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Mandibular Reconstruction: The Pathology And Its Impact On Over All Prognosis

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Abstract

Introduction: *Mandibular reconstruction plays a pivotal role in the multidisciplinary management of patients with mandibular defects caused by a range of pathologies.* ***Objective:*** *The main objective pf the study is to find the Mandibular [1]Reconstruction, its pathology and its impact on over all prognosis.* ***Methodology:*** *This descriptive cross-sectional study. Patients were selected from six referral units within the Oral and Maxillofacial Surgery (OMFS) department at KTDH. The study included 88 patients from various regions of the country who presented to Khartoum Teaching Dental Hospital (KTDH) with mandibular continuity defects resulting from tumor resection or other causes.* ***Results:*** *Complications were categorized into recipient site, donor site, and general complications. Four patients had documented assessments of soft tissue graft viability. One was assessed based on color, two used needle prick, and one used ultrasound. No surgeons employed Doppler ultrasound or other imaging techniques. The overall graft success rate was 69.3% (61 patients). Of these, 34 patients (48.4%) had successful reconstruction with primary soft tissue healing, while failure occurred in 18 cases (20.5%).* ***Conclusion:*** *It is concluded that mandibular reconstruction is an effective procedure for restoring function and aesthetics in patients with mandibular defects caused by various pathologies. The majority of patients experience successful graft healing, minimal complications, and high satisfaction rates.*

Introduction

Mandibular reconstruction plays a pivotal role in the multidisciplinary management of patients with mandibular defects caused by a range of pathologies. The mandible, a critical component of the facial skeleton, contributes to essential functions such as speech, chewing, swallowing, and facial aesthetics. Any significant deformity or resection due to disease can lead to profound physical and psychological challenges for the patient. Understanding the pathology that leads to mandibular reconstruction, as well as the reconstruction techniques available, is vital to improving patient outcomes. Several conditions may necessitate the surgical resection of part or all of the mandible. The most common cause of mandibular defects is head and neck cancers, particularly oral squamous

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cell carcinoma. In these cases, oncologic surgery often requires extensive resection of the jaw to ensure complete removal of the tumor and to achieve clear margins. Other malignancies, such as osteosarcomas or metastatic cancers, may also necessitate mandibular resection. In addition to malignant conditions, benign tumors such as ameloblastoma, odontogenic keratocysts, and fibrous dysplasia can also require surgical intervention, especially when they are large or recurrent. These benign tumors, although not life-threatening, can cause significant deformity and functional impairment due to their location in the mandible. Additionally, osteonecrosis of the jaw (ONJ), particularly in patients undergoing radiation therapy for head and neck cancers or those receiving bisphosphonate therapy for osteoporosis, can result in bone death. This condition often leaves patients with significant defects in the mandible, requiring reconstructive surgery. Congenital anomalies such as hemifacial microsomia and other craniofacial syndromes may also involve the mandible, necessitating reconstructive procedures to restore proper facial symmetry and function. In some cases, these surgeries are performed in childhood and require revision during adulthood. The overall prognosis of patients requiring mandibular reconstruction depends on several factors, including the underlying pathology, the extent of the defect, and the timing of intervention. For patients with cancer, prognosis is heavily influenced by the stage and aggressiveness of the tumor, as well as the completeness of tumor resection. In cases of malignancy, the goal of mandibular resection is to achieve clear oncologic margins while minimizing functional and aesthetic deficits. Reconstructive surgery plays a key role in improving postoperative quality of life, allowing patients to regain essential functions such as eating and speaking, which are often compromised by the disease itself or by the surgery needed to remove it. Reconstruction techniques vary widely depending on the defect size and location, the patient's condition, and the availability of donor tissues. Free flap reconstruction, such as the fibula free flap, is considered the gold standard for large defects as it allows for both structural support and the restoration of vascularized bone, which is essential for successful healing and rehabilitation. Free flap techniques have significantly improved the long-term outcomes of patients undergoing mandibular reconstruction by providing durable, functional, and aesthetic solutions. Implant-based reconstructions may also be considered in cases of smaller defects, where prosthetic devices are used to replace missing bone or restore occlusion. Advances in 3D imaging and printing technologies have revolutionized this field, allowing for patient-specific implants and custom-designed solutions that improve both function and aesthetics. Mandibular reconstruction is not only about restoring physical structures; it also has a profound impact on the patient's mental health and social interactions. Loss of facial symmetry, impaired speech, and difficulty eating can severely affect a patient's self-esteem and ability to engage in daily activities. Successful reconstruction improves quality of life by restoring both functional and aesthetic outcomes. Studies have shown that patients who undergo mandibular reconstruction report improved satisfaction with their appearance, greater ease in social interactions, and enhanced overall well-being.

Objective

The main objective pf the study is to find the Mandibular Reconstruction, its pathology and its impact on over all prognosis.

Methodology

This descriptive cross-sectional study. Patients were selected from six referral units within the Oral and Maxillofacial Surgery (OMFS) department at KTDH. The study included 88 patients from various regions of the country who presented to Khartoum Teaching Dental Hospital (KTDH) with mandibular continuity defects resulting from tumor resection or other causes.

Inclusion Criteria:

1. Patients who underwent mandibular reconstruction
2. Patients aged> 18 years.
3. Patients who had completed at least a 6-month postoperative follow-up to assess both immediate and short-term outcomes.

Exclusion Criteria:

1. Patients who had partial procedures or did not complete the full course of mandibular reconstruction were excluded.
2. Patients with serious comorbid conditions, such as advanced cardiovascular disease, uncontrolled diabetes, or active cancer, were excluded to avoid skewing results due to unrelated health factors.
3. Patients who had undergone previous mandibular reconstruction were excluded to ensure the study focused on first-time reconstructive outcomes.

Data Processing:

Data was collected using a pre-designed form created by the author. The form captured various factors influencing the reconstructive procedure, including:

- Personal data
- Pathology
- Type of resection
- Site and type of reconstruction
- Complications
- Follow-up outcomes

Data Analysis:

The data were analyzed using SPSS statistical software (version 29), and results were presented in descriptive and tabular formats.

Ethical Considerations:

All clinical information was obtained with the consent of patients or their guardians. Ethical clearance was granted by the hospital's ethical committee

Results

Complications were categorized into recipient site, donor site, and general complications. Four patients had documented assessments of soft tissue graft viability. One was assessed based on color, two used needle prick, and one used ultrasound. No surgeons employed Doppler ultrasound or other imaging techniques. The overall graft success rate was 69.3% (61 patients). Of these, 34 patients (48.4%) had successful reconstruction with primary soft tissue healing, while failure occurred in 18 cases (20.5%). Fourteen grafts were removed, and two were replaced. re were no cases of reconstruction plate or miniplate fractures. However, six reconstruction plates (6.8%) were extruded, two intraorally (2.3%) and four extraorally (4.5%). Loosening occurred in four cases (4.5%). Eighty-four patients (95.5%) had long-term follow-up, while four cases (4.5%) had short-term follow-up. The majority of patients (86, 97.7%) had strong family support during their treatment, with only two patients (2.3%) lacking family support. A statistically significant relationship was found between family support and reconstruction success ($p=0.01$). No patient received dental rehabilitation. Sixty-six patients (75%) returned to work, while 22 (25%) did not. Patient satisfaction was high, with 80 patients (90.9%) reporting satisfaction, and 8 patients (9.1%) expressing dissatisfaction when asked directly about their satisfaction with the surgery results.

Table 1: Complications and Graft Success

Category	Details	Number of Cases	Percentage (%)
Recipient Site Complications	Soft Tissue Graft Viability Assessed (Color)	1	1.1%
	Soft Tissue Graft Viability Assessed (Needle Prick)	2	2.3%
	Soft Tissue Graft Viability Assessed (Ultrasound)	1	1.1%
Donor Site Complications	None reported	-	-
General Complications	None reported	-	-
Graft Success Rate	Successful Reconstruction with Primary Healing	34	48.4%
	Graft Failure	18	20.5%
	Grafts Removed	14	-
	Grafts Replaced	2	-
Hardware Complications	Reconstruction Plate Extrusion (Intraoral)	2	2.3%
	Reconstruction Plate Extrusion (Extraoral)	4	4.5%
	Loosening of Hardware	4	4.5%

Table 2: Follow-Up Outcomes and Patient Satisfaction

Category	Details	Number of Cases	Percentage (%)
Follow-Up	Long-Term Follow-Up	84	95.5%
	Short-Term Follow-Up	4	4.5%
Family Support	Strong Family Support	86	97.7%
	Lack of Family Support	2	2.3%
Return to Work	Returned to Work	66	75.0%
	Did Not Return to Work	22	25.0%
Patient Satisfaction	Satisfied	80	90.9%
	Unsatisfied	8	9.1%

Discussion

Several key observations can be drawn from the results, providing valuable insights into the effectiveness of the procedures, potential challenges, and factors influencing patient recovery and satisfaction. The assessment of soft tissue graft viability at the recipient site showed relatively low complication rates, with only 1.1% of cases evaluated based on color and another 2.3% through needle prick. Ultrasound evaluation was also used in 1.1% of cases, suggesting that clinical methods are utilized based on the specific circumstances of each case. Overall, the low percentage of complications indicates that tissue viability is well-maintained in the majority of patients. Notably, no donor site or general complications were reported in the dataset. This suggests that the harvesting of donor tissue was performed with minimal issues, and patients did not experience systemic complications related to the surgery. However, this should be interpreted cautiously, as complications may still occur in other settings, depending on factors such as patient health and the extent of surgery. The success rate of mandibular reconstruction appears promising, with 48.4% of patients experiencing successful reconstruction with primary healing. However, a significant portion of patients (20.5%) experienced graft failure, necessitating additional interventions such as graft removal (14 cases) or graft replacement (2 cases). These findings highlight the importance of close monitoring post-surgery, as well as the potential need for revision surgeries in a subset of patients. Although graft failure occurs in a notable proportion, many patients still achieve successful outcomes, and improvements in surgical techniques and postoperative care may further enhance success rates. Hardware-related complications were also observed, with 2.3% of patients experiencing intraoral reconstruction plate extrusion and 4.5% experiencing extraoral extrusion. Additionally, 4.5% of patients reported loosening of hardware. These complications can affect the stability of the reconstruction and may require further surgical intervention to address the issues. Given the significant role hardware plays in maintaining structural integrity post-reconstruction, the rate of complications, while not insignificant, suggests that most patients tolerate the implants relatively well. The majority of patients (95.5%) underwent long-term follow-up, which is critical for detecting late complications, ensuring graft success, and optimizing functional outcomes. The small percentage of patients with short-term follow-up (4.5%) suggests that nearly all patients were actively engaged in their postoperative care, which is a positive indicator of both patient compliance and the healthcare team's efforts in managing recovery. Long-term follow-up is essential in monitoring graft success, hardware integration, and the overall rehabilitation process, contributing to better prognosis and reduced risk of complications. Family support was reported as strong in 97.7% of cases, indicating that most patients had a solid support system during their recovery process. This factor is often critical for successful rehabilitation, as patients with robust family support are more likely to adhere to postoperative care recommendations, attend follow-up visits, and engage in necessary rehabilitation activities. The 2.3% of patients who lacked family support may face greater challenges in their recovery, and this underscores the need for additional support systems, such as counseling or social services, to assist patients in these situations. The data indicates that 75.0% of patients were able to return to work following their recovery, which is a significant marker of functional success and quality of life. Returning to work often signifies that patients have regained sufficient oral function, physical endurance, and psychological well-being. However, 25.0% of patients were unable to return to work, suggesting that a quarter of patients may experience ongoing difficulties, whether due to functional limitations, complications, or other factors. These cases may benefit from extended rehabilitation programs or additional support to facilitate a more successful return to daily activities and employment. Patient satisfaction, as reported in 90.9% of cases, indicates a high level of overall contentment with the outcomes of the surgery. Satisfied patients likely experienced successful graft healing, minimal complications, and regained functionality. On the other hand, 9.1% of patients were unsatisfied, which could be attributed to complications, poor functional outcomes, or unmet aesthetic expectations. The relatively high satisfaction rate is a testament to the success of modern mandibular reconstruction techniques but also highlights the need for managing patient expectations and addressing complications promptly to improve satisfaction levels further.

Conclusion

It is concluded that mandibular reconstruction is an effective procedure for restoring function and aesthetics in patients with mandibular defects caused by various pathologies. The majority of patients experience successful graft healing, minimal complications, and high satisfaction rates. However, challenges such as graft failure, hardware complications, and difficulties in returning to work highlight the need for ongoing advancements in surgical techniques and postoperative care. Strong family support and long-term follow-up are crucial in ensuring optimal outcomes and patient recovery.

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