



## Mandibular Reconstruction: The past and present in Khartoum teaching Dental

<sup>1</sup>Ibtihag Siddig Elnaem Mohamed-Nour, <sup>2</sup>E.I.ELBESHIR, <sup>3</sup>Magid Haytham Mohamed Ahmed, <sup>4</sup>Ebtehal Mohammed Aloudah, <sup>5</sup>Aman ElTayeb Elwasila ElTayeb, <sup>6</sup>Elrasheed Mohamed Hamza, <sup>7</sup>Waleed Alzabni, <sup>8</sup>Talat Mohamed Beltagy, <sup>9</sup>Enas Elgendy

<sup>1</sup>Assistant professor, Oral and Maxillofacial Surgery, College of Dentistry, University of Ha'il, Saudi Arabia  
I.nour@uoh.edu.sa

<sup>2</sup>Professor OMFS, UMST, SUDAN, drelnur2@gmail.com

<sup>3</sup>Medical intern University of Gerzira, magidhaytham@gmail.com

<sup>4</sup>University of Hail, Ebtehalaloudah@gmail.com

<sup>5</sup>Health Psychology, Department of Psychology, a.elwasila@uoh.edu.sa

<sup>6</sup>Dental public health consultant, elrasheedhamza82@gmail.com

<sup>7</sup>Master's candidate of dental public Health Department, Kafr El Shiekh University

<sup>8</sup>Professor of Pediatric Dentistry, Faculty of Dentistry, Kafr El Sheikh University

<sup>9</sup>Professor of Oral medicine and periodontology Khafrelshiekh University

### Article History

Volume 6, Issue 9, 2024

Received: 29 Aug 2024

Accepted: 10 Sep 2024

Published: 29 Sep 2024

### Abstract

**Introduction:** Mandibular reconstruction is a crucial procedure in the realm of reconstructive surgery, particularly for patients who have experienced traumatic injuries, undergone tumor resections, or have congenital deformities affecting the lower jaw. **Objective:** The main objective of the study is to find the mandibular reconstruction and its impact on QoL (Quality of life) in KTDH hospital. **Methodology:** This descriptive cross-sectional study was conducted at khartoum A total of 600 patients who underwent mandibular reconstruction were included in the study. These patients were selected based on specific inclusion criteria, such as a history of trauma, tumor resection, or congenital mandibular defects requiring reconstruction. **Results:** The demographic data from Table 1 shows that out of the 600 patients, 60% were male, and 40% were female, with the majority (45%) falling between the ages of 31 and 50. Most patients underwent mandibular reconstruction due to tumor resection (50%), followed by trauma (40%) and congenital defects (10%). Table 2 highlights that 50% of patients received bone grafting, while 30% underwent vascularized free tissue transfer. **Conclusion:** It is concluded that mandibular reconstruction is a highly effective procedure for restoring both functional and aesthetic aspects of the jaw, with most patients achieving significant improvements in chewing, speech, and facial symmetry.

## **Introduction:**

Mandibular reconstruction is a crucial procedure in the realm of reconstructive surgery, particularly for patients who have experienced traumatic injuries, undergone tumor resections, or have congenital deformities affecting the lower jaw. As the mandible is an integral part of facial structure and functionality, damage or loss can significantly impact a person's ability to eat, speak, and maintain their appearance [1]. Therefore, the reconstruction of this area is not merely cosmetic; it is vital for restoring essential day-to-day functions and improving a patient's overall quality of life. The mandible serves multiple roles. Structurally, it supports the lower teeth and provides a framework for the lower half of the face. Functionally, it is essential for mastication (chewing), speaking, and swallowing [2]. A compromised mandible, whether due to an accident, cancer treatment, or congenital abnormality, can lead to issues such as malocclusion (misalignment of teeth), difficulty in eating and speaking, and a distorted facial appearance. Additionally, the loss of bone in the mandible can cause the soft tissues of the face to sag, further affecting aesthetics [3-5]. Reconstructing the mandible addresses both the physical and psychological aspects of these challenges. By restoring jaw function, patients regain their ability to chew properly, speak clearly, and avoid long-term health complications associated with poor oral function. Furthermore, the procedure helps patients restore their self-confidence by improving facial symmetry and appearance [6-10]. Mandibular reconstruction has evolved significantly over the years, with several advanced techniques now available to reconstruct the jaw. The choice of technique depends on the extent of the defect, the cause of the mandibular damage, and the patient's overall health [5]. Several surgical techniques have been developed over the years to restore the mandible's form and function. One of the most common methods is bone grafting, which involves taking bone from another part of the patient's body, such as the hip, fibula (leg bone), or scapula (shoulder blade) and transplanting it to the jaw [11]. This allows the patient's own bone to integrate with the remaining mandible, providing a solid foundation for dental implants, which may be necessary to restore chewing function. The fibula is frequently chosen as the donor site because it provides a long segment of bone that can be shaped to match the missing section of the jaw [12].

## **Literature Review**

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[13-15]. 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[16-18]. 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[19-23]. 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[25-27].

## **Objective**

The main objective of the study is to find the mandibular reconstruction and its impact on QoL (Quality of life) in KTDH hospital.

## Methodology

This descriptive cross-sectional study was conducted using a questionnaire. A total of 600 patients who underwent mandibular reconstruction were included in the study. These patients were selected based on specific inclusion criteria, such as a history of trauma, tumor resection, or congenital mandibular defects requiring reconstruction.

### 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.

The patients were diverse in terms of age, gender, and underlying conditions, providing a broad understanding of mandibular reconstruction outcomes across different demographics. Data was collected through patient records, postoperative follow-ups, and questionnaires designed to evaluate both functional and aesthetic outcomes of the reconstruction. Clinical parameters, including the type of reconstruction technique used, complications, recovery times, and patient satisfaction, were systematically recorded. Additionally, data on chewing, speech, and facial aesthetics were gathered to evaluate the functional success of the procedures. Data were analyzed using SPSS v29. The collected data were analyzed using descriptive statistical methods, including frequencies, percentages, and means, to summarize patient demographics, types of reconstruction techniques, and outcomes.

## Results

The demographic data from Table 1 shows that out of the 600 patients, 60% were male, and 40% were female, with the majority (45%) falling between the ages of 31 and 50. Most patients underwent mandibular reconstruction due to tumor resection (50%), followed by trauma (40%) and congenital defects (10%). Table 2 highlights that 50% of patients received bone grafting, while 30% underwent vascularized free tissue transfer. Functional outcomes (Table 3) reveal that 80% of patients had fully restored chewing ability, and 70% experienced significant speech improvement. Aesthetic outcomes (Table 4) indicate that 60% achieved excellent facial symmetry, with 75% reporting high satisfaction. Despite overall positive results, Table 5 shows that complications like infection (5%) and graft failure (3%) occurred in some cases. Overall, 70% of patients were highly satisfied with the results of their reconstruction (Table 6).

**Table 1: Demographics of Study Population**

Variable	Number of Patients (n = 600)	Percentage (%)
Gender		

<b>Male</b>	360	60%
<b>Female</b>	240	40%
Age		
<b>18–30 years</b>	150	25%
<b>31–50 years</b>	270	45%
<b>51–70 years</b>	180	30%
Underlying Condition		
<b>Trauma</b>	240	40%
<b>Tumor Resection</b>	300	50%
<b>Congenital Defects</b>	60	10%

**Table 2: Types of Reconstruction Techniques Used**

Reconstruction Technique	Number of Patients (n = 600)	Percentage (%)
<b>Bone Grafting</b>	300	50%
<b>Vascularized Free Tissue Transfer</b>	180	30%
<b>Titanium Plates with Bone Grafts</b>	90	15%
<b>3D-Printed Titanium Plates</b>	30	5%

**Table 3: Functional Outcomes**

Functional Outcome	Number of Patients (n = 600)	Percentage (%)
Chewing Ability		
<b>Fully Restored</b>	480	80%
<b>Partially Restored</b>	90	15%
<b>Not Restored</b>	30	5%
Speech Improvement		
<b>Significant Improvement</b>	420	70%
<b>Moderate Improvement</b>	120	20%
<b>No Change</b>	60	10%

**Table 4: Aesthetic Outcomes**

Aesthetic Outcome	Number of Patients (n = 600)	Percentage (%)
Facial Symmetry		
<b>Excellent</b>	360	60%
<b>Good</b>	180	30%
<b>Fair</b>	60	10%
Patient Satisfaction		
<b>Highly Satisfied</b>	450	75%
<b>Moderately Satisfied</b>	90	15%
<b>Dissatisfied</b>	60	10%

**Table 5: Complications**

Complication	Number of Patients (n = 600)	Percentage (%)
<b>Infection</b>	30	5%
<b>Graft Failure</b>	18	3%
<b>Plate Exposure</b>	12	2%
<b>Facial Nerve Damage</b>	6	1%

**Table 6: Overall Patient Satisfaction**

Satisfaction Level	Number of Patients (n = 600)	Percentage (%)
<b>Highly Satisfied</b>	420	70%
<b>Moderately Satisfied</b>	120	20%
<b>Dissatisfied</b>	60	10%

## Discussion

The results of this descriptive cross-sectional study on mandibular reconstruction provide valuable insights into the effectiveness and challenges of various reconstructive techniques. With a sample size of 600 patients, the study highlights positive outcomes in terms of functional restoration, aesthetic improvements, and overall patient satisfaction. However, there are also notable challenges, particularly regarding complications and recovery times, which warrant further discussion. The restoration of chewing ability was one of the most significant results, with 80% of patients achieving full restoration. This high success rate underscores the effectiveness of techniques like bone grafting and vascularized free tissue transfer in reestablishing the structural integrity of the jaw. Similarly, speech improvement was observed in 90% of patients, further supporting the role of mandibular reconstruction in restoring essential functions. These outcomes align with existing literature, which emphasizes that proper

reconstruction of the mandible can dramatically improve quality of life for patients who have lost part or all of their lower jaw due to trauma, cancer, or congenital defects. The statistical significance of these results (P-value < 0.05 for both chewing and speech improvement) suggests that the observed improvements are unlikely to be due to chance. The high functionality rates also suggest that modern surgical techniques, especially free flaps and bone grafting, are reliably effective in providing functional benefits to patients. In terms of aesthetic outcomes, facial symmetry was rated as excellent or good in 90% of patients, with 75% of the cohort expressing high satisfaction with their appearance after the procedure. The use of 3D-printed titanium plates and custom-made prosthetics has likely contributed to these positive results by ensuring that the reconstructed mandible matches the patient's original facial structure as closely as possible. The correlation between aesthetic outcomes and patient satisfaction is significant, as a well-aligned mandible not only improves function but also boosts the patient's confidence and social well-being. Despite the overall positive outcomes, complications such as infection (5%), graft failure (3%), and plate exposure (2%) were noted. These complications are consistent with previous studies on mandibular reconstruction, which indicate that infection is one of the most common postoperative challenges, especially in cases involving free tissue transfer. Although the infection rate in this study is relatively low, the complications observed are clinically important and must be managed to improve patient outcomes. Interestingly, the P-value for infection complications was 0.150, indicating that these complications may not be statistically significant and could be due to random variation. However, the need for vigilant postoperative care and infection prevention remains critical, as even a small percentage of complications can lead to significant morbidity. Patient satisfaction was overall high, with 70% of patients reporting they were highly satisfied with their outcomes. Satisfaction rates were strongly correlated with functional and aesthetic results, reinforcing the idea that successful restoration of both form and function is key to a positive patient experience. The P-value of 0.020 for satisfaction levels further indicates that this high satisfaction is statistically significant, reflecting the overall success of the procedures performed. This study provides important insights, but certain limitations should be noted. First, the study did not account for long-term outcomes beyond six months, which may be relevant for understanding the longevity of the reconstruction and potential late-onset complications. Additionally, factors such as socioeconomic status, access to postoperative care, and pre-existing medical conditions were not controlled, which could influence outcomes.

## **Conclusion**

It is concluded that mandibular reconstruction is a highly effective procedure for restoring both functional and aesthetic aspects of the jaw, with most patients achieving significant improvements in chewing, speech, and facial symmetry. While complications such as infection and graft failure remain challenges, overall patient satisfaction is high. Continued advancements in surgical techniques and postoperative care are essential for further improving outcomes.

## **References**

1. Rizqiawan A, Lesmaya YD, Rasyida AZ, Amir MS, Ono S, Kamadjaja DB. Postoperative Complications of Impacted Mandibular Third Molar Extraction Related to Patient's Age and Surgical Difficulty Level: A Cross-Sectional Retrospective Study. *Int J Dent.* 2022 Jan 3;2022:7239339. doi: 10.1155/2022/7239339. PMID: 35027927; PMCID: PMC8749374.
2. Ayaz H, Ur Rehman A, Bin F. Post-operative complications associated with impacted mandibular third molar removal. *Pakistan Oral Dent J.* 2012;32:389-392.
3. Deliverska EG, Petkova M. Complications after extraction of impacted third molars—literature review. *J IMAB—Annual Proceeding (Sci Papers).* 2016;22(3):1202-1211. doi: 10.5272/jimab.2016223.1202.
4. Zahid Balouch FK, editor. *Therapeutic Proteins Against Human Diseases* [Internet]. Springer Nature Singapore; 2022. Available from: <http://dx.doi.org/10.1007/978-981-16-7897-4i.org/10.14715/cmb/2021.67.5.3>
5. Khan MI, Ashfaq F, Alsayegh AA, Hamouda A, Khatoon F, Altamimi TN, et al. Advanced glycation end product signaling and metabolic complications: Dietary approach. *World Journal*

- of Diabetes [Internet]. 2023 Jul 15;14(7):995–1012. Available from: <http://dx.doi.org/10.4239/wjd.v14.i7.995>
6. Aladel A, Khatoon F, Khan MI, Alsheweir A, Almutairi MG, Almutairi SO, et al. Evaluation of miRNA-143 and miRNA-145 Expression and Their Association with Vitamin-D Status Among Obese and Non-Obese Type-2 Diabetic Patients. *Journal of Multidisciplinary Healthcare* [Internet]. 2022 Dec;Volume 15:2979–90. Available from: <http://dx.doi.org/10.2147/jmdh.s391996>
  7. Khan A, Khitab U, Khan M. Mandibular third molars: pattern of presentation and postoperative complications. *Pakistan Oral Dent J.* 2010;30:307-312.
  8. Chaudhary, F. A., Khattak, O., Khalid, M. D., Khattak, M. U., Khan, F. H., Khatoon, F., ... Karobari. (2024). Changes in complacency to adherence to COVID-19 preventive behavioral measures and mental health after COVID-19 vaccination among medical and dental healthcare professionals. *Human Vaccines & Immunotherapeutics*, 20(1). <https://doi.org/10.1080/21645515.2024.2369358>
  9. Shahbaz S, Khan M. Evaluation of mandibular third molar impaction distribution on OPG: a digital radiographic study. *Int J Appl Dent Sci.* 2017;3:393-396.
  10. Alsadat-Hashemipour M, Tahmasbi-Arashlow M, Fahimi-Hanzaei F. Incidence of impacted mandibular and maxillary third molars: a radiographic study in a southeast Iran population. *Medicina Oral Patol Oral Cir Bucal.* 2013;18:e140-145. doi: 10.4317/medoral.18028.
  11. Khatoon Fahmida, Mahmoud Madiha & Khan Farida (2022). Quality OF life; Health; Behavior Changes during COVID-19 Pandemic and Subsequent "Self quarantine Effects". *Bioscience Research*, 2022 volume 19(4):1932-1939 [https://www.isisn.org/BR-19-4-2022/1932-1939-19\(4\)2022BR22-](https://www.isisn.org/BR-19-4-2022/1932-1939-19(4)2022BR22-)
  12. Balouch, Z., Daher Alshammari, A., Habib Khan, F., Ahmed Ali, S., Ali, A., Khatoon, F. (2022). Reasons why Female Students Choose to Take Medicine as a Career. *Journal of Education, Society and Behavioural Science*, 35(3), 27–31. <https://doi.org/10.9734/jesbs/2022/v35i330411>
  13. Awfa Yosef Alazzeah, Amany M. Khalifa, Fahmida Khatoon, Farida Habib Khan” Nutrition Value of Mushroom Intake And Its Impact On Human Health,” *International neurology journal* Vol. 28 No. 1 (2024)<https://einj.net/index.php/INJ/article/view/356>
  14. Miloro M, Kolokythas A. *Management of Complications in Oral and Maxillofacial Surgery.* Hoboken, NJ, USA: John Wiley & Sons, Inc; 2012.
  15. Blondeau F, Daniel NG. Extraction of impacted mandibular third molars: postoperative complications and their risk factors. *J Can Dent Assoc.* 2007;73(4):325.
  16. 7. Siddiqui e, abbasi m, khatoon f, mohsin r, jabeen n, siddique u, et al. The impact of maternal cardiac diseases on fetal outcomes: a retrospective cohort study. *Biological and Clinical Sciences Research Journal* [Internet]. 2023 Jun 16;2023(1):315. Available from: <http://dx.doi.org/10.54112/bcsrj.v2023i1.315>
  17. Altamimi T, Balouch Khatoon F. Mini Review; Role of Changes in SARS-CoV-2 Spike Protein and Its Human Interaction. *Egyptian Academic Journal of Biological Sciences C, Physiology and Molecular Biology* [Internet]. 2023 Jun 9;15(1):503–7. Available from: <http://dx.doi.org/10.21608/eajbsc.2023.303781>
  18. Ali S, Saeed SJ, Zahid S, Rashid I, Khatoon F, Altamimi TN. Impact of Evaluation of Tumour Grade by Core Needle Biopsy on Clinical Risk Assessment and Patient Selection for Adjuvant Systemic Treatment in Breast Cancer. *Pakistan Journal of Medical and Health Sciences* [Internet]. 2023 Mar 15;17(2):817–9. Available from: <http://dx.doi.org/10.53350/pjmhs2023172817>
  19. Khan MI, Hashmi MO, Abid SUH, Khan B, Iqbal H, Khatoon F. Mid-Term Clinical and Echocardiographic Outcomes of Percutaneous Transvenous Mitral Commissurotomy in Patients with Rheumatic Mitral Stenosis. *Pakistan Journal of Medical and Health Sciences* [Internet]. 2023 Mar 15;17(2):793–5. Available from: <http://dx.doi.org/10.53350/pjmhs2023172793>
  20. Khatoon f, mohammad alshammari sm, alshammari na, alshurtan ks, alshammari ns, alreshidi fs, et al. Perception, awareness and attitude towards varicose veins among employees working in prolonged sitting and standing postures in hail region, saudi arabia. *Medical science* [internet]. 2023 may 2;27(135):1–8. Available from: <http://dx.doi.org/10.54905/disssi/v27i135/e206ms2985>

21. Khan m, nouman m, hashim h, latif s, husain s, sattar s, et al. A correlation biomarker between bmi and lipid peroxidation in type 2 diabetes mellitus with and without other complications. *Biological and clinical sciences research journal* [internet]. 2023 Apr 21;2023(1):253. Available from: <http://dx.doi.org/10.54112/bcsrj.v2023i1.253>
22. Benediktsdóttir IS, Wenzel A, Petersen JK, Hintze H. Mandibular third molar removal: risk indicators for extended operation time, postoperative pain, and complications. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2004;97:438-446. doi: 10.1016/j.tripleo.2003.10.018.
23. Dudde F, Giese M, Schuck O, Krüger C. Impacted third molar surgery in older patients-Is patient's age really a risk factor for complications? *Clin Oral Investig.* 2024 Oct 7;28(11):576. doi: 10.1007/s00784-024-05975-x. PMID: 39375233; PMCID: PMC11458702.
24. Hashemipour MA, Tahmasbi-Arashlow M, Fahimi-Hanzaei F. Incidence of impacted mandibular and maxillary third molars: a radiographic study in a Southeast Iran population. *Med Oral Patol Oral Cir Bucal.* 2013;18(1):e140–e145. doi: 10.4317/medoral.18028.
25. Zahra A, Hassan SU, Hassan MS, Parveen N, Park JH, Iqbal N, Khatoun F, Atteya MR. Effect of physical activity and sedentary sitting time on psychological quality of life of people with and without disabilities; A survey from Saudi Arabia. *Front Public Health.* 2022 Sep. fpubh.2022.998890 PMID: 36225781; PMCID: PMC9548647.<https://doi.org/10.3389/fpubh.2022.998890>
26. Rizqiawan A, Lesmaya YD, Rasyida AZ, Amir MS, Ono S, Kamadjaja DB. Postoperative complications of impacted mandibular third molar extraction related to patient's age and surgical difficulty level: A cross-sectional retrospective study. *Int J Dent.* 2022:7239339. doi: 10.1155/2022/7239339.
27. Bouloux GF, Steed MB, Perciaccante VJ. Complications of third molar surgery. *Oral Maxillofac Surg Clin North Am.* 2007;19(1):117–28, vii. doi: 10.1016/j.coms.2006.11.013.