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The Impact of Multiple Suture Closure Technique on Oral Health-Related Quality of Life (OHRQoL) Following Mandibular Third Molar Surgery

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Abstract: Introduction: Mandibular third molar surgery is commonly associated with postoperative complications which may adversely affect OHRQoL. However, evidence on the effect of multiple suture closure on patient-reported outcomes and clinical recovery remains limited. **Aim:** The aim of the study was to evaluate the impact of multiple suture technique on OHRQoL following mandibular third molar surgery.

Methods: A prospective observational study. Forty-seven patients undergoing surgical removal of impacted mandibular third molars with multiple suture closure technique were consecutively recruited. OHRQoL and clinical recovery were assessed using the OHIP-14 questionnaire and pain intensity, trismus and facial swelling respectively at baseline and on postoperative Day 1, Day 3, Day 7, and one month. Descriptive statistics were used to summarize outcomes while associations between socio-demographic variable and OHRQoL categories were analyzed using Chi-square/Fisher's exact tests. Changes over time were analyzed using repeated measures ANOVA with Greenhouse-Geisser correction, with statistical significance set at $p < 0.05$.

Results: Preoperatively, all participants reported impaired OHRQoL. Severe impact declined progressively over the postoperative period, with no participant reporting severe impact at one month. Repeated measures ANOVA demonstrated significant reductions in pain and trismus over time ($p < 0.0001$), while changes in facial swelling were not statistically significant ($p = 0.189$). No significant associations were found between socio-demographic variables and OHRQoL outcomes at any time point ($p > 0.05$).

Conclusion: The multiple suture technique following mandibular third molar surgery was associated with a progressive improvement in OHRQoL, with near-complete recovery by one month. The technique did not prolong postoperative morbidity thus supporting favourable patient-centered outcomes.

Keywords: Mandibular third molar, multiple suture closure, oral health-related quality of life, OHIP-14, postoperative recovery.

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1. INTRODUCTION

In oral and maxillofacial practice, mandibular third molar surgery is regarded as one of the most commonly performed procedures, often indicated for recurrent pericoronitis, dental

caries, periodontal disease, root resorption of adjacent teeth, or associated pathology.^[1] Although routine, the procedure is frequently followed by postoperative complications such as pain, facial swelling, trismus and haemorrhage in addition to difficulty with eating and speaking [1]. These postoperative

complications, particularly in the early healing phase, may substantially disrupt daily activities and negatively influence patient's overall perception of treatment success.

Increasing emphasis has now shifted towards patient-centered outcomes, especially oral health-related quality of life (OHRQoL), as a critical measure of postoperative recovery. OHRQoL is a multidimensional construct that reflects how oral conditions and treatments can affect physical function, psychological well-being, and social interaction [2, 3]. The assessment of OHRQoL in oral surgery provides insight into patients' subjective experiences, complementing clinical indicators such as wound healing and absence of infection. There are different instruments for measuring OHRQoL. One of such instruments is the Oral Health Impact Profile-14 (OHIP-14), which is validated and has demonstrated reliability in assessing short and medium-term changes in quality of life following third molar surgery [4].

Previous literatures have consistently shown that mandibular third molar extraction leads to a temporary deterioration in OHRQoL, with the greatest impact occurring with the first few postoperative days and gradual improvement subsequently [5, 6]. The extent and duration of this impact are influenced by several factors such as duration of the procedure, extent of bone removal, surgical difficulty, postoperative management and flap design. Among these factors, wound closure technique has been identified as an important but underexplored determinant of postoperative comfort and functional recovery.

Although different closure techniques exist, the multiple suture closure technique is commonly employed following mandibular third molar surgery to achieve optimal flap adaptation, secure haemostasis, and protect the surgical site during the initial phases of healing [7]. This technique involves the placement of more than one suture to approximate wound margins, particularly in cases requiring extensive mucoperiosteal flap elevation [8]. While multiple sutures may enhance wound stability and reduce the risk of clot displacement, they may also increase tissue tension, limit drainage of inflammatory exudates, and complicate oral hygiene practices.^[9] These factors may contribute to increased postoperative pain, swelling, and functional limitation, thereby influencing patients' perceived quality of life [9].

Existing studies on wound closure techniques following third molar surgery have largely focused on comparisons between primary closure and secondary healing or sutured versus sutureless approaches [7, 9-12]. Findings remain inconsistent, with some reporting increased discomfort with extensive suturing and others showing no significant difference in clinical healing outcomes [10-13]. However, evidence specifically evaluating the effect of multiple suture closure technique on OHRQoL using standardized patient-reported outcome measures is limited.

In addition, socio-demographic factors such as age, sex, educational level, occupation, marital status, and ethnicity may influence pain perception, coping mechanisms, and health reporting behaviours, thereby modifying perceived quality of life after surgery.

This study therefore aims to assess the impact of multiple sutures closure technique on OHRQoL following mandibular third molar surgery using OHIP-14 at baseline and at successive postoperative intervals.

2. MATERIALS AND METHODS

2.1. Design of the Study

This was a prospective observational study conducted at a teaching (tertiary) hospital. Ethical approval was acquired from the Ethics and Research Committee of the institution, and written informed consent was obtained from all participants prior to enrolment.

2.2. Population of the Study

Participants were patients indicated for surgical removal of impacted mandibular third molars at the Oral and Maxillofacial Surgery Clinic of the teaching hospital.

2.3. Inclusion Criteria

Patients aged ≥ 18 years who met the National Institute for Health and Clinical Excellence (NICE) guideline for third molar surgery, with moderate Pederson difficulty index, were medically fit (ASA I), literate, had no active infection at the surgical site, and consented to participate [14, 15].

2.4. Exclusion Criteria

Patients with systemic conditions affecting wound healing, pregnancy or lactation, odontogenic infection at the operative site, allergy to prescribed medications, previous surgery at the site, or refusal to consent were excluded.

2.5. Sample Size and Sampling

A total of 47 participants were consecutively recruited and followed up throughout the study period.

2.6. Surgical Procedure

All surgical procedures were performed by the researcher under strict aseptic conditions. Local anesthesia was achieved using 2% lignocaine with 1:100,000 adrenaline administered through inferior alveolar nerve block, lingual and long buccal nerve block. A standard three-sided mucoperiosteal flap was raised, followed by bone guttering under copious irrigation, tooth elevation, and delivery. Sectioning of the tooth was performed where indicated. Bony edges were smoothed down, socket irrigated with sterile normal saline, and haemostasis achieved.

2.7. Closure Technique

In the multiple suture closure technique, sutures were placed at the anterior relieving incision, distal relieving incision, and the interdental papilla distal to the mandibular second molar using 3-0 silk sutures. This technique aimed to ensure flap adaptation and secure wound closure.

2.8. Postoperative Management

All participants received standard postoperative medications, including antibiotics and analgesics, unless contraindicated. Postoperative instructions were provided, and follow-up appointments were scheduled for clinical evaluation on postoperative days 1, 3, 7 and at one month.

2.9. OHRQoL Assessment

OHRQoL was evaluated using the OHIP-14 questionnaire at baseline and subsequent postoperative intervals. Responses were recorded on a five-point Likert scale, with higher scores reflecting greater impairment. Domain-specific impacts were categorized as no, moderate and severe.

2.10. Outcome Measure

The primary outcome was OHRQoL assessed using a modified OHIP-14 questionnaire at baseline, Day 1, Day 3, Day 7, and one month postoperatively.

2.11. Clinical Outcome Measurements

Postoperative clinical recovery was assessed using pain intensity, trismus, and facial swelling at baseline and on postoperative Days 1, 3, 7, and one month. Pain was evaluated using a 10-cm Visual Analogue Scale (VAS). Trismus was assessed by measuring maximum inter-incisal distance between the maxillary and mandibular central incisors in millimeters using a vernier caliper, as described by Ustun *et al.* [33]. Facial swelling was assessed by linear facial width measurements using fixed anatomical landmarks with a tape rule, following the method adopted by Bello *et al.* [34]. All measurements were performed by a trained blinded assistant.

2.12. Data Management and Statistical Analysis

Data were analyzed using IBM SPSS version 24. Descriptive statistics summarized participants' characteristics and outcomes. Associations between socio-demographic factors and OHRQoL categories were evaluated using Chi-square or Fisher's exact tests. Changes in postoperative clinical parameters (pain intensity, facial swelling, and trismus) over time were assessed with repeated measures ANOVA, with statistical significance defined as $p < 0.05$.

3. RESULTS

The distribution of socio-demographic characteristics and OHRQoL findings across the study population are summarized in tables below covering the baseline period and postoperative time points.

Table 1. Baseline OHIP-14 Quality of Life (Multiple Suture Closure Technique).

Variable	Category	No Impact n (%)	Moderate Impact n (%)	Severe Impact n (%)	Total n (%)	p-value
Age (years)						
1	≤20	0(0%)	3(6.4%)	1(2.1%)	4(8.5%)	0.304

At baseline (Table 1), all participants experienced some degree of impairment in OHRQoL, as none reported "no impact". Most patients (87.2%) recorded a moderate level of impact, while 12.8% experienced a severe impact on their OHRQoL. These results highlight the considerable negative effect of impacted mandibular third molars on patients' quality of life before surgical intervention.

On the first postoperative day (Table 2), a small proportion of participants (6.4%) reported no impact on OHRQoL, indicating early signs of postoperative improvement. During this period, 76.6% of patients continued to experience a moderate impact, while the proportion reporting severe impact increased to 17.0%. This pattern suggests that although recovery had begun for some individuals, postoperative symptoms remained prominent for many patients shortly after surgery.

By the third postoperative day (Table 3), further improvement in OHRQoL was observed. At this point, 17.0% of participants reported no impact, 76.6% continued to report moderate impact, and the proportion experiencing severe impact declined markedly to 6.4%. The reduction in severe impact reflects a progressive alleviation of postoperative pain, facial swelling, and functional restrictions commonly encountered after mandibular third molar surgery.

At postoperative Day 7 (Table 1 of the supplementary documents), improvement in OHRQoL became more evident. More than one-quarter of the participants (25.5%) reported no impact on OHRQoL, while 68.1% experienced moderate and 6.4% still reported severe impact.

At the one-month follow-up (Table 4), OHRQoL outcomes showed substantial recovery across the study population. Severe impact was no longer reported by any participant, with 44.7% experiencing no impact and 55.3% reporting moderate impact on OHRQoL.

Analysis of socio-demographic variables revealed no statistically significant relationships between OHRQoL outcomes and age, sex, marital status, religion, educational attainment, occupation, or ethnicity at any assessment point ($p > 0.05$).

In addition, repeated measures ANOVA using the Greenhouse-Geisser Correction (Table 5) were performed to evaluate clinical recovery over time. The result demonstrated a statistically significant change in pain (VAS) scores across postoperative period ($p < 0.0001$), as well as a significant reduction in trismus over time ($p < 0.0001$). However, changes in facial width across the study time points were not statistically significant ($p = 0.189$).

	21–30	0(0%)	19(40.4%)	3(6.4%)	22(46.8%)	
	31–40	0(0%)	16(34%)	1(2.1%)	17(36.2%)	
	>40	0(0%)	3(6.4%)	1(2.1%)	4(8.5%)	
	Total	0(0%)	41(87.2%)	6(12.8%)	47(100%)	
Sex						
2	Male	0(0%)	16(36.2%)	3(12.8%)	19(40.4%)	0.674
	Female	0(0%)	25(40.4%)	3(4.3%)	28(59.6%)	
	Total	0(0%)	41(87.2%)	6(12.8%)	47(100%)	
Marital Status						
3	Single	0(0%)	26(55.3%)	4(8.5%)	30(63.8%)	1.000
	Married	0(0%)	15(31.9%)	2(4.3%)	17(36.2%)	
	Total	0(0%)	41(87.2%)	6(12.8%)	47(100%)	
Religion						
4	Christian	0(0%)	40(85.1%)	6(12.8%)	46(97.9%)	1.000
	Muslim	0(0%)	1(2.1%)	0(0%)	1(2.1%)	
	Total	0(0%)	41(87.2%)	6(12.8%)	47(100%)	
Education						
5	Primary	0(0%)	1(2.1%)	0(0%)	1(2.1%)	1.000
	Secondary	0(0%)	3(6.4%)	0(0%)	3(6.4%)	
	Tertiary	0(0%)	36(76.6%)	6(12.8%)	42(89.4%)	
	None	0(0%)	1(2.1%)	0(0%)	1(2.1%)	
	Total	0(0%)	41(87.2%)	6(12.8%)	47(100%)	
Occupation						
6	Level I	0(0%)	3(6.4%)	0(0%)	3(6.4%)	0.845
	Level II	0(0%)	7(14.9%)	0(0%)	7(14.9%)	
	Level III	0(0%)	9(19.1%)	1(2.1%)	10(21.3%)	
	Level IV	0(0%)	7(14.9%)	2(4.3%)	9(19.1%)	
	Level V	0(0%)	15(31.9%)	3(6.4%)	18(38.3%)	
	Total	0(0%)	41(87.2%)	6(12.8%)	47(100%)	
Ethnicity						
7	Non-Edo Indigenous	0(0%)	15(31.9%)	5(10.6%)	20(42.6%)	0.070
	Edo Indigenous	0(0%)	26(55.3%)	1(2.1%)	27(57.4%)	
	Total	0(0%)	41(87.2%)	6(12.8%)	47(100%)	

Table 2. Day 1 OHIP-14 Quality of Life for Multiple Suture Closure Technique.

Variable	Category	No Impact n (%)	Moderate Impact n (%)	Severe Impact n (%)	Total n (%)	p-value
Age (years)						
1	≤20	0(0%)	2(4.3%)	2(4.3%)	4(8.5%)	0.598
	21–30	2(4.3%)	17(36.2%)	3(6.4%)	22(46.8%)	
	31–40	1(2.1%)	14(29.8%)	2(4.3%)	17(36.2%)	
	>40	0(0%)	3(6.4%)	1(2.1%)	4(8.5%)	
	Total	3(6.4%)	36(76.6%)	8(17%)	47(100%)	
Sex						
2	Male	0(0%)	17(36.2%)	2(4.3%)	19(40.4%)	0.265
	Female	3(6.4%)	19(40.4%)	6(12.8%)	28(59.6%)	
	Total	3(6.4%)	36(76.6%)	8(17%)	47(100%)	
Marital Status						
3	Single	3(6.4%)	23(48.9%)	4(8.5%)	30(63.8%)	0.421
	Married	0(0%)	13(27.7%)	4(8.5%)	17(36.2%)	
	Total	3(6.4%)	36(76.6%)	8(17%)	47(100%)	
Religion						
4	Christian	3(6.4%)	35(74.5%)	8(17%)	46(97.9%)	1.000
	Muslim	0(0%)	1(2.1%)	0(0%)	1(2.1%)	
	Total	3(6.4%)	36(76.6%)	8(17%)	47(100%)	
Education						
5	Primary	0(0%)	1(2.1%)	0(0%)	1(2.1%)	0.501
	Secondary	0(0%)	3(6.4%)	0(0%)	3(6.4%)	
	Tertiary	3(6.4%)	32(68.1%)	7(14.9%)	42(89.4%)	
	None	0(0%)	0(0%)	1(2.1%)	1(2.1%)	
	Total	3(6.4%)	36(76.6%)	8(17%)	47(100%)	
Occupation						
6	Level I	0(0%)	3(6.4%)	0(0%)	3(6.4%)	0.926
	Level II	0(0%)	5(10.6%)	2(4.3%)	7(14.9%)	
	Level III	1(2.1%)	8(17.0%)	1(2.1%)	10(21.3%)	
	Level IV	0(0%)	8(17.0%)	1(2.1%)	9(19.1%)	

	Level V	2(4.3%)	12(25.5%)	4(8.5%)	18(38.3%)	
	Total	3(6.4%)	36(76.6%)	8(17%)	47(100%)	
Ethnicity						
7	Non-Edo Indigenous	0(0%)	16(34%)	4(8.5%)	20(42.6%)	0.375
	Edo Indigenous	3(6.4%)	20(42.6%)	4(8.5%)	27(57.4%)	
	Total	3(6.4%)	36(76.6%)	8(17%)	47(100%)	

Table 3. Day 3 OHIP-14 Quality of Life for Multiple Suture Closure Technique.

Variable	Category	No Impact n (%)	Moderate Impact n (%)	Severe Impact n (%)	Total n (%)	p-value
Age (years)						
1	≤20	0(0%)	4(8.5%)	0(0%)	4(8.5%)	0.730
	21–30	4(8.5%)	17(36.2%)	1(2.1%)	22(46.8%)	
	31–40	4(8.5%)	12(25.5%)	1(2.1%)	17(36.2%)	
	>40	0(0%)	3(6.4%)	1(2.1%)	4(8.5%)	
	Total	8(17%)	36(76.6%)	3(6.4%)	47(100%)	
Sex						
2	Male	3(6.4%)	14(29.8%)	2(4.3%)	19(40.4%)	0.752
	Female	5(10.6%)	22(46.8%)	1(2.1%)	28(59.6%)	
	Total	8(17.0%)	36(76.6%)	3(6.4%)	47(100%)	
Marital Status						
3	Single	5(10.6%)	23(48.9%)	2(4.3%)	30(63.8%)	0.563
	Married	3(6.4%)	13(27.7%)	1(2.1%)	17(36.2%)	
	Total	8(17%)	36(76.6%)	3(6.4%)	47(100%)	
Religion						
4	Christian	8(17%)	36(76.6%)	2(4.3%)	46(97.9%)	0.064
	Muslim	0(0%)	0(0%)	1(2.1%)	1(2.1%)	
	Total	8(17%)	36(76.6%)	3(6.4%)	47(100%)	
Education						
5	Primary	0(0%)	1(2.1%)	0(0%)	1(2.1%)	0.754
	Secondary	1(2.1%)	2(4.3%)	0(0%)	3(6.4%)	
	Tertiary	7(14.9%)	32(68.1%)	3(6.4%)	42(89.4%)	
	None	0(0%)	1(2.1%)	0(0%)	1(2.1%)	

	Total	8(17%)	36(76.6%)	3(6.4%)	47(100%)	
Occupation						
6	Level I	0(0%)	3(6.4%)	0(0%)	3(6.4%)	0.992
	Level II	1(2.1%)	6(12.8%)	0(0%)	7(14.9%)	
	Level III	2(4.3%)	8(17%)	0(0%)	10(21.3%)	
	Level IV	2(4.3%)	6(12.8%)	1(2.1%)	9(19.1%)	
	Level V	3(6.4%)	13(27.7%)	2(4.3%)	18(38.3%)	
	Total	8(17%)	36(76.6%)	3(6.4%)	47(100%)	
Ethnicity						
7	Non-Edo Indigenous	3(6.4%)	15(31.9%)	2(4.3%)	20(42.6%)	0.754
	Edo Indigenous	5(10.6%)	21(44.7%)	1(2.1%)	27(57.4%)	
	Total	3(6.4%)	36(76.6%)	8(17%)	47(100%)	

Table 4. One (1) Month OHIP-14 Quality of Life for Multiple Suture Closure Technique.

Variable	Category	No Impact n (%)	Moderate Impact n (%)	Severe Impact n (%)	Total n (%)	p-value
Age (years)						
1	≤20	3(6.4%)	1(2.1%)	0(0%)	4(8.5%)	0.644
	21–30	10(21.3%)	12(25.5%)	0(0%)	22(46.8%)	
	31–40	7(14.9%)	10(21.3%)	0(0%)	17(36.2%)	
	>40	1(2.1%)	3(6.4%)	0(0%)	4(8.5%)	
	Total	21(44.7%)	26(55.3%)	0(0%)	47(100%)	
Sex						
2	Male	9(19.1%)	11(21.3%)	0(0%)	19(40.4%)	1.000
	Female	12(25.5%)	16(34.0%)	0(0%)	28(59.6%)	
	Total	21(44.7%)	26(55.3%)	0(0%)	47(100%)	
Marital Status						
3	Single	15(31.9%)	15(31.9%)	0(0%)	30(63.8%)	0.375
	Married	6(12.8%)	11(23.4%)	0(0%)	17(36.2%)	
	Total	21(44.7%)	26(55.3%)	0(0%)	47(100%)	
Religion						
4	Christian	20(42.6%)	26(55.3%)	0(0%)	46(97.9%)	0.447
	Muslim	1(2.1%)	0(0%)	0(0%)	1(2.1%)	

	Total	21(44.7%)	26(55.3%)	0(0%)	47(100%)	
Education						
5	Primary	1(2.1%)	0(0%)	0(0%)	1(2.1%)	0.877
	Secondary	1(2.1%)	2(4.3%)	0(0%)	3(6.4%)	
	Tertiary	19(40.4%)	23(48.9%)	0(0%)	42(89.4%)	
	None	0(0%)	1(2.1%)	0(0%)	1(2.1%)	
	Total	21(44.7%)	26(55.3%)	0(0%)	47(100%)	
Occupation						
6	Level I	1(2.1%)	2(4.3%)	0(0%)	3(6.4%)	0.803
	Level II	3(6.4%)	4(8.5%)	0(0%)	7(14.9%)	
	Level III	3(6.4%)	7(14.9%)	0(0%)	10(21.3%)	
	Level IV	5(10.6%)	4(8.5%)	0(0%)	9(19.1%)	
	Level V	9(19.1%)	9(19.1%)	0(0%)	18(38.3%)	
	Total	21(44.7%)	26(55.3%)	0(0%)	47(100%)	
Ethnicity						
7	Non-Edo Indigenous	11(23.4%)	9(19.1%)	0(0%)	20(42.6%)	0.256
	Edo Indigenous	10(21.3%)	17(36.2%)	0(0%)	27(57.4%)	
	Total	21(44.7%)	26(55.3%)	0(0%)	47(100%)	

Table 5. Repeated Measures ANOVA (Greenhouse-Geisser Corrected) Analysis.

Outcome Variable	df (Time, Error)	F value	p-value
Pain (VAS)	2.259; 103.905	855.616	< 0.0001*
Facial Width	1.354; 62.287	1.754	0.189
Trismus	1.600; 73.598	15.679	< 0.0001*

* = Significant difference.

4. DISCUSSION

The present study assessed the impact of multiple suture closure technique on oral OHRQoL after mandibular third molar surgery. The findings from this study demonstrate a progressive improvement in OHRQoL over the postoperative period, with the greatest negative impact observed preoperatively and in the early postoperative days, followed by significant recovery by one month.

At baseline, all participants reported some degree of impact on their quality of life, with the majority experiencing moderate impairment. This finding is consistent with previous

studies which have shown that impacted mandibular third molars can significantly interfere with daily activities and overall well-being. Patients often experience discomfort or pain during mastication, difficulty in speech, and challenges in maintaining adequate oral hygiene due to the presence of the impacted tooth [16-19]. In addition, recurrent inflammation of the surrounding soft tissues, food impaction, and localized infection may further exacerbate functional limitations and discomfort. Beyond the physical symptoms, these conditions can also lead to psychological distress, including anxiety, irritability, and reduced social confidence, particularly when persistent pain or swelling affects normal daily interactions.

On the first postoperative day, a small proportion of patients reported no impact on OHRQoL, suggesting that early recovery and relief from preoperative discomfort had begun in some individuals. However, a notable proportion continued to report moderate and severe impact. This observation reflects the typical early postoperative course following third molar extraction, characterized by pain, swelling, trismus, and difficulty in performing routine oral functions [20, 21]. It is also consistent with existing literature indicating that the first 24–48 hours following mandibular third molar surgery represent the peak period for postoperative morbidity. During this period, patients commonly experience the highest levels of pain, swelling, and functional limitation as a result of the acute inflammatory response triggered by surgical trauma to the tissues. The release of inflammatory mediators such as prostaglandins and cytokines leads to localized edema, increased vascular permeability, and sensitization of nerve endings, which collectively contribute to heightened discomfort [22–24].

By postoperative Day 3, there was a marked reduction in the proportion of participants reporting severe impact, while the majority continued to report moderate effects. This suggests that a gradual resolution of acute postoperative symptoms, including pain, edema, and functional limitation. The decline in severe impact by this time point is consistent with previous studies that reported an improvement in OHRQoL as the inflammatory response subsides and patients' adaptation to postoperative discomfort [18, 26]. This observed trend supports the notion that multiple sutures provide adequate flap stability and promote orderly healing without prolonging severe morbidity.

On postoperative Day 7, further improvement in OHRQoL was observed, with a greater number of participants reporting no impact and a continued decline in severe impact. This period corresponds to the late inflammatory and early proliferative phases of healing, during which pain and swelling diminish, and oral functions gradually normalize [19, 25, 26]. The persistence of moderate impact in some participants may reflect residual discomfort or limitations in jaw movement, which is common in the first postoperative week.

At the one-month follow-up, nearly half of the participants reported no impact, and none experienced severe effects on OHRQoL. This indicates near-complete recovery of functional, psychological, and social aspects of oral health, consistent with the typical healing trajectory following third molar extraction [5, 27]. These findings suggest that the multiple suture closure technique does not adversely affect long-term quality of life and may contribute to secure wound closure and uneventful healing without prolonging patient morbidity. These findings suggest that the multiple suture closure technique does not negatively influence patients' long-term quality of life following mandibular third molar surgery. Despite the initial postoperative discomfort commonly associated with surgical removal of impacted mandibular third molars, the technique appears to support a stable and favorable healing process over time. By ensuring adequate approximation of the surgical wound margins, multiple sutures may enhance wound

stability, minimize the risk of food impaction, and reduce the likelihood of postoperative complications such as wound dehiscence or delayed healing.

Furthermore, socio-demographic variables like age, sex, marital status, education, occupation, religion, and ethnicity were not significantly associated with OHRQoL outcomes at any point. This suggests that the observed patterns of recovery are primarily influenced by the surgical procedure and wound closure method rather than patient-specific demographic factors. Similar findings have been reported in previous studies, indicating that OHRQoL after third molar surgery is largely determined by surgical trauma, flap design, and postoperative care rather than patient characteristics [28–30].

While multiple suture closures have been suggested to potentially increase tissue tension and limit drainage, this study shows that, when properly performed, it does not result in prolonged severe postoperative morbidity or negative impact on OHRQoL. Compared with studies evaluating single-suture or sutureless techniques, the progressive improvement in quality of life in this cohort suggests that multiple sutures provide effective flap adaptation and protection of the surgical site without compromising patient comfort [7]. Nevertheless, careful surgical technique and postoperative management remain crucial to minimizing transient functional limitations.

The results of repeated measures ANOVA (Table 5) further support the observed trends in OHRQoL. There was a statistically significant reduction in pain (VAS) scores over the postoperative period ($p < 0.0001$) and a significant improvement in trismus ($p < 0.0001$), indicating that functional recovery and relief from discomfort occurred progressively. In contrast, changes in facial width were not statistically significant ($p = 0.189$), suggesting that postoperative swelling did not meaningfully impact recovery. These objective clinical findings complement the patient-reported OHRQoL data, providing a more comprehensive understanding of the postoperative outcomes associated with the multiple suture closure technique. While patient-reported measures reflect the subjective experience of recovery, such as perceived pain, functional limitation, and overall well-being, the objective clinical assessments provide measurable evidence of healing and reduction in postoperative complications. The convergence of these two forms of evidence strengthens the reliability of the findings and suggests that the technique is both clinically effective and positively perceived by patients [31, 32].

CONCLUSION

The multiple suture technique following mandibular third molar surgery was associated with a progressive improvement in OHRQoL with the greatest impact occurring preoperatively and during the first postoperative days. Recovery was largely completed by one month, and socio-demographic factors did not significantly influence outcomes. These findings support the continued use of multiple sutures for achieving secure flap closure and favourable patient-centered outcomes in third molar surgery. In addition, the absence of prolonged postoperative morbidity indicates that the multiple suture closure tech-

nique is both clinically effective and patient-friendly, supporting uneventful recovery while maintaining satisfactory long-term OHRQoL outcomes.

DECLARATION OF PATIENT CONSENT

The authors certify that all appropriate consent was obtained for this study. Informed consent was obtained from all participants prior to their inclusion in the study. The participants were adequately informed about the nature, purpose, procedures, potential risks, and benefits of the study. They

were assured that their participation or withdrawal from the study would not affect their standard of care.

FINANCIAL SUPPORT AND SPONSORSHIP

This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this paper.

SUPPLEMENTARY DOCUMENTS

Table 1. Day 7 OHIP-14 Quality of Life for Multiple Suture Closure Technique.

Variable	Category	No Impact n (%)	Moderate Impact n (%)	Severe Impact n (%)	Total n (%)	p-value
Age (years)						
1	≤20	1(2.1%)	2(4.3%)	1(2.1%)	4(8.5%)	0.617
	21–30	7(14.9%)	14(29.8%)	1(2.1%)	22(46.8%)	
	31–40	4(8.5%)	12(25.5%)	1(2.1%)	17(36.2%)	
	>40	0(0%)	4(8.5%)	0(0%)	4(8.5%)	
	Total	12(25.5%)	32(68.1%)	3(6.4%)	47(100%)	
Sex						
2	Male	4(8.5%)	14(29.8%)	1(2.1%)	19(40.4%)	0.133
	Female	8(17.0%)	18(38.3%)	2(4.3%)	28(59.6%)	
	Total	12(25.5%)	32(68.1%)	3(6.4%)	47(100%)	
Marital Status						
3	Single	9(19.1%)	18(38.3%)	3(6.4%)	30(63.8%)	0.265
	Married	3(6.4%)	14(29.8%)	0(0%)	17(36.2%)	
	Total	12(25.5%)	32(68.1%)	3(6.4%)	47(100%)	
Religion						
4	Christian	12(25.5%)	31(66%)	3(6.4%)	46(97.9%)	1.000
	Muslim	0(0%)	1(2.1%)	0(0%)	1(2.1%)	
	Total	12(25.5%)	32(68.1%)	3(6.4%)	47(100%)	
Education						
5	Primary	0(0%)	1(2.1%)	0(0%)	1(2.1%)	0.831
	Secondary	0(0%)	3(6.4%)	0(0%)	3(6.4%)	
	Tertiary	12(25.5%)	27(57.4%)	3(6.4%)	42(89.4%)	
	None	0(0%)	1(2.1%)	0(0%)	1(2.1%)	
	Total	12(25.5%)	32(68.1%)	3(6.4%)	47(100%)	

Occupation						
6	Level I	0(0%)	3(6.4%)	0(0%)	3(6.4%)	0.435
	Level II	1(2.1%)	6(12.8%)	0(0%)	7(14.9%)	
	Level III	2(4.3%)	8(17%)	0(0%)	10(21.3%)	
	Level IV	2(4.3%)	7(14.9%)	0(0%)	9(19.1%)	
	Level V	7(14.9%)	8(17%)	3(6.4%)	18(38.3%)	
	Total	12(25.5%)	32(68.1%)	3(6.4%)	47(100%)	
Ethnicity						
7	Non-Edo Indigenous	7(14.9%)	11(23.4%)	2(4.3%)	20(42.6%)	0.256
	Edo Indigenous	5(10.6%)	21(44.7%)	1(2.1%)	27(57.4%)	
	Total	12(25.5%)	32(68.1%)	3(6.4%)	47(100%)	

APPENDIX I

INFORMED CONSENT FORM

TITLE OF RESEARCH: The impact of multiple suture closure technique on oral health-related quality of life (OHRQoL) following mandibular third molar surgery.

NAME OF RESEARCHER: Dr Ogbob, Chiedu Benz, a Senior Registrar in the Department of Oral and Maxillofacial Surgery, University of Benin Teaching Hospital (UBTH), Benin City.

SPONSORSHIP: The research will be self-sponsored.

PURPOSE OF RESEARCH: The aim of the study is to evaluate the impact of multiple suture technique on OHRQoL following mandibular third molar surgery.

PROCEDURES: This will involve participant's exposure to peri-apical radiographs to assess the type of impaction and to calculate the difficulty index. Trans-alveolar extraction under local anaesthesia for all patients will be performed by a single surgeon. The procedures will be performed under sound hygienic conditions. This will involve the use of sterile aprons for surgeons and patients, sterile surgical handpieces and surgical instruments.

The surgical procedure will be same for all participants and multiple closure technique will be placed for all participants. Sutures will be placed at the anterior relieving incision, distal relieving incision, and the interdental papilla distal to the mandibular second molar using 3-0 silk sutures.

Pre-operative/baseline pain score, maximum mouth opening, facial width measurement on the side planned for impacted third molar surgery will be evaluated/measured and same measurements will be taken on day 1, day 3, day 7 and one month after surgery and recorded in the appropriate appendices. Self-administered Oral Health Impact Profile-14 (OHIP-14) questionnaire will be used to assess OHRQoL at baseline and on day1, day 3, day 7 and one month after surgery.

All patients will be given 500mg amoxicillin manufactured by Beechem and 400mg metronidazole manufactured by May and Baker 8 hourly per oral for five days except patients that are allergic to penicillin and will be placed on 250mg erythromycin 6 hourly. Tablet Diclofenac potassium 50mg by Novartis twice daily will be administered orally as the analgesic for five days. Post extraction instructions will be given to all participants.

COMPENSATION: Participants will not be paid for participating in this research but in the event of injury resulting from this study, medical treatment will be provided by the researcher.

BENEFITS: Relief from pain, improve mouth opening and chewing capacity, prevention of spread of infection, relief from swelling, improve patient's self-esteem and Quality of Life.

DISCOMFORT AND RISKS FROM THE PROCEDURE: Pain, swelling, temporal restriction of mouth opening along with decreased chewing capacity, sensory nerve damage, dry socket, infection, iatrogenic damage to adjacent second molar, iatrogenic mandibular fracture and temporomandibular dislocation.

PERIOD OF TIME REQUIRED: The timing for the procedure is less than an hour but subsequent review visit will be less than 20 minutes.

CONFIDENTIALITY AND ANONYMITY: Any data or questions will remain confidential with regard to participants' identity.

The data collected from participants will be analyzed and findings from the analysis will enable the Oral and Maxillofacial Surgeon evaluate the impact of multiple suture technique on OHRQoL following mandibular third molar surgery.

I certify that I have been adequately informed and that I fully understand the explanations for the research and I voluntarily give the researcher permission for the procedure.

I have been given an opportunity to ask whatever questions I might have, and all questions and enquiries have been answered to my satisfaction.

I further understand that I am free to withdraw my consent and terminate my participation at any time I so wish.

.....
Participant Signature

.....
Date

I, the undersigned, have fully defined and explained the research to the above participants.

.....
Name of Researcher

.....
Researcher's Signature/Date

I was present when the study was explained to the participants and by my observation it was clearly understood by the patients.

.....
Name of Witness

.....
Signature/Date

CONTACT ADDRESSES:

Dr Ogboh, Chiedu Benz. Senior Registrar, Department of Oral and Maxillofacial Surgery, University of Benin Teaching Hospital (UBTH), Benin City, Edo State, Nigeria. Phone No: 08023328233, 08033988329 Email: drbenz2004@gmail.com	Ethics and Research Committee, University of Benin Teaching Hospital (UBTH), Benin City, Edo State, Nigeria. Phone No: 07063331337.
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APPENDIX II

ORAL HEALTH IMPACT PROFILE-14 (OHIP-14)

This questionnaire contains questions regarding the condition of your teeth.

To answer each question, tick one of the following possible answers.

Questions	Never 0	Hardly ever 1	Occasionally 2	Fairly often 3	Very often 4
Q1. Have you been self-conscious because of your teeth, mouth or dentures?					
Q2. Have you had painful aching in your mouth?					
Q3. Have you had difficulty doing your usual jobs because of problems with your teeth, mouth or dentures?					
Q4. Have you had trouble pronouncing any words because of problems with your teeth, mouth or dentures?					

Q5. Have you found it uncomfortable to eat any food because of problems with your teeth, mouth or dentures?					
Q6. Have you been totally unable to function because of problems with your teeth, mouth or dentures?					
Q7. Have you been a bit irritable with other people because of problems with your teeth, mouth or dentures?					
Q8. Have you been embarrassed because of your teeth, mouth or dentures?					
Q9. Have you felt tense because of problem with your teeth, mouth or dentures?					
Q10. Have you had to interrupt meals because of problems with your teeth, mouth or dentures?					
Q11. Have you felt that life in general was less satisfying because of problems with your teeth, mouth or dentures?					
Q12. Has your diet been unsatisfactory because of problems with your teeth, mouth or dentures?					
Q13. Have you found it difficult to relax because of problems with your teeth, mouth or dentures?					
Q14. Have you felt that your sense of taste has worsened because of problems with your teeth, mouth or dentures?					

APPENDIX III

VISUAL ANALOGUE SCALE (VAS)

Instructions:

Please indicate your present level of pain by marking a circle across the point that corresponds with the level of your pain. Utmost accuracy and honesty are required.

0cm “No pain”

APPENDIX IV

PROFORMA A (PRE-OPERATIVE ASSESSMENT)

Serial No: Hospital No:

A. BIODATA

Age ----- Sex ----- Marital Status ----- Tribe ----- Religion -----

Social Habits: Alcohol consumption [], Tobacco use [], Others [please specify] -----

Address-----

Educational Background: None [] Primary [] Secondary [] Postsecondary []

Others (specify) -----

Occupation -----

Phone No. ----- E-mail Address -----

B. CLINICAL ASSESSMENT

i) Site of impacted mandibular third molar tooth extracted: Right side [] Left side []

ii) Indication for Extraction:

Pericoronitis []

Dental Caries []

Periodontal disease []

Prosthetic reasons []

Orthodontic reason []

Others Specify

C) RADIOGRAPHIC ASSESSMENT

a) WINTER'S CLASSIFICATION:

Mesioangular []

Distoangular []

Vertical []

Horizontal []

b) PELL AND GREGORY (RAMUS RELATION)

Class I []

Class II []

Class III []

c) PELL AND GREGORY (OCCLUSAL RELATION)

Position A []

Position B []

Position C []

d) PEDERSON DIFFICULTY INDEX:

Mild (3-4) []

Moderate (5-6) []

Severe (7-10) []

D) DURATION OF THE PROCEDURE FROM THE TIME OF INCISION TO WHEN THE LAST SUTURE WAS PLACED: -----

APPENDIX V

PROFORMA B

BASELINE MEASUREMENTS (30 MINUTES PRIOR TO SURGERY)

SECTION 1; TRISMUS

MAXIMUM INTERINCISAL DISTANCE (MID) IN MILLIMETER (CM)

MID ASSESSMENT IN CM	1 ST	2 ND	TOTAL	AVERAGE
READINGS				

SECTION 2; FACIAL WIDTH

LANDMARKS	TP	TC	LA	TOTAL	AVERAGE
READINGS					

TP = most posterior point on the midline of tragus to soft tissue pogonium.

TC = most posterior point on the midline of tragus to the most lateral point on the corner of the mouth.

LA = Lateral canthus of the eye to the most inferior point on the angle of the mandible.

SECTION 3

VISUAL ANALOGUE SCALE (VAS)

VAS score Reading -----

APPENDIX VI

PROFORMA C

DAY 1 POST-OPERATIVE EVALUATION OF PARAMETERS

SERIAL NO..... HOSPITAL NO.....

SECTION 1; TRISMUS

MAXIMUM INTERINCISAL DISTANCE (MID) IN MILLIMETER (CM)

MID ASSESSMENT IN CM	1 ST	2 ND	TOTAL	AVERAGE
READINGS				

SECTION 2; FACIAL WIDTH

LANDMARKS	TP	TC	LA	TOTAL	AVERAGE
READINGS					

TP = most posterior point on the midline of tragus to soft tissue pogonium.

TC = most posterior point on the midline of tragus to the most lateral point on the corner of the mouth.

LA = Lateral canthus of the eye to the most inferior point on the angle of the mandible.

SECTION 3

VISUAL ANALOGUE SCALE (VAS)

VAS score Reading -----

APPENDIX VII

PROFORMA D

DAY 3 POST-OPERATIVE EVALUATION OF PARAMETERS

SERIAL NO..... HOSPITAL NO.....

SECTION 1; TRISMUS

MAXIMUM INTERINCISAL DISTANCE (MID) IN MILLIMETER (CM)

MID ASSESSMENT IN CM	1 ST	2 ND	TOTAL	AVERAGE
READINGS				

SECTION 2; FACIAL WIDTH

LANDMARKS	TP	TC	LA	TOTAL	AVERAGE
READINGS					

TP = most posterior point on the midline of tragus to soft tissue pogonium.

TC = most posterior point on the midline of tragus to the most lateral point on the corner of the mouth.

LA = Lateral canthus of the eye to the most inferior point on the angle of the mandible.

SECTION 3.

VISUAL ANALOGUE SCALE (VAS)

VAS score Reading -----

APPENDIX VIII

PROFORMA E

DAY 7 POST-OPERATIVE EVALUATION OF PARAMETERS

SERIAL NO..... HOSPITAL NO.....

SECTION 1; TRISMUS

MAXIMUM INTERINCISAL DISTANCE (MID) IN MILLIMETER (CM)

MID ASSESSMENT IN CM	1 ST	2 ND	TOTAL	AVERAGE
READINGS				

SECTION 2; FACIAL WIDTH

LANDMARKS	TP	TC	LA	TOTAL	AVERAGE
READINGS					

TP = most posterior point on the midline of tragus to soft tissue pogonium.

TC = most posterior point on the midline of tragus to the most lateral point on the corner of the mouth.

LA = Lateral canthus of the eye to the most inferior point on the angle of the mandible.

SECTION 3

VISUAL ANALOGUE SCALE (VAS)

VAS score Reading -----

APPENDIX IX

PROFORMA F

ONE MONTH POST-OPERATIVE EVALUATION OF PARAMETERS

SERIAL NO..... HOSPITAL NO.....

SECTION 1; TRISMUS

MAXIMUM INTERINCISAL DISTANCE (MID) IN MILLIMETER (CM)

MID ASSESSMENT IN CM	1 ST	2 ND	TOTAL	AVERAGE
READINGS				

SECTION 2; FACIAL WIDTH

LANDMARKS	TP	TC	LA	TOTAL	AVERAGE
READINGS					

TP = most posterior point on the midline of tragus to soft tissue pogonium.

TC = most posterior point on the midline of tragus to the most lateral point on the corner of the mouth.

LA = Lateral canthus of the eye to the most inferior point on the angle of the mandible.

SECTION 3

VISUAL ANALOGUE SCALE (VAS)

VAS score Reading -----

APPENDIX X

POST EXTRACTION INSTRUCTIONS

Operation Day

- 1) Go home and rest and do not be involved in any strenuous exercise.
- 2) Continue to swallow your saliva (i.e., avoid spitting out) for the next 24 hours.
- 3) Do not disturb the extraction site with your tongue or fingers.
- 4) Avoid taking any hot food or beverages for the next 24 hours.
- 5) Avoid alcohol and smoking for the next 24 hours.
- 6) All these rules are important to prevent bleeding; but if bleeding commences again, apply gauze or a clean handkerchief to the site and hold for 30 minutes. If bleeding persists, please report to the accident and emergency department of the hospital.
- 7) Commence the use of your medications.

The following day

- 1) Commence on the use of warm saline mouthwash. Take a stainless-steel cup, half-filled with warm water, add a level-full teaspoon of salt and shake gently to dissolve. Take some quantity of the water into the mouth and hold the water at the extraction site until water cools. Repeat every 3 hours for the next one week.
- 2) Try and eat normally and ensure routine mouth exercise.
- 3) Report to the clinic on day 1-, 3-, 7- and one-month post operatively; but in case of any complaint any other day, report to the clinic immediately.
- 4) Your doctor's phone number is 08023328233.

APPENDIX XI

Author Information

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Ethical Approval

Ethical approval for this study was obtained from the Ethics and Research Committee of the University of Benin Teaching Hospital (UBTH) with Protocol Number ADM/E22/A/VOL.VII/14734 and written consent were obtained from all eligible patients who participated in the study.

Authors Contributions

Dr. Chiedu Benz Ogboh (Corresponding Author) was responsible for the overall conceptualization of the study and the formulation of the research design. Dr Chiedu coordinated patient recruitment, performed the surgical procedures, and oversaw comprehensive data acquisition. Dr Chiedu also played a central role in the interpretation of findings and undertook the drafting, revision, and finalization of the manuscript. All activities were carried out under the close supervision of Prof Esezobor Peter Egbor ensuring adherence to methodological standards and alignment with the study's scientific objectives.

Prof Esezobor Peter Egbor provided critical oversight throughout the entire course of the research. Their contributions included offering comprehensive methodological guidance, ensuring adherence to sound scientific principles, and providing consistent mentorship from study conception through data interpretation and manuscript writing. Their expertise, diligence, and sustained involvement were instrumental in maintaining the quality, coherence, and overall integrity of the research.

Dr Sylvanus Okey Ugwueze and Dr Aimuamwosa Dannis Osagie contributed meaningfully to the conduct of the study by assisting with patient follow-up assessments, supporting systematic data collection, participating in the literature review process, and aiding in the execution of statistical analyses. Their involvement helped ensure the accuracy, completeness, and methodological soundness of the research data and its interpretation.

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