KNOTLESS BARBED VERSUS POLYDIOXANONE SUTURES FOR INTRAORAL WOUND CLOSURE: A RANDOMIZED COMPARATIVE CLINICAL STUDY

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ABSTRACT

Background: Intraoral sutures remain exposed to saliva, plaque, functional movement and microbial colonisation. Conventional sutures require knots that can concentrate foreign material and local tension, whereas barbed sutures engage tissue along the suture line and permit knotless continuous closure.

Objective: To compare the clinical efficacy of an absorbable knotless barbed suture with a conventional absorbable polydioxanone suture (PDS) for intraoral wound closure.

Methods: This prospective randomised comparative clinical study included 20 patients aged 18-45 years who required closure of a full-thickness gingival or labio-buccal sulcular incision. Ten participants received continuous knotless barbed closure and ten received continuous PDS closure. Wound-closure time, a five-point wound-healing index and a three-point mucosal-scarring index were assessed on postoperative days 3 and 7, at 2 weeks, and at 1 and 3 months.

Results: Mean closure time was 7.9 +/- 1.91 minutes with the barbed suture and 8.8 +/- 2.86 minutes with PDS ($p = 0.419$). The barbed group showed earlier improvement in tissue colour, bleeding on palpation, granulation tissue, incision-margin epithelisation and suppuration. Mucosal colour, contour, suture marks and overall appearance also improved earlier, particularly from day 7 onward. Wound width decreased progressively in both groups without statistically significant intergroup differences.

Conclusion: Within the limitations of a small single-centre sample, absorbable knotless barbed sutures produced favourable early clinical and aesthetic healing without prolonging closure time. Larger trials with concealed allocation, blinded assessment and procedure-specific stratification are needed before routine superiority can be established.

Keywords: barbed suture; polydioxanone; intraoral wound closure; oral surgery; wound healing; mucosal scar; knotless closure

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1. INTRODUCTION

Accurate wound closure is a basic determinant of surgical healing. The suture must hold wound margins in stable apposition, reduce dead space, assist haemostasis and preserve the vascularity of the tissues until the wound can tolerate functional loading. In the oral cavity, this task is complicated by saliva, dense microbial colonisation, continuous movement during speaking and mastication, variable tissue thickness and the difficulty of maintaining a dry operative field. These conditions can promote plaque retention and capillary transport of microorganisms along the suture material, making the design and handling properties of the suture clinically relevant [1-5].

Suture performance is not determined by tensile strength alone. Size, filament structure, elasticity, plasticity, memory, knot security, tissue drag, degradation profile and inflammatory response influence the behaviour of a suture after implantation. Monofilament materials generally show reduced wicking and lower bacterial adherence than braided materials, but they may be less compliant and may require additional throws to maintain knot security. Polydioxanone is a synthetic absorbable monofilament that retains support for an extended period and is widely used when prolonged approximation is desirable [1,4,6].

The knot is the mechanically weakest and biologically most bulky component of a conventional suture line. It increases the amount of implanted material, can act as a plaque-retentive niche and may create focal pressure at the wound edge. In restricted intraoral access, the time and dexterity required to place secure knots may also increase manipulation of the flap. Barbed sutures

were developed to distribute holding force through multiple microscopic projections along the thread. These barbs permit the suture to move in the direction of placement but resist reverse movement, thereby maintaining approximation without a terminal knot [7-9].

Barbed sutures may offer several theoretical benefits for intraoral surgery. Continuous self-anchoring can distribute tension more evenly along the incision, limit backsliding while the next bite is placed and reduce the amount of foreign material concentrated at knots. The technique may be particularly useful in long vestibular or sulcular incisions and in anatomically constrained areas. However, barb geometry also reduces the effective core diameter of the thread and may increase tissue drag or cut-through when excessive tension is applied. Exposed suture ends can irritate adjacent mucosa, and the clinical result remains dependent on accurate bite depth, spacing and flap mobilisation [7-10].

Clinical evidence specific to oral and maxillofacial surgery remains limited. Randomised studies in intraoral incisions have reported shorter or comparable closure time and acceptable wound healing with knotless barbed sutures, but sample sizes have generally been small and the procedures heterogeneous [11-13]. Studies of oral reconstruction and other surgical specialties similarly suggest technical efficiency, while systematic reviews caution that benefits vary according to procedure, operator experience and outcome definition [14-17]. Therefore, both early inflammatory healing and later mucosal scar quality should be evaluated rather than relying on closure speed alone.

The present study compared an absorbable knotless barbed suture with conventional absorbable PDS in patients requiring intraoral wound closure. The primary clinical domains were operating time and early wound healing, assessed through tissue colour, bleeding on palpation, granulation tissue, incision-margin epithelisation and suppuration. Secondary domains addressed mucosal scar width, contour, colour, suture marks and overall appearance over three months. The null hypothesis was that no clinically meaningful difference would exist between the two suture systems across the scheduled postoperative assessments.

2. MATERIALS AND METHODS

2.1 Study design and setting

A prospective, randomised, comparative clinical study was conducted in the Department of Oral and Maxillofacial Surgery, Teerthanker Mahaveer Dental College and Research Centre, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh. The planned study period was 18 months. Ethical approval was obtained from the institutional ethics committee (TMDCRC/IEC/TH/23-24/OMFS 02), and written informed consent was obtained from every participant in English or Hindi before enrolment. The sample size was estimated with G*Power using 95% power, a 5% type-I error rate and anticipated proportions of 0.80 and 0.10 between groups. The resulting sample comprised 20 participants, with ten patients in each group. The source dissertation reported random allocation, although the method used to generate the sequence and conceal assignment was not documented. Neither the operating surgeon nor the participant was blinded to the suture used because the materials and techniques were visibly different.

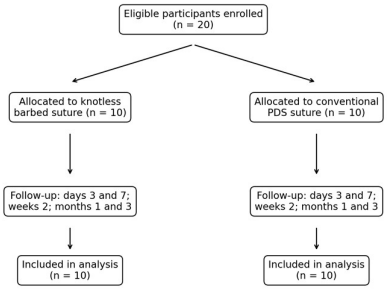

Figure 1. Participant allocation and follow-up schedule reported in the study.

2.2 Eligibility criteria

Patients were eligible when they were 18-45 years old, required closure of a full-thickness gingival or labio-buccal sulcular incision, were cooperative and willing to maintain oral hygiene, and had no known systemic disease likely to impair healing. Exclusion criteria were local infection at the surgical site, uncontrolled bleeding or coagulation disorders, inability to cooperate with clinical assessment, refusal to participate, or anticipated inability to complete follow-up.

2.3 Intervention groups

Group A (study group, n = 10) received an absorbable knotless barbed suture (BARB-E) in a continuous pattern. Group B (control group, n = 10) received a conventional absorbable polydioxanone monofilament suture in a continuous pattern. Both techniques were used for intraoral closure after completion of the indicated surgical procedure.

2.4 Suture technique and perioperative care

For barbed closure, the first bite was placed beneath the mucosa and the thread was advanced in the direction that allowed smooth passage. Gentle reverse traction engaged the barbs within the surrounding tissue and maintained approximation while subsequent bites were placed. The running suture was continued along the incision without a terminal knot. For conventional PDS closure, the first stitch was secured in the manner of a conventional running suture; subsequent bites were placed perpendicular to the wound line and the closure was completed with a square knot over the free end. In both groups, the operator aimed to

achieve passive approximation without blanching or excessive inversion of the wound margins.

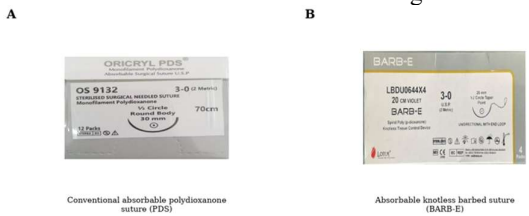

Figure 2. Suture materials used in the dissertation: (A) conventional absorbable PDS and (B) absorbable knotless barbed suture. Images reproduced from the submitted dissertation.

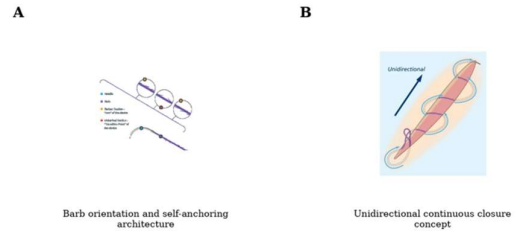

Figure 3. Structural and technical concept of the knotless barbed suture: (A) barb orientation along the monofilament and (B) unidirectional continuous tissue approximation. Illustrations reproduced from the submitted dissertation.

After closure, gauze pressure was maintained for at least 30 minutes. Patients were instructed not to rinse or spit during the first 24 hours, to clean the adjacent teeth gently, to use an antiseptic mouth rinse, and to avoid smoking and alcohol. The postoperative regimen recorded in the dissertation included amoxicillin-clavulanate 625 mg three times daily, metronidazole 400 mg three times daily, acetaminophen 500 mg three times daily, pantoprazole 40 mg once daily, 0.12% chlorhexidine mouthwash and warm saline rinses. Medication was prescribed for five days except saline rinses, which continued for seven days. The paper reports this regimen descriptively and does not infer that all components were necessary for every intraoral procedure.

2.5 Outcome measures

Operating time was recorded in minutes from the beginning of wound closure until closure was complete. Clinical healing was evaluated on postoperative days 3 and 7, at 2 weeks, and at 1 and 3 months. The wound-healing index used five ordered categories from very poor (score 1) to excellent (score 5), based on tissue colour, bleeding on palpation, granulation tissue, epithelial status of the incision margin and suppuration. Higher scores represented better early healing.

Table 1. Clinical wound-healing index used in the study.

Score	Healing category	Tissue colour	Bleeding	Granulation	Incision margin	Suppuration
1	Very poor	>= 50 % red gingiva	Yes	Yes	Not epithelialised; epithelial loss beyond margin	Yes
2	Poor	>= 50 % red gingiva	Yes	Yes	Not epithelialised; connective tissue exposed	No
3	Good	25-50 % red gingiva	No	No	No exposed connective tissue	No
4	Very good	<25% red gingiva	No	No	No exposed connective tissue	No
5	Excellent	All pink tissue	No	No	No exposed connective tissue	No

Mucosal scarring was evaluated with three-point ordinal ratings. A score of 0 represented the most favourable category, score 1 an intermediate category and score 2 the least favourable category. The five domains were wound width, height or contour, colour match, visibility of suture marks and overall appearance.

Table 2. Mucosal scarring index used in the study.

Parameter	Score 2	Score 1	Score 0
Width	>=1 mm	<=1 mm	0 mm
Height/contour	Hypertrophic or invaginated	Slightly hypertrophic or invaginated	Flush with surrounding mucosa
Colour	Obvious mismatch	Slight mismatch	Perfect match
Suture mark	Clearly visible	Slightly visible	Absent

Overall appearance	Poor	Acceptable	Good

2.6 Statistical analysis

Data were entered in Microsoft Excel and analysed with IBM SPSS Statistics version 23. Descriptive results are presented as frequency, percentage, mean and standard deviation. Group differences in age and wound-closure time were evaluated with independent-group comparisons after assessing distributional assumptions using the Shapiro-Wilk test and homogeneity with Levene's test. Ordinal and nominal outcomes were compared with chi-square tests as reported in the dissertation. Statistical significance was set at $p < 0.05$. Because the study was exploratory and included multiple repeated comparisons, individual p-values should be interpreted together with the consistency and clinical direction of the findings.

2.7 Data integrity and reporting approach

The article was prepared from the final dissertation tables, narrative results and clinical-image plates. Group totals, means, standard deviations, category frequencies and reported p-values were retained without creating patient-level observations that were not available in the source document. No missing-value imputation or secondary reanalysis was undertaken. Where a table and the accompanying narrative used slightly different terminology, the clinically defined outcome label from the methods section was used consistently in the paper.

Because the wound-healing and scar indices are ordinal, the paper reports category distributions and between-group p-values rather than presenting the scores as continuous measurements. The analysis is therefore descriptive and comparative. The repeated postoperative observations describe the clinical course at scheduled visits but were not modelled as a longitudinal repeated-measures dataset in the source study. Accordingly, no claim is made that individual observations were statistically independent across time. Quality-control checks included confirmation that each group totalled ten participants, comparison of summary values across the abstract and results tables, and verification of the direction of significant differences against the clinical descriptions. The source dissertation did not report assessor calibration, inter-rater reliability or blinded outcome assessment. These omissions are acknowledged when interpreting the ordinal healing scores and are addressed in the limitations and recommendations for future trials.

3. RESULTS

3.1 Participant characteristics and operating time

All 20 enrolled participants were included in the reported analysis. The control group comprised six men and four women, whereas all ten participants in the barbed-suture group were men. The mean age was 27.7 +/- 6.2 years in the PDS group and 26.3 +/- 4.4 years in the barbed group. The overall age range was 20-38 years. Mean wound-closure time was numerically lower with the knotless barbed suture by 0.9 minutes, but the difference was not statistically significant ($p = 0.419$).

Table 3. Baseline characteristics and wound-closure time.

Variable	Conventional PDS (n=10)	Knotless barbed (n=10)	Overall / p value
Male, n (%)	6 (60.0)	10 (100.0)	16 (80.0)
Female, n (%)	4 (40.0)	0 (0.0)	4 (20.0)
Age, years, mean +/- SD	27.7 +/- 6.2	26.3 +/- 4.4	27.0 +/- 5.3
Age range, years	20-38	20-33	20-38
Closure time, min, mean +/- SD	8.8 +/- 2.859	7.9 +/- 1.911	p = 0.419

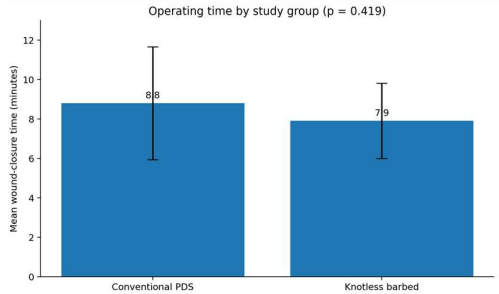

Figure 4. Mean operating time with standard-deviation error bars. The 0.9-minute numerical difference did not reach statistical significance.

3.2 Early wound-healing index

The distribution of wound-healing scores favoured the knotless barbed group at multiple intervals. Tissue colour differed significantly at every assessment, with a greater proportion of barbed-suture wounds progressing to very good or excellent colour categories. Bleeding on palpation and granulation tissue also resolved earlier in the barbed group. Incision-margin epithelisation showed a similar pattern, indicating faster coverage of exposed connective tissue. Suppuration was uncommon after the early period and resolved more rapidly in the barbed group. These findings indicate a consistent difference in the timing of early inflammatory and proliferative healing rather than a single isolated outcome.

Table 4. Reported intergroup p-values for wound-healing domains.

Outcome	Day 3	Day 7	Day	Day	Day	Direction

			14	30	90	
Tissue colour	.001	.002	.034	.021	.043	Barbed favoured
Bleeding on palpation	.012	.043	.018	.043	.043	Barbed favoured
Granulation tissue	.049	.043	.043	.006	.001	Barbed favoured
Incision margin	.043	.021	.010	.049	.043	Barbed favoured
Suppuration	.005	.001	.001	.043	.005	Barbed favoured

3.2.1 Clinical interpretation of the healing domains

Tissue colour provided the most consistent visual distinction between the groups. At each review, wounds closed with the barbed suture moved earlier from marked erythema toward pink mucosa. Because colour is influenced by vascular congestion, epithelial maturity and local irritation, this pattern is compatible with earlier inflammatory resolution; however, colour scoring remains observer dependent and should not be treated as a direct measure of perfusion. Bleeding on gentle palpation followed the same temporal direction. Earlier absence of bleeding suggests greater surface stability and reduced friability of the healing margin. Granulation-tissue scores also favoured the barbed group, indicating earlier transition from an immature repair bed toward organised tissue. These findings are biologically related, and their agreement across time points strengthens the interpretation that the groups differed in the pace, rather than the eventual occurrence, of healing.

Incision-margin scores reflected epithelial continuity and the presence or absence of exposed connective tissue. The repeated advantage in this domain is clinically relevant because early epithelial coverage protects the wound interface during mastication and oral-hygiene procedures. Suppuration was recorded less often or resolved earlier in the barbed group. This observation should be interpreted cautiously: the study did not use microbiological confirmation, so the outcome represents a clinical sign of local inflammation rather than a proven difference in postoperative infection. The five domains were analysed separately in the source dissertation, but they are not independent biological events. Colour, bleeding, granulation, epithelialisation and suppuration arise from overlapping inflammatory and proliferative processes. Consequently, the pattern of concordant results is more informative than any single p-value. At the same time, repeated testing at five visits increases the possibility of chance significance, particularly in a sample of ten participants per group. The findings therefore support a promising early-healing signal that requires confirmation in a larger, assessor-blinded trial with a prespecified primary endpoint.

3.3 Distribution of tissue-colour scores

Table 5 reproduces the tissue-colour distribution in the compact style of the dissertation. On day 3, 80% of PDS wounds remained in score 1 compared with 20% of barbed-suture wounds. By day 7, 80% of the barbed group had reached score 3 and 20% score 4, whereas the PDS group remained distributed across scores 1-3. At one month, 70% of the barbed group had reached the excellent score 5, while 60% of the control group remained at score 4. At three months, every barbed-suture wound was scored excellent compared with 60% in the PDS group.

Table 5. Intergroup comparison of tissue-colour scores at different time intervals.

Time	Group	Score 1	Score 2	Score 3	Score 4	Score 5	p
Day 3	PDS	8 (80%)	2 (20%)	0	0	0	.001
	Barbed	2 (20%)	6 (60%)	2 (20%)	0	0	
Day 7	PDS	4 (40%)	3 (30%)	3 (30%)	0	0	.002
	Barbed	0	0	8 (80%)	2 (20%)	0	
Day 14	PDS	0	1 (10%)	6 (60%)	3 (30%)	0	.034
	Barbed	0	0	1 (10%)	9 (90%)	0	
Day 30	PDS	0	0	4 (40%)	6 (60%)	0	.021
	Barbed	0	0	0	3 (30%)	7 (70%)	
Day 90	PDS	0	0	0	4 (40%)	6 (60%)	.043
	Barbed	0	0	0	0	10 (100%)	

3.4 Mucosal scarring and aesthetic healing

Wound width narrowed progressively in both groups and did not differ significantly at any follow-up point. In contrast, height or contour improved earlier in the barbed group at days 7 and 14, but the groups converged by one and three months. Mucosal colour match, suture-mark resolution and overall appearance showed significant differences from day 7 onward. Thus,

the principal aesthetic advantage was an earlier transition toward normal colour and contour and less visible suture-related marking, rather than a durable difference in wound width.

Table 6. Reported intergroup p-values for mucosal-scarring domains.

Outcome	Day 3	Day 7	Day 14	Day 30	Day 90	Interpretation
Width	.500	.587	.500	.587	.587	No significant difference
Height/contour	.792	.001	.001	.792	1.000	Earlier barbed improvement
Colour match	.500	.001	.010	.012	.043	Barbed favoured from day 7
Suture mark	1.000	.039	.001	.049	.012	Barbed favoured from day 7
Overall appearance	.816	.001	.012	.001	.001	Barbed favoured from day 7

3.5 Overall pattern of statistical differences

The matrix in Figure 5 summarises all reported intergroup p-values. The strongest and most persistent differences were observed for inflammatory healing, incision-margin recovery and overall appearance. Width was consistently non-significant, and contour differences were confined to the first two postoperative weeks. This pattern supports an interpretation of accelerated early recovery rather than a large difference in final wound dimensions.

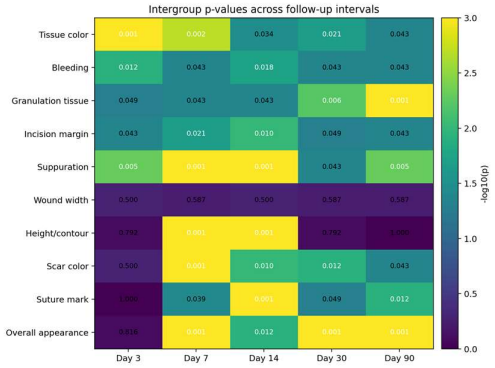

Figure 5. Heat map of reported intergroup p-values. Darker cells represent stronger statistical evidence of a group difference; values below 0.05 were considered significant.

3.6 Representative clinical appearance

Representative images from the dissertation demonstrate the serial intraoral appearance of the wound in both groups. These photographs are illustrative and should not be interpreted as independent quantitative evidence. In the barbed-suture sequence, progressive reduction in erythema and improved margin integration are visible during the first month. The PDS sequence also shows healing, but residual inflammatory colour and suture-related impressions appear more prominent in the early images.

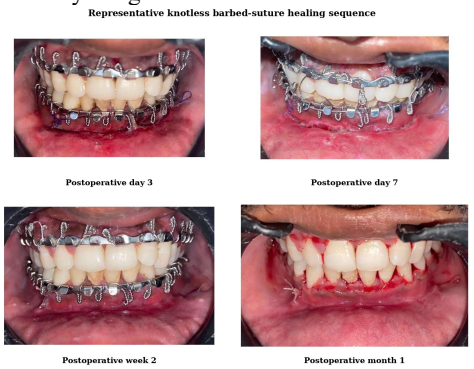

Figure 6. Representative healing sequence in a participant treated with the absorbable knotless barbed suture. Images reproduced from the submitted dissertation.

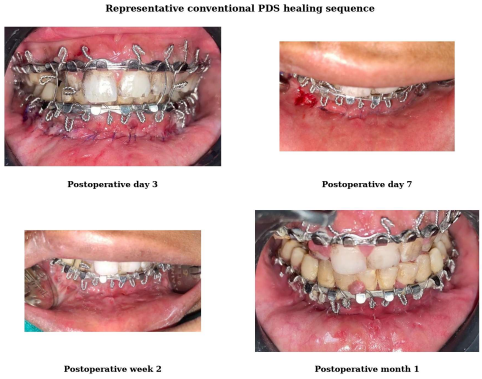

Figure 7. Representative healing sequence in a participant treated with conventional absorbable PDS. Images reproduced from the submitted dissertation.

3.7 Summary of clinical findings

Taken together, the barbed suture did not significantly reduce operating time in this sample, although the mean was lower. Its main observed advantage was faster improvement across several early wound-healing and aesthetic domains. Both materials ultimately supported wound closure, and the absence of a width difference suggests that basic approximation and contraction were achieved in both groups. The study therefore supports the clinical feasibility of barbed closure while indicating that its potential benefit may lie more in distributed tension and reduced knot-related irritation than in a large reduction in procedure time.

4. DISCUSSION

4.1 Principal findings

This study compared continuous absorbable knotless barbed closure with continuous conventional PDS closure after intraoral surgery. The main finding was a consistent advantage for the barbed group in the timing of clinical recovery. Tissue colour, bleeding, granulation tissue, incision-margin condition and suppuration improved earlier, while scar colour, contour, suture marks and overall appearance also favoured the barbed group from approximately the first postoperative week. Closure time was 0.9 minutes shorter on average, but the difference was not statistically significant. Wound width followed a similar course in both groups. The findings should be interpreted as evidence of feasibility and a signal of earlier healing rather than proof of universal superiority. With only ten participants per group, individual patients substantially influence percentages and p-values. In addition, the unequal sex distribution, heterogeneity of the underlying surgical procedures and lack of assessor blinding may have affected the results. Nevertheless, the convergence of multiple related outcomes in the same direction is clinically noteworthy and is compatible with the mechanical design of barbed sutures. Barbed sutures anchor at multiple points along the incision. This may reduce local dependence on a terminal knot and limit the transient loosening that can occur while a conventional running suture is being advanced. A more uniform distribution of closing force can preserve wound-edge contact without requiring excessive focal tension. Experimental and clinical literature across several specialties has described similar technical advantages, although the magnitude of time saving varies substantially [7-9,14-17].

4.2 Operating time and technical efficiency

The observed closure-time difference was modest and non-significant. This differs from reports in which barbed sutures substantially shortened intraoral closure [11,12]. Several explanations are plausible. The present sample was small; incision length and surgical procedure were not standardised in the analysis; and the operating team may have been more familiar with conventional suturing. Barbed suturing has a learning curve because tension must be adjusted continuously and reverse handling can engage the barbs unexpectedly. Once familiarity develops, time savings may become more evident, particularly in long incisions or restricted anatomical locations. A statistically non-significant time result does not imply that the technique lacked practical value. Knot elimination can simplify closure, reduce instrument exchanges and maintain approximation while the surgeon repositions the needle. Conversely, the time needed to orient the barbs, trim the tail and check for exposed ends can offset these gains in short wounds. Future trials should report incision length, closure time per centimetre, number of needle passes, need for additional stitches and operator experience.

4.3 Early inflammatory healing

The early wound-healing index showed the clearest between-group differences. Tissue colour and bleeding on palpation are visible indicators of vascular congestion and local inflammation. Faster transition from red to pink mucosa and earlier cessation of bleeding in the barbed group suggest more rapid stabilisation of the wound margins. Reduced knot bulk may decrease plaque retention and mechanical irritation, while distributed anchorage may limit micro-motion during speech and mastication. Microbial adherence and capillary transport differ among suture materials and constructions, supporting the biological relevance of the implanted configuration [3,5,18,19]. Granulation tissue represents the proliferative phase of repair, during which fibroblasts, endothelial cells and extracellular matrix restore tissue continuity. Earlier maturation in the barbed group may reflect stable approximation and reduced interruption of the wound interface. Similarly, the incision-margin findings indicate earlier epithelial coverage, an important barrier against mechanical contamination and microbial ingress. Wound healing is multifactorial, and these clinical observations cannot identify a single mechanism; local perfusion, flap handling, incision design, oral hygiene and medication also contribute [20-22]. Suppuration resolved earlier in the barbed group. The study was not designed to diagnose infection microbiologically, and no culture data were reported. Accordingly, this result should be described as a clinical inflammatory observation rather than evidence of an antimicrobial effect of the barbed material. A knotless system may reduce plaque-retentive bulk, but it does not replace asepsis, atraumatic technique or postoperative hygiene.

4.4 Mucosal scar maturation and aesthetics

Wound width decreased in both groups without a significant difference. This finding is clinically plausible because both materials provided sufficient approximation for contraction and collagen remodelling. The absence of a width effect also helps distinguish accelerated surface recovery from a fundamental difference in final wound closure. Height or contour normalised earlier with the barbed suture during the first two weeks, but the groups were similar at later visits, suggesting that early tissue organisation rather than final contour was affected. Colour match, suture marks and overall appearance favoured the barbed group from day 7 onward. Aesthetic recovery of oral mucosa reflects epithelial thickness, vascular integration, collagen organisation and the absence

of persistent inflammation. Less prominent suture marks may result from fewer bulky knots and a more even distribution of pressure. Similar considerations underpin aesthetic scoring in periodontal and reconstructive soft-tissue research [23-25]. The representative photographs support the direction of the quantitative findings but cannot substitute for blinded standardised photographic assessment.

4.5 Comparison with previous research

The present findings are broadly consistent with the randomised trial by Idupulapati and colleagues, who compared knotless barbed and polydioxanone sutures for intraoral incisions and reported favourable operative and healing outcomes with barbed closure [11]. Sharma and colleagues also found that knotless barbed sutures facilitated closure of intraoral incisions in maxillofacial trauma, especially in less accessible areas [12]. Differences in procedure type, incision length, suture product and surgeon experience limit direct numerical comparison, but the common finding is that barbed closure is clinically workable and may improve efficiency or early healing. Crosetti and colleagues reported preliminary experience with barbed sutures in oral cavity reconstruction, where long incisions and complex access make knotless continuous closure attractive [14]. Evidence from arthroplasty and other surgical fields has also shown reduced closure time in some settings, although systematic reviews highlight heterogeneity and procedure-specific complications [15-17]. These broader data support selective rather than indiscriminate adoption. Recent reviews of surgical suture technology describe a shift from passive filaments toward bioactive, antimicrobial, drug-eluting and sensor-enabled materials [6-9,26-28]. Barbed sutures are part of this evolution because geometry itself becomes a functional design element. Their benefit, however, remains dependent on material biocompatibility, degradation behaviour and appropriate clinical technique.

4.6 Clinical implications

For oral and maxillofacial surgeons, an absorbable knotless barbed suture may be considered when a continuous closure is planned, the incision is sufficiently long to benefit from self-anchoring, and tissue thickness permits secure barb engagement. Potential indications include vestibular approaches, selected trauma incisions, reconstructive wounds and other situations in which repeated knot tying is difficult. The surgeon should avoid excessive tension, ensure that the terminal segment is buried or trimmed appropriately, and inspect the closure for mucosal irritation or tissue cut-through. Conventional PDS remains an effective control material. It is familiar, predictable and capable of prolonged support. The results do not justify replacing PDS in every case. Short incisions, thin friable mucosa, contaminated wounds or sites where barbs may contact mobile structures may favour conventional interrupted or running techniques. Cost, availability and training also influence material selection.

4.7 Strengths and limitations

The study used prospective follow-up at five clinically relevant intervals and evaluated both inflammatory healing and later scar quality. The same broad domains were applied to each group, and the three-month observation period allowed early differences to be separated from later convergence. The dissertation also preserved serial clinical photographs and detailed score distributions, permitting transparent condensation into a research-paper format.

Several limitations are important. First, the sample of 20 participants was small and drawn from a single centre. Second, the experimental group included only men, whereas the control group included men and women; the study was not powered to examine sex-related differences. Third, the underlying operations and incision lengths were not stratified in the results. Fourth, random-sequence generation and allocation concealment were not described, and surgeons and participants were not blinded. Fifth, the outcome assessor was not reported as blinded, increasing the possibility of observer bias in ordinal clinical scores. Sixth, repeated chi-square comparisons were made across many outcomes and time points without a reported adjustment for multiplicity. Some tables in the source dissertation contain minor internal inconsistencies in percentages or terminology; the present paper uses the reported primary counts and p-values but avoids deriving unsupported patient-level estimates. Seventh, no patient-reported pain, comfort, satisfaction, cost, bacterial colonisation or wound-dehiscence endpoint was analysed. Finally, the study did not report trial registration or a procedure-specific adverse-event analysis. Future research should use multicentre, adequately powered, parallel-group trials with concealed randomisation and blinded photographic assessment. Incision length and procedure type should be standardised or included as covariates. Outcomes should include closure time per unit length, pain, analgesic use, dehiscence, infection, tissue cut-through, suture exposure, patient satisfaction and cost. A prespecified primary endpoint and longitudinal ordinal modelling would reduce the risk of chance findings from multiple comparisons.

5. CONCLUSION

In this prospective comparative study, absorbable knotless barbed sutures achieved intraoral closure with a mean operating time comparable to conventional PDS and were associated with earlier improvement in several clinical wound-healing and mucosal-aesthetic parameters. The most consistent

differences involved tissue colour, inflammatory resolution, granulation, epithelial margin recovery, scar colour, suture marks and overall appearance. Wound width improved similarly in both groups, and contour differences diminished over time. These findings support the knotless barbed suture as a feasible adjunct for selected intraoral closures, but the small sample, baseline imbalance and methodological limitations require cautious interpretation. Larger blinded and procedure-specific trials are necessary before routine superiority over conventional PDS can be concluded.

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