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Prosthetic Rehabilitation Following Surgical Recontouring of Osseous Brown Tumor: A Case Report

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ABSTRACT

Mandibular brown tumors represent rare osseous manifestations of primary hyperparathyroidism. Although parathyroidectomy results in regression of 90% of lesions within 6-10 months, substantial lesion size may necessitate 2-5 years for complete remineralization. Complete denture rehabilitation following osseous recontouring presents significant clinical challenges due to severe mandibular resorption. This case is distinctive for its integrated surgical approach: a preoperatively validated surgical guide designed to simultaneously optimize surgical safety and prosthodontic outcomes.

A 58-year-old female with primary hyperparathyroidism underwent parathyroidectomy in 2021, with incidental discovery of a mandibular brown tumor confirmed histopathologically. Clinical examination demonstrated Class IV Atwood mandibular resorption, severe vestibular depth reduction, and residual fibrous tissue. Conservative osseous recontouring, strategically planned using a preoperatively validated surgical guide, was performed. Three months post-operatively, comprehensive prosthodontic rehabilitation was initiated with fabrication of complete maxillary and mandibular dentures using refined vestibular support zone design and border molding to compensate for severe resorption.

At three-month follow-up post-denture insertion, the patient demonstrated secure denture retention, restoration of vertical dimension of occlusion and facial contours, optimal functional restoration, and complete absence of tumor recurrence. Patient satisfaction and adaptation were excellent. Radiographic evaluation confirmed continued osseous stability.

Conservative osseous recontouring planned with specific consideration of prosthodontic rehabilitation objectives, combined with meticulous complete denture fabrication, provides an effective management approach for patients with mandibular brown tumors requiring complex prosthodontic rehabilitation. This coordinated multidisciplinary approach achieves favorable functional, esthetic, and psychosocial outcomes.

Keywords: Brown tumor, Hyperparathyroidism, Mandibular recontouring, Complete denture prosthesis, Multidisciplinary management.

1. Introduction

Mandibular brown tumors represent rare osseous manifestations of primary hyperparathyroidism, occurring predominantly in advanced disease stages with generalized bone resorption (1). While early detection has reduced their incidence, these lesions remain clinically significant entities requiring multidisciplinary management (2).

Brown tumors result from abnormal bone metabolism associated with hyperparathyroidism, creating non-

neoplastic osteolytic lesions histologically characterized by vascular fibroblastic stroma and multinucleated osteoclastic giant cells (3). The mandible is a common site of involvement, potentially compromising mastication, phonation, and swallowing functions (4). Parathyroidectomy constitutes first-line treatment, often permitting spontaneous regression of small to moderate lesions; however, extensive destructive lesions necessitate adjunctive surgical intervention to restore mandibular integrity and osseous continuity (5).

This case illustrates coordinated endocrine-surgical-prosthodontic management. It documents specifically: a four-year period of progressive osseous healing and radiographic stabilization following parathyroidectomy, with full regression of the brown tumor; conservative osseous recontouring performed on the stabilized mandible in accordance with prosthodontic rehabilitation objectives, utilizing a surgical guide to ensure precise bone removal while maximizing preservation of mandibular structure; and successful complete denture rehabilitation initiated three months after osseous recontouring surgery, addressing specific challenges including loss of vestibular depth, altered ridge morphology, residual fibrous tissue at the surgical site, and compromised retention surface area, with documented outcomes at three-month follow-up after denture insertion.

Current literature on mandibular brown tumor management primarily addresses surgical approaches or isolated prosthodontic rehabilitation in non-systemic conditions (6). Few reports document the integrated endocrine-surgical-prosthodontic continuum or emphasize conservative osseous management guided by prosthodontic endpoints utilizing surgical guides. This case demonstrates the feasibility of coordinated multidisciplinary care and surgical planning in managing such complex anatomical challenges.

The complexity of complete denture rehabilitation on a previously lesioned and severely resorbed mandible warrants documentation of effective management strategies (7). This case report illustrates that meticulous surgical planning guided, conservative osseous recontouring, appropriate timing of prosthodontic intervention, and meticulous denture fabrication technique can achieve successful functional restoration despite substantial anatomical compromises.

2. Case Presentation

2.1 Patient Information

A 58-year-old woman was referred from the Department of Oral Surgery at the Dental Consultation and Treatment Center of the Rabat University Hospital Center to the Department of Removable Prosthodontics for the management of complete bimaxillary edentulism.

The patient reported significant functional impairment, including difficulty with mastication, speech, and swallowing, associated with marked psychosocial discomfort related to her oral condition.

2.2 Medical History

One year prior to referral, the patient had initially presented to the hospital with progressive swelling in the right mandibular region. Her medical history was notable for well-controlled arterial hypertension managed with dual antihypertensive therapy. She also reported long-term supplementation with calcium and vitamin D. No allergies to medications or dental materials were reported. Extraoral examination revealed a firm, bony swelling involving the right body of the mandible. Sensory examination demonstrated preserved light-touch sensation in the territory of the mental nerve. Intraoral examination confirmed the presence of a palpable swelling extending from the mandibular molar region toward the lower incisor area. The oral cavity was completely edentulous. A right mandibular tumefaction with cortical expansion measuring approximately 6 × 3 cm was observed, extending from the canine to the molar region Panoramic radiography demonstrated a multilocular radiolucent lesion involving the right mandibular body. The lesion extended from the second molar region anteriorly toward the lower incisors and vertically to the lower border of the mandible, raising concern for a possible pathological fracture (Figure 1a).

Based on the clinical and radiographic findings, the initial differential diagnosis included a cystic lesion or a benign odontogenic tumor. Aspiration of the lesion yielded negative results, favoring a solid tumoral process. The provisional diagnosis therefore included ameloblastoma or central giant cell granuloma, without excluding other rare benign tumors. Further laboratory investigations revealed hypercalcemia, hypophosphatemia, and elevated parathyroid hormone (PTH) levels, strongly suggesting primary hyperparathyroidism.

An excisional biopsy was subsequently performed. Histopathological examination showed a tumoral proliferation rich in multinucleated giant cells,

associated with a small population of mononuclear stromal cells. The basal epithelial layer remained preserved, and the mitotic index was negligible (Figure 2).

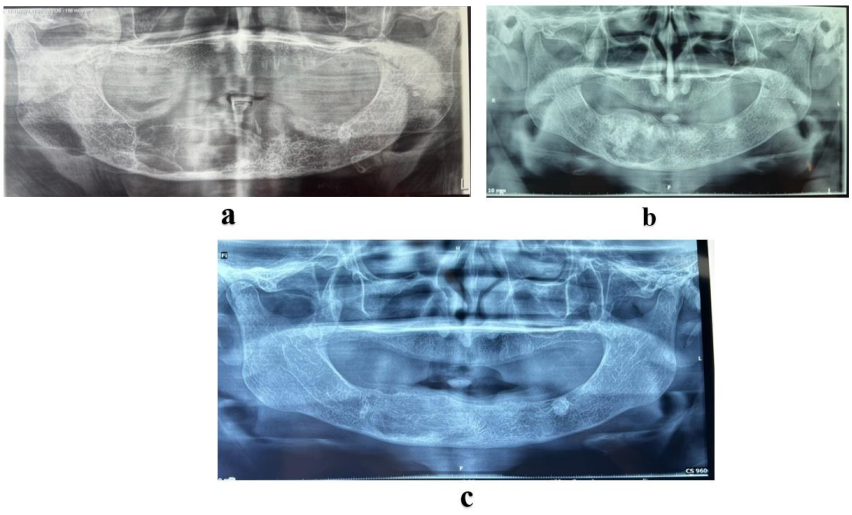

Figure 1: a: Initial panoramic radiograph; b: Panoramic radiograph in 2022; c: Orthopantomogram at 5 years showing a complete healing of the bony lesion

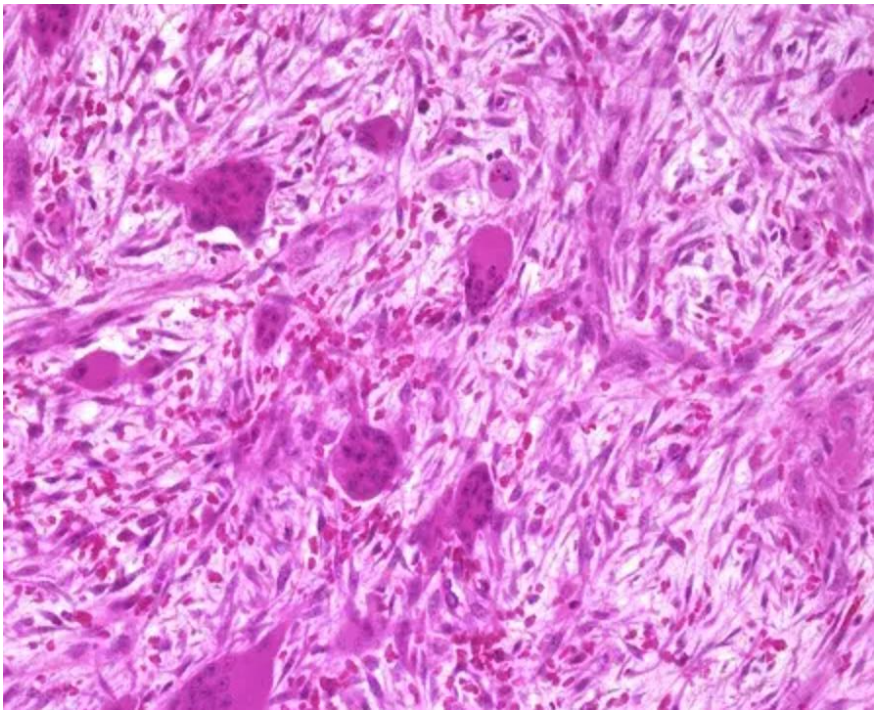

Figure 2: Histological section showing multinucleated giant cells dispersed within a spindle-shaped mononuclear stromal background, characteristic of central giant cell granuloma (H&E stain, ×40)

Cervical ultrasonography revealed the presence of a left parathyroid adenoma, confirming the diagnosis of primary hyperparathyroidism. Given the biochemical abnormalities and histopathological findings, the mandibular lesion was ultimately diagnosed as a brown tumor secondary to primary hyperparathyroidism. A bone scintigraphy was subsequently performed and demonstrated a hyperfixating mandibular focus on the right side, with no evidence of distant skeletal involvement (Figure 3).

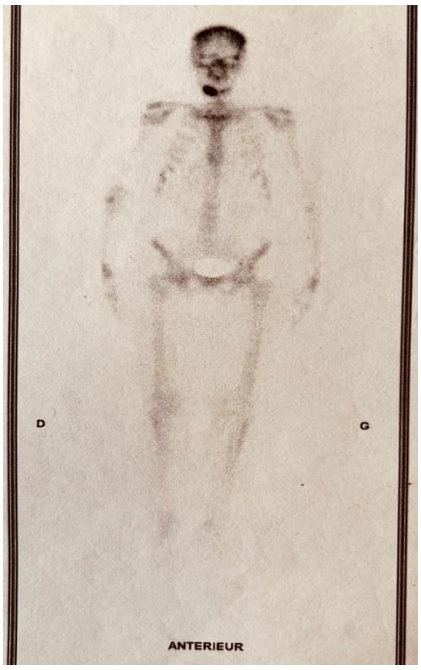

Figure 3: Bone scintigraphy showing increased radiotracer uptake in the right mandibular region without evidence of distant skeletal involvement

The therapeutic strategy focused on the treatment of the underlying endocrine disorder. The patient underwent surgical excision of the parathyroid adenoma by a specialized surgical team. The first radiological follow-up at 8 months demonstrated the onset of bone healing, with a slight horizontal reduction in the lesion's dimensions (Figure1b).

The second follow-up at 5 years revealed marked and complete re-ossification of the lesion (Figure1c). Cone-beam computed tomography (CBCT) showed a reduction in buccolingual bone expansion, with bone density corresponding to type III according to the Lekholm and Zarb classification (1985) (Figure 4).

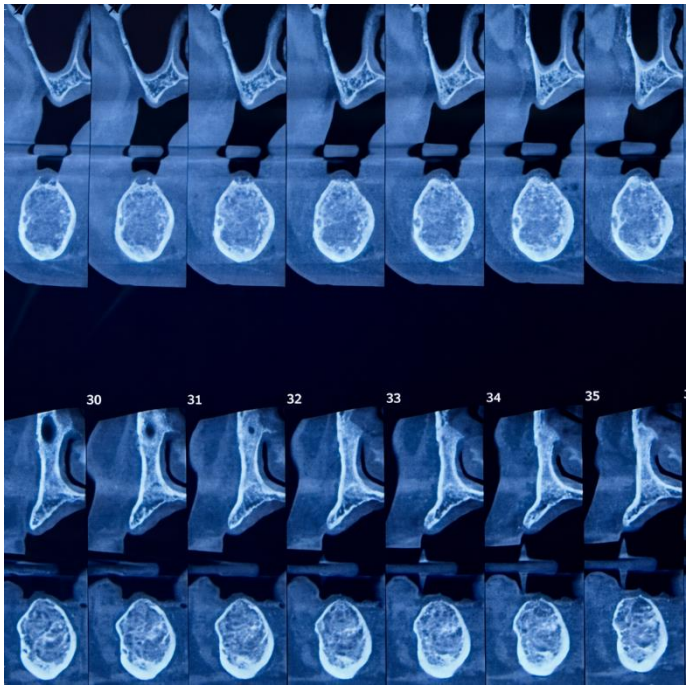

Figure 4: CBCT image demonstrating reduced buccolingual bone expansion and bone density corresponding to type III

2.3 Prosthodontic Clinical Findings

Following endocrine management, a comprehensive oral examination was performed as part of the prosthodontic rehabilitation planning.

Extraoral examination showed no facial asymmetry or submandibular swelling. Intraoral examination revealed complete maxillary edentulism with Atwood Class III alveolar resorption and complete mandibular edentulism with severe Atwood Class IV resorption.

The oral mucosa appeared healthy overall. However,

a fibrous thickening in the right vestibular region, corresponding to the previous site of the mandibular brown tumor, was observed. This thickening was associated with a marked reduction in the inferior vestibular depth, representing a significant anatomical challenge for mandibular denture retention. The mandibular ridge was firm, non-tender, and clinically stable, with no abnormal mobility or mucosal dehiscence (Figure 5).

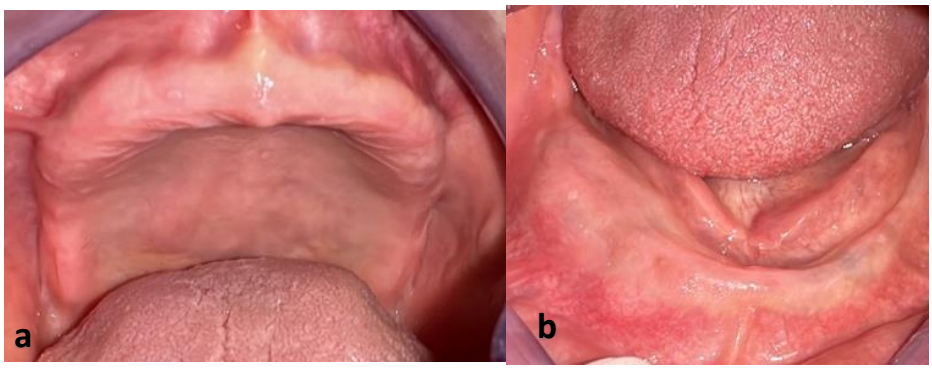

Figure 5: a: Intraoral view of the maxilla; b: Intraoral view of the mandible with brown tumor on the right side

2.4 Therapeutic Intervention

The therapeutic approach was distinctive for its coordinated multidisciplinary planning. Instead of conventional fragmented management, a guided mandibular osseous recontouring procedure was preoperatively designed to pursue two simultaneous objectives: (1) surgical safety through controlled bone remodeling aimed at minimizing fracture risk, and (2) optimization of the denture bearing surface to enhance mandibular prosthetic retention despite severe Atwood Class IV resorption. The surgical guide was fabricated on a preoperative mandibular cast after waxing the desired alveolar contour corresponding to the planned denture bearing zone. Although initially tissue supported, the guide was positioned after elevation of a full thickness mucoperiosteal flap, allowing stable seating on residual anatomical landmarks and multiple contact points on the exposed alveolar crest. It therefore acted as a three-dimensional reference for controlled, conservative smoothing and leveling of the crest, rather than for aggressive bone reduction, ensuring that bone removal was limited to the minimal volume required to regularize the ridge and improve vestibular depth. A preoperatively validated guide, derived from three-dimensional anatomical assessment, thus enabled precise contouring of the residual osteolytic area and systematic leveling of the mandibular alveolar crest in accordance with prosthodontic requirements (Figure 6). This proactive strategy tailored the osseous foundation to prosthodontic biomechanical demands, directly addressing the challenges posed by reduced vestibular depth and residual scar tissue at the brown tumor site, anatomic constraints that would typically jeopardize denture retention and stability. Rather than relying solely on prosthetic compensation, the surgical recontouring optimized the underlying foundation for denture support and long-term retention.

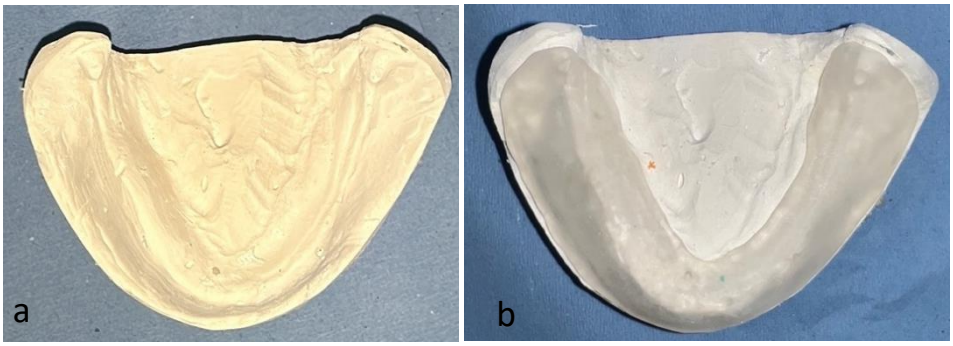

Figure 6: a: Surgical model demonstrating planned mandibular osseous recontouring. b: Custom surgical guide on recontouring model

Comprehensive preoperative optimization included nutritional counseling with protein-enriched diet,

adjustment of antihypertensive treatment (target <130/80 mmHg), calcium-vitamin D supplementation, chlorhexidine 0.12% mouthrinses initiated three days preoperatively, and structured psychological counseling to address anticipatory anxiety.

Preoperatively, prophylactic antibiotic coverage was provided with amoxicillin–clavulanic acid (2 g administered one hour before surgery). The procedure was then performed under local anesthesia, using a previously validated surgical template to guide the intervention. After reflection of the mucoperiosteum to expose the bone irregularity, conservative osseous recontouring of the right mandibular body was carried out, consisting of meticulous smoothing of osseous hypertrophy areas and systematic leveling of the mandibular alveolar crest, and the removal of excess soft tissues with soft tissue scissors (Figure 7). The intraoperative course was uneventful**,** with no complications observed. Postoperatively**,** analgesic management included tramadol (50 mg every 6 hours) for three days, with metoclopramide prescribed on an as-needed basis to control nausea.

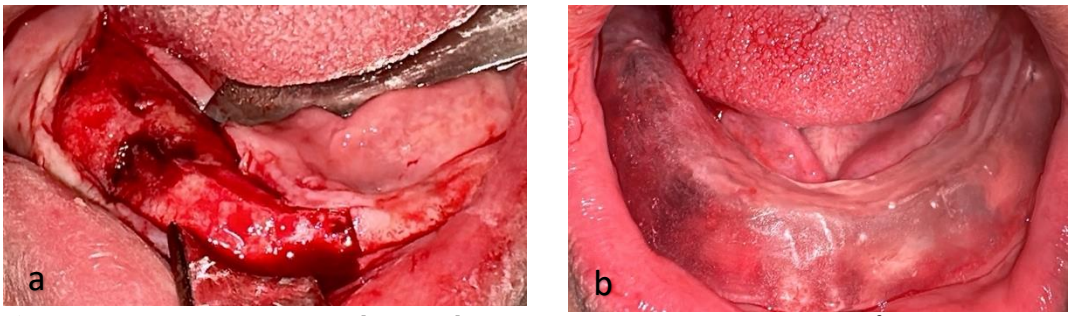

Figure 7: a: Intraoperative view showing the conservative osseous recontouring after mucoperiosteal flap reflection. b: Immediate placement of the surgical guide following the excision of excess soft tissues

After complete soft tissue and bone healing at three months (Figure 8 a), the prosthodontic phase commenced. Anatomical and functional impressions of the maxillary and remodeled mandibular ridges were made, and maxillomandibular relationships were established through careful vertical dimension of occlusion determination. The maxillary complete denture was fabricated according to conventional protocols. The mandibular complete denture required specific design modifications due to surgically modified bone anatomy and severe residual resorption. Reduced vestibular depth and residual scar tissue necessitated refinement of the mandibular vestibular support zone with optimized flange extension. Precise border molding maximized denture extension and mechanical retention despite Atwood Class IV ridge morphology. Both dentures were fabricated in heat-polymerized acrylic resin with meticulous occlusal adjustment. Initial clinical adaptation included selective pressure relief, fine occlusal adjustments, and comprehensive patient instruction in denture care (Fig 8 b,c,d).

2.5 Follow-up and Outcomes

Postoperative clinical assessments at days 7, 14, 21, and 30 confirmed uneventful surgical healing with excellent treatment compliance and satisfactory oral hygiene. At three months, comprehensive clinical and radiographic evaluation demonstrated complete absence of tumor recurrence, stable mandibular architecture, and successful bimaxillary prosthetic adaptation. Full functional restoration of mastication, phonation, and swallowing was achieved. No perioperative complications or adverse events were recorded.

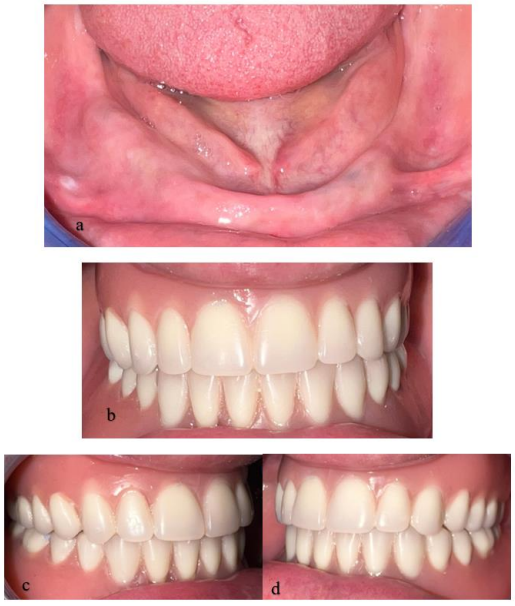

Figure 8: a: Brown tumor regression post-cicatrization; Complete bimaxillary denture rehabilitation: frontal occlusal (b), right lateral (c), and left lateral (d) views demonstrating final esthetic and functional outcomes

3. Discussion

Brown tumor represents a rare manifestation of primary hyperparathyroidism with reported incidence between 1.5% and 15% (8), demonstrating preferential mandibular localization in patients over 50 years of age (9). Following parathyroidectomy, approximately 90% of brown tumors exhibit near-complete regression within 6 to 10 months; however, substantial initial lesion size may necessitate 2 to 5 years for complete osseous remineralization. Progressive radiographic documentation confirming the characteristic "ground glass" pattern typical of post-parathyroidectomy bone healing demonstrates favorable and predictable disease evolution (10).

This case is distinguished by its integrated multidisciplinary approach in which guided osseous recontouring simultaneously optimized surgical safety through controlled bone remodeling minimizing fracture risk and prosthodontic objectives through optimization of the denture-bearing surface. Unlike conventional fragmented management, this direct coordination of surgical and prosthodontic planning objectives represents a substantial innovation for prosthodontic rehabilitation in medically complex patients.

The three-dimensional surgical guide, validated preoperatively, enabled precise ablation of excessive bone while optimizing the alveolar crest according to biomechanical requirements of the denture. This proactive approach directly addressed the major anatomic challenge posed by severe Atwood Class IV mandibular resorption combined with reduced vestibular depth and residual scar tissue, anatomic limitations typically incompatible with adequate denture retention.

Close coordination among endocrinology, oral and maxillofacial surgery, and prosthodontics facilitated optimal rehabilitation. The timing of prosthodontic intervention at three months post-recontouring, permitting complete soft tissue healing and osseous stabilization, aligned with contemporary recommendations. Structured preoperative psychological counseling proved essential, as psychosocial adaptation significantly influences prosthodontic success in complex edentulous cases (11).

At three months post-insertion, the patient demonstrated complete functional restoration encompassing mastication, phonation, and swallowing, with radiographically confirmed absence of tumor recurrence and optimal mandibular structural integrity. These remarkable outcomes attest to the efficacy of this integrated approach.

Few reports document the integrated endocrine-surgical-prosthodontic continuum or emphasize joint optimization of surgical objectives coordinated with prosthodontic requirements through preoperative planning. This case addresses this gap by demonstrating the clinical feasibility and efficacy of truly coordinated multidisciplinary planning. The guided osseous recontouring approach, validated through preoperatively designed surgical guides, represents an innovation transferable to patients with other conditions associated with severe mandibular resorption including idiopathic atrophy, tumor sequelae, and post-traumatic deformities, thereby enhancing the general applicability of this strategy in contemporary prosthodontic practice (12).

4. Conclusions

This case report underscores the importance of individualized prosthodontic adaptation in the face of compromised mandibular anatomy. The functional and esthetic success achieved three months' post-insertion confirms that refined prosthodontic techniques, combined with optimal surgical preparation, can compensate for severe anatomic limitations and restore quality of life in complex edentulous patients.

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