Oral Maxillofac Surg.1996: 54(7): 889-97. DOI: 10.1016/s0278-2391(96)90543-1

[8] Baker SR, Sullivan MJ. Osteocutaneous free scapular flap for one-stage mandibular reconstruction. Arch Otolaryngol Head Neck Surg. 1988: 114(3):267-77. DOI: 10.1001/archotol.1988.01860150049015

[9] Basa S, Uner E, Citir M, Aras K. Reconstruction of a large mandibular defect by distraction osteogenesis: a case report. J Oral Maxillofac Surg. 2000 Dec; 58(12):1425-8. DOI: 10.1053/joms.2000.18282

[10] Fernandes RP, Yetzer JG. Reconstruction of Acquired oromandibular Defects. Oral Maxillofac Surg Cli North Am. 2013 May; 25(2): 241-9. DOI: 10.1016/j.coms.2013.02.003

[11] Hidalgo DA. Fibula free flap: A new method of mandible reconstruction. Plast Reconstr Surg 1989 Jul; 84(1):71-9.

[12] Carbiner R, Jerjes W, Shakib K, Giannoudis PV, Hopper C. Analysis of the compatibility of dental implant systems in fibula free flap reconstruction. Head Neck Oncol. 2012 Jun 21; 4(1): 37. DOI: 10.1186/1758-3284-4-37

[13] Kramer FJ, Dempf R, Bremer B. Efficacy of dental implants placed into fibula-free flaps for orofacial reconstruction. Clin Oral Implants Res. 2005 Feb; 16(1):80–8. DOI: 10.1111/j.1600-0501.2004.01040.x

[14] Lizuka T, Hafliger J, Seto I, Rahal A, Mericske-Stern R, Smolka K. Oral rehabilitation after mandibular reconstruction using an osteocutaneous fibula free flap with endosseous implants. Factors affecting the functional outcome in patient with oral cancer. Clin Oral Impl Res. 2005 Feb; 16(1):69-79. DOI: 10.1111/j.1600-0501.2004.01076.x

[15] Kawai T, Murakami S, Hiranuma H, Sakuda M. Radiographic changes during bone healing after mandibular fractures. Br J Oral Maxillofac Surg. 1997 Oct; 35(5):312-8. DOI: 10.1016/s0266-4356(97)90402-2

[16] Compagnon D, Woda A. Supraeruption of the unopposed maxillary first molar. J Prosthet Dent. 1991 Jul;66(1):29-34. DOI:10.1016/0022-3913(91)90347-y

[17] Nassar H, Al-Dabbagh N, Aldabbagh R, Albahiti M, Jadu FM, Qutob A, et al. Dental follow-up and maintenance index: the development of a novel multidisciplinary protocol. Heliyon. 2020 May 24; 6(5):e03954. DOI: 10.1016/j.heliyon.2020.e03954

[18] Lizuka T, Hafliger J, Seto I, Rahal A, Mericske-Stern R, Smolka K. Oral rehabilitation after mandibular reconstruction using an osteocutaneous fibula free flap with endosseous implants. Factors affecting the functional outcome in patient with oral cancer. Clin Oral Impl Res. 2005 Feb; 16(1):69-79. DOI: 10.1111/j.1600-0501.2004.01076.x

[19] Goodacre CJ, Bernal G, Rungcharassaeng K, Kan JY. Clinical complications with implant and implant prostheses. J Prosthet Dent. 2003 Aug; 90(2): 121-32. DOI: 10.1016/s0022-3913(03)00212-9

[20] Wei FC, Celik N, Yang WG, Chen IH, Chang YM, Chen HC. Complications after reconstruction by plate and soft-tissue free flap in composite mandibular defects and secondary salvage reconstruction with osteocutaneous flap. Plast Reconstr Surg. 2003 Jul;112(1): 37-42. DOI: 10.1097/01.prs.0000065911.00623.bd

[21] Schmitt CM, Moest T, Lutz R, Wehrhan F, Neukam FW. Long-term outcomes after vestibuloplasty with a porcine collagen matrix (Mucograft®) versus the free gingival graft: a comparative prospective clinical trial. Clin Oral Implants Res. 2016 Nov; 27(11): e125-e133. DOI : 10.1111/clr.12575

[22] Pappalardo M, Tsao CK, Tsang ML, Zheng J, Chang YM, Tsai CY. Long-term outcome of patients with or without osseointegrated implants after resection of mandibular ameloblastoma and reconstruction with vascularized bone graft: Functional assessment and quality of life. J Plast Reconstr Aesthet Surg. 2018 Jul; 71(7):1076-1085. DOI: 10.1016/j.bjps.2018.03.008