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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

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Summary Background: The optimal management after the resection of mandibular ameloblastoma has been very challenging to surgeons. The aim of this study is to evaluate the functional, aesthetic, and quality of life outcomes of patients who had a segmental mandibular resection and immediate reconstruction with or without osseointegrated implants.

Method: Patients' demographics, tumor characteristics, treatment, and complications were retrieved. Patients were divided into two groups: dental rehabilitated vs. nondental rehabilitated depending on the placement of osseointegrated implants followed by an implanted-retained prosthesis. Functional outcomes and quality of life were assessed using the Performance Status Scale, the University of Washington Quality of Life (UW-QOL) scale, and the 14-item Oral Health Impact Profile (OHIP-14). Aesthetic outcome was evaluated by patients using a Visual Analog Scale.

Results: Thirty-four patients were reviewed. Twenty-two patients were included in the dental rehabilitated group and 12 in the nondental rehabilitated group. No recurrence of the tumor was found during the average follow-up period of 7.4 years. Although both groups reported a similar satisfaction in appearance, patients in the dental rehabilitated group scored significantly higher

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in masticatory function and "eating in public" ($p < 0.01$). There were significant differences ($p < 0.05$) regarding "chewing," "activity," and "anxiety" when assessed using the UW-QOL scale. Indeed, patients in the dental rehabilitated group showed a definitively better outcome in "physical disability" and "psychological discomfort" dimensions when assessed using the OHIP-14.

Conclusion: Vascularized bone graft reconstruction followed by immediate or delayed placement of osseointegrated implants showed as an ideal and predictable treatment modality for patients with ameloblastoma. The results suggested that patients with osseointegrated implants had a significantly better masticatory function, improved quality of life, and less psychological consequences.

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Introduction

The comprehensive treatment of mandibular ameloblastoma has been a challenging task, and many controversies have existed regarding the optimal approach in the literature. Although ameloblastoma is typically asymptomatic at the initial stage, it tends to be locally aggressive leading to facial asymmetry, pain, speech problems, and malocclusion. The ideal treatment should achieve adequate excision minimizing recurrence, provide excellent cosmesis, and restore oral functions to allow a higher quality of life. Two surgical modalities are commonly performed: conservative treatments such as enucleation, curettage, and cryotherapy; or radical treatments with marginal and segmental mandibulectomy.¹ Conventionally, the clinicopathological subtypes with the radiological pattern and the primary or recurrent presentation of the tumor would be considered during the surgical planning. Three clinicopathological variants have been described: unicystic, solid-multicystic, and peripheral ameloblastomas.² Indeed, ameloblastoma can be seen as a unilocular or multilocular radiolucent lesion with a honeycomb or soap bubble appearance.³ Conservative treatment modalities have shown a high recurrence rate ranging from 50% to 90%, and the need for multiple operations causes functional and psychological discomfort to the patients.^{4,5} On the other hand, the more aggressive approach of marginal or segmental resection, although achieving a significantly lower recurrence rate (<10%),⁶⁻⁸ is highly invasive.

During the past three decades, the vascularized bone graft has become a "gold standard" for reconstruction of mandibular defects with good functional and aesthetic results.⁹⁻¹¹ Recent studies have emphasized on how the radical treatment of ameloblastoma and immediate mandibular reconstruction influence the patients and have also focused on patients' quality of life regarding masticatory performance, aesthetic outcome, and psychosocial impact.^{12,13} For patients requiring mandibular reconstruction, especially those with benign tumors, full oral rehabilitation should comprise not only the reconstruction of the mandibular bone but also the restoration of masticatory and speech functions with osseointegrated implants and implant-retained prosthesis. This additional effort could play a key role in improving the quality of life of such patients.^{14,15} Few reports have assessed postoperative outcome and quality of life of patients with ameloblastoma undergoing rehabilitation with implant-retained prosthesis who had undergone mandibular recon-

struction. The purpose of this study was to compare the long-term functional-aesthetic outcome and quality of life in patients with mandibular ameloblastoma who have been treated with segmental mandibulectomy and vascularized fibula flap reconstruction, with or without osseointegrated dental implants.

Methods

Patients who underwent the combined care of the senior author with the plastic surgery team at Chang Gung Memorial Hospital from March 2004 to September 2014 were selected. This study was approved by the institutional review board. The selection criteria were patients with a large mandibular ameloblastoma treated with segmental resection and vascularized fibula osteoseptocutaneous flap. Patients with primary or recurrent mandibular ameloblastoma with a minimum of 2-year postoperative follow-up were included. Patients at various stages of dental rehabilitation before completion were excluded. Patients were divided into two groups: dental rehabilitated vs. nondental rehabilitated depending on the placement of osseointegrated implants followed by an implanted-retained prosthesis. Patients' medical records were reviewed for demographic and tumor characteristics, reconstructive techniques, primary or secondary placement of osseointegrated implants, and early and late postoperative complications.

Surgical procedure

Preoperatively, a three-dimensional model of the mandible produced from high-resolution dental cone beam computed tomography (CBCT) was manufactured to aid in operative planning and to allow for accurate shaping of reconstruction plates along the inferior mandibular border. Segmental resection of the mandibular ameloblastoma was performed with a safety margin of at least 0.5 cm of the normal bone. The sacrifice of the inferior alveolar nerve has always been necessary for oncology safety,¹⁶ with preservation of the proximal and distal ends, whenever possible, for reconstruction with a nerve graft. Following intermaxillary fixation, a preformed reconstruction plate was fixed to the remaining native mandibular border to obtain a correct alignment of the temporomandibular joints and a stable occlusion.

A fibula osteoseptocutaneous flap was harvested simultaneously by the ablative procedure using the manner described

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