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Original Research Article

Effectiveness of knotless barbed suture compared with vicryl suture in impacted third molar surgery: a randomized split-mouth study

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ABSTRACT

Background: Wound closure following surgical extraction of impacted third molars directly influences postoperative recovery. Conventional vicryl sutures require knot placement, which prolongs closure time, increases infection risk, and may cause uneven tissue tension. Knotless barbed sutures eliminate these drawbacks through self-anchoring barbs. Objectives were to compare knotless barbed sutures with conventional vicryl sutures for soft tissue wound healing, wound closure time, postoperative pain, and trismus following bilateral impacted mandibular third molar surgery.
Methods: A randomized split-mouth design was employed in 15 patients (aged 18-50 years) undergoing bilateral mandibular third molar extraction. One side received 3-0 knotless barbed sutures (study group); the contralateral side received 3-0 polyglactin 910 (Vicryl) sutures (control group). Parameters assessed on postoperative days 3 and 7 included wound healing (Landry-Turnbull index), suturing time (stopwatch), pain VAS (Visual analog scale), and trismus (maximal interincisal distance via Vernier caliper). Data were analyzed using SPSS Version 26.
Results: Barbed sutures demonstrated significantly shorter closure time (2.6±0.35 min vs. 4.06±0.38 min; $p<0.001$), superior wound healing scores on day 7 (4.87±0.34 vs. 3.53±0.50; $p<0.001$), and lower pain scores on day 7 (0.87±0.88 vs. 2.0±0.89; $p=0.002$). No statistically significant difference in trismus was observed between groups at any time point.
Conclusions: Knotless barbed sutures are a clinically superior alternative to vicryl sutures for closure after impacted third molar surgery, offering faster wound closure, improved healing, and reduced postoperative pain.

Keywords: Barbed suture, Vicryl, Impacted third molar, Wound healing, Suturing time

INTRODUCTION

Surgical wound closure is a critical determinant of postoperative healing and patient comfort following any operative procedure. In oral and maxillofacial surgery, the surgical extraction of impacted mandibular third molars is among the most frequently performed procedures, indicated for recurrent pericoronitis, periodontal defects, caries in adjacent teeth, cystic lesions, and orthodontic facilitation.[1,2]

The oral environment presents unique wound-healing challenges, including constant moisture, mechanical stress, and high microbial load, underscoring the need for suture materials that provide secure tissue approximation while minimising complications. Conventional absorbable sutures such as polyglactin 910 (Vicryl) have long been the standard. Vicryl is a synthetic, braided multifilament copolymer of glycolide and lactide, valued for predictable absorption, high tensile strength, and ease of handling.[3] However, its knot-dependent design introduces several disadvantages: knot placement extends

surgical time, creates potential foci for bacterial colonisation, generates uneven tension along the suture line, and may cause localized ischemia, delayed healing, or patient discomfort.[4]

Barbed sutures, originally developed for plastic and orthopaedic applications, are designed with microscopic barbs along their length that anchor the suture within tissue without the need for knots.[5,6] Their self-retaining mechanism permits uniform tension distribution, reduces operative time, and decreases the foreign body burden at the wound site. These properties have generated interest in the use of barbed sutures in intraoral surgery, where access is limited and wound management is challenging.[7,8]

Despite growing evidence from other surgical specialities, limited data exist regarding the performance of knotless barbed sutures in third molar surgery. This randomized split-mouth study was designed to compare 3-0 knotless barbed absorbable sutures with 3-0 polyglactin 910 sutures across four clinically relevant parameters: wound closure time, soft tissue healing, postoperative pain, and trismus.

METHODS

A prospective randomized split-mouth clinical study was conducted for a period of 12 months from January 31st 2025, to February 28th 2026, in the Department of Oral and Maxillofacial Surgery of a tertiary care dental institution after obtaining approval from the institutional ethics committee and written informed consent from all participants. Sample size was calculated using a two-sided paired t-test (α=0.05, power=90%, SD=6.2, expected mean difference=7.37) based on a study conducted by Ceyar et al yielding a minimum requirement of 15 subjects.[9] Each participant served as their own control, providing observations for both suture types at bilateral extraction sites. Consecutive sampling was employed until the target was reached. Patients aged 18-50 years requiring bilateral surgical extraction of impacted mandibular third molars were screened for eligibility. Subjects with systemic diseases affecting wound healing, acute local infection, pregnancy, known allergy to suture material, or those on long-term steroids, anticoagulants, or analgesics were excluded. A total of 15 patients who met the eligibility criteria were recruited, and each patient contributed two surgical sites, yielding 30 study sites for analysis in the split-mouth design. Random allocation of the study side and control side was performed using the lottery method, ensuring that one side received a knotless barbed suture and the contralateral side received conventional polyglactin 910 (Vicryl) sutures for wound closure (Figure 1 A and B).

All surgical procedures were performed under local anaesthesia using standard aseptic protocol by the same surgeon to minimise operator variability. A mucoperiosteal flap was elevated, followed by bone guttering and tooth sectioning wherever indicated, and the tooth was removed traumatically. After thorough irrigation with sterile saline, wound closure was carried out according to group allocation. In the study sites, 3-0 knotless barbed absorbable sutures were placed using a simple continuous technique without knot tying, whereas in control sites, closure was achieved using 3-0 Vicryl sutures with conventional interrupted suturing and knot placement. The time taken for wound approximation was recorded intraoperatively using a stopwatch from the first suture bite to completion of closure. Postoperatively, all patients were prescribed oral paracetamol three times daily for three days and were given standard postoperative instructions.

Outcome assessment was performed on the 3rd and 7th postoperative days. Soft tissue healing was evaluated using the Landry, Turnbull, and Howley healing index. Postoperative pain intensity was assessed using the VAS, and trismus was measured as maximum inter-incisal mouth opening using a vernier calliper at baseline and during follow-up visits. Data were entered into Microsoft excel and analysed using SPSS Version 26. Quantitative variables were expressed as mean±standard deviation, and comparison between the two suturing techniques was performed using the paired t test. A p value of less than 0.05 was considered statistically significant.

RESULTS

A total of 15 subjects undergoing bilateral impacted mandibular third molar extraction were included in the study, yielding 30 surgical sites for analysis using a split-mouth design. The majority of participants were aged ≤25 years (40%), followed by 26-30 years (33.3%), while 26.7% were older than 30 years. Females constituted 53.3% of the study population, with males accounting for 46.7% (Table 1).

Soft tissue wound healing assessed using the Landry-Turnbull healing index demonstrated significantly higher scores in the barbed suture group compared to the Vicryl group at both postoperative day 3 and day 7 (Table 2). On day 3, the mean healing score was 4.27±0.44 in the barbed suture group compared with 3.00±0.00 in the Vicryl group ($p<0.001$). Similarly, on day 7, the healing score was 4.87±0.34 in the barbed suture group and 3.53±0.50 in the Vicryl group ($p<0.001$). Although both groups showed improvement in healing between day 3 and day 7, the difference in mean improvement between the two suturing techniques was not statistically significant.

The mean time required for wound closure was significantly lower in the barbed suture group (2.60±0.35 minutes) compared to the Vicryl group (4.06±0.38 minutes) (Table 3). This represented a mean reduction of 1.46 minutes, which was statistically highly significant ($p<0.001$).

Postoperative pain assessment using the VAS revealed no statistically significant difference between the two suturing techniques on postoperative day 3 (p=0.150). However, by postoperative day 7, pain scores were significantly lower in the barbed suture group (0.87±0.88) compared to the Vicryl group (2.00±0.89) (p=0.002) (Table 4). Both groups demonstrated significant reduction in pain from day 3 to day 7, with a greater mean reduction observed in the barbed suture group.

Evaluation of trismus using maximal interincisal mouth opening showed comparable values between the two groups at all time points, including preoperative, immediate postoperative, day 3, and day 7 assessments (Table 5). No statistically significant differences were observed between the suturing techniques (p>0.05). Nevertheless, within-group analysis indicated progressive improvement in mouth opening during the postoperative period in both groups.

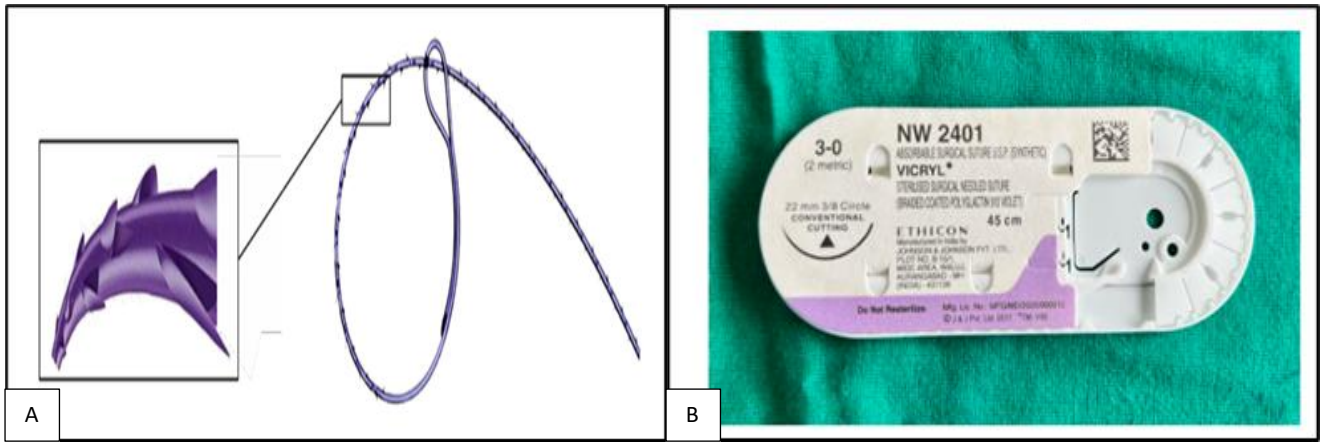

Figure 1: (A) 3-0 knotless barbed absorbable suture; (B) ethicon 3-0 vicryl suture.

Table 1: Sociodemographic profile of study participants, (n=15).

Variables	Category	N (%)
Age group (in years)	≤25	6 (40)
	26-30	5 (33.3)
	>30	4 (26.7)
Gender	Male	7 (46.7)
	Female	8 (53.3)

Table 2: Comparison of soft tissue wound healing scores (Landry-Turnbull index) between suturing techniques.

Parameters	Barbed suture (Group A) Mean±SD	Vicryl suture (Group B) Mean±SD	T value	P value
Day 3 healing score	4.27±0.44	3.00±0.00	10.72	<0.001
Day 7 healing score	4.87±0.34	3.53±0.50	8.26	<0.001
Mean improvement (Day 3→ day 7)	0.60±0.49	0.53±0.50	0.39	0.70

Table 3: Comparison of wound closure time between suturing techniques.

Parameters	Barbed suture (Group A) Mean±SD (min)	Vicryl suture (Group B) Mean±SD (min)	Mean difference	T value	P value
Wound closure time	2.60±0.35	4.06±0.38	1.46	10.56	<0.001

Table 4: Comparison of postoperative pain scores (VAS) between suturing techniques.

Parameters	Barbed suture (Group A) Mean±SD	Vicryl suture (Group B) Mean±SD	Mean difference	T value	P value
Day 3 pain score	4.27±0.44	4.60±0.71	-0.33	1.49	0.150
Day 7 pain score	0.87±0.88	2.00±0.89	-1.13	3.37	0.002
Mean reduction (Day 3 → Day 7)	-3.40±0.88	-2.60±1.08	-0.80	2.20	0.036

Table 5: Comparison of Trismus (Maximum interincisal distance) between suturing techniques.

Time point	Barbed suture (Group A) Mean±SD (mm)	Vicryl suture (Group B) Mean±SD (mm)	Mean difference	T value	P value
Preoperative	44.45±5.98	44.13±5.87	0.32	0.15	0.89
Immediate postop	42.47±6.13	41.60±5.57	0.87	0.40	0.70
Day 3	43.13±5.84	41.93±5.46	1.20	0.56	0.58
Day 7	44.27±6.02	42.67±5.72	1.60	0.72	0.48

DISCUSSION

This randomized split-mouth study provides evidence that 3-0 knotless barbed sutures confer clinically meaningful advantages over conventional vicryl sutures in four key postoperative domains following impacted mandibular third molar surgery. The split-mouth design-by enabling each patient to serve as their own control-substantially reduces interindividual variability and confounding, representing one of the most rigorous designs available for intraoral suture comparisons.[10]

The most striking finding was the 36% reduction in wound closure time with barbed sutures (2.60 vs. 4.06 min; $p<0.001$). This reduction is directly attributable to the elimination of knot tying. Similar time savings have been reported across multiple surgical disciplines. Ramkumar et al demonstrated reduced closure times with polydioxanone barbed sutures in third molar surgery, and Krishnan et al reported a mean closure time of 2.69 min with barbed sutures versus 4.27 min with vicryl in a comparable split-mouth trial.[9,10] Deo et al similarly documented a 30% reduction in mean closure time with PGCL barbed sutures in intraoral procedures.[11,12] In a high-volume clinical environment, these time savings have meaningful implications for surgical efficiency, operator fatigue, and patient time under anesthesia.

Wound healing was assessed using the validated Landry0Turnbull index, which evaluates tissue color, response to palpation, granulation tissue, and epithelialization.[13,14] By day 7, barbed sutures yielded significantly superior healing scores. The mechanistic basis for this advantage lies in the uniform tension distribution afforded by the continuous barbed design, which eliminates focal ischemia at knot sites and minimizes tissue manipulation during closure.[5] Murtha et al demonstrated laboratory evidence that barbed sutures maintain tensile strength equivalent to smooth sutures while achieving more homogeneous wound edge approximation.[5] In a systematic review, Krishnan and Periasamy also reported enhanced early intraoral healing with knotless designs, attributing the benefit to reduced local inflammatory load secondary to a lower foreign body burden at the suture site.[15]

Pain differences were not statistically significant on day 3 but became significant by day 7, with barbed sutures producing a 79.6% VAS reduction versus 56.5% in the vicryl group. The delayed emergence of this difference may reflect the progressive dissipation of the shared surgical trauma effect in early postoperative healing, allowing the intrinsic properties of each suture material to become apparent at later timepoints. The elimination of bulky knots reduces mucosal irritation and bacterial colonization, consistent with findings by Uysal et al who reported significantly lower pain during suture removal and reduced bacterial colony-forming units with barbed sutures following third molar surgery.[15]

Unlike the other parameters, trismus did not differ significantly between groups at any time point. Both groups demonstrated comparable reduction in maximal interincisal distance immediately postoperatively, with gradual recovery by day 7. Trismus following third molar surgery is primarily mediated by inflammation and muscle spasm secondary to intraosseous bone removal and tissue manipulation rather than suture choice per se.[16,17] This finding is consistent with prior literature indicating that suture material selection has limited direct influence on postoperative muscle function.[9,16]

Some limitations of this study merit acknowledgment. The sample size (n=15), while statistically powered for the primary outcomes, limits generalizability. The single-center, single-operator design ensures procedural consistency but may introduce operator-specific bias and restricts external validity. The follow-up period of 7 days captures early healing but does not address late outcomes such as suture extrusion, delayed wound dehiscence, or scar remodeling. Future multicenter randomized controlled trials with larger samples, extended follow-up, and histological analysis of wound healing are warranted.

CONCLUSION

This randomized split-mouth study demonstrates that 3-0 knotless barbed absorbable sutures are a clinically superior alternative to conventional 3-0 polyglactin 910 sutures for wound closure following surgical extraction of impacted mandibular third molars. Barbed sutures significantly reduced operative closure time, yielded superior soft tissue healing by postoperative day 7, and produced lower pain scores at day 7. No significant difference in trismus was observed between groups. These findings support the adoption of knotless barbed sutures in routine intraoral oral surgical practice, with the caveat that larger multicenter trials are needed to confirm and extend these results.

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