"COMPARISON OF KNOTLESS BARBED SUTURE VERSUS MONOCRYLE SUTURE FOR INTRAORAL USE IN MAXILLOFACIAL FRACTURES: A RANDOMISED CONTROL TRIAL"

By

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(BRANCH III)

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LIST OF ABBREVIATIONS USED

1.	OMFS	Oral And Maxillofacial Surgery
2.	BRP	Barbed Reposition Pharyngoplasty
3.	UPPP	Uvulopalatopharyngoplasty
4.	ESP	Expansion Sphincter Pharyngoplasty
5.	OSA	Obstructive Sleep Apnoea

ABSTRACT

Introduction:

Maxillofacial trauma involves different management modalities, which includes various approaches such as extraoral or intraoral approach. The intraoral approach is most preferred as it avoids facial scars. Various suture materials are available for wound closures such as conventional sutures, medication coated sutures or barbed sutures for good wound healing. The objective of this research was to check the effectiveness of knotless unidirectional barbed sutures for intraoral suturing in craniomaxillofacial trauma in comparison with conventional (monocryl) sutures.

Material and method:

The randomized control trial study was performed on 26 patients with 40 incision sites with maxillofacial trauma who fulfil the exclusion and inclusion criteria and was done in KLES Dr. Prabhakar Kore's Hospital, Belagavi. Patients were allotted in group A and group B randomly.

Group A (control group): 3-0 monocryl suture material was used for wound closure.

Group B (case group): 3-0 unidirectional barbed suture material was used wound closure.

Patients were recalled for follow up after 1 week and 2 week.

On follow up we have evaluated wound healing, loosening of suture, wound dehiscence, and wound closure time.

Result:

A total 40 incision sites were included in our comparative study which comprised of case group and a control group. Out of the 40 sites, 20 were allotted in group A and 20 were in group B. We have found that intra oral suturing time in group A was significantly greater than group B. The wound healing was found better with barbed suture as compared to monocryl suture. Loosening of sutures and wound dehiscence were found equal in case group and control group.

Conclusion:

The barbed suture saves time during surgery by reducing closure time and making wound closure easier in less accessible areas. The prong in the suture thread prevent tissue sliding and provide even distribution of stress throughout the wound borders, which eliminate the need for knot placement which in turn improves the wound healing.

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INTRODUCTION

Maxillofacial trauma, involves soft tissue and hard tissue injuries which frequently occurs due to self falls, road traffic accident, violent attacks, animal attacks, sports injury.[1] For which various treatment options are available like surgical method(ORIF) or conservative method. Open reduction and internal fixation have less disadvantages such as reduced period of IMF, malocclusion and facial asymmetry, so in recent years ORIF is the most preferred option.[2]

Different approaches are used for ORIF such as intraoral, transcutaneous, or extraoral approach which requires placement of incision. But Intraoral approach is most preferable method because of having less complications and good aesthetic results. There are many options are available for closure of incision like resorbable suture materials and non-absorbable suture materials, non-suture materials like derma clips, steri strips, cyanoacrylate and fibrin glue.[3] Despite this, suturing is still the most prevalent method of intraoral surgery. The common complication with intraoral suture is accumulation of microbes in and around the operative site. It is necessary to maintain a proper hygiene post-operatively for healthy healing of surgical wound. As compared to the extraoral wound sutures, the intraoral environment sutures get quickly covered with debris like biofilm, and which act as source of pathogens, which can initiate inflammation of the neighbouring tissues which provide a pathway for wound infection. The microbes that grow over the sutures pose a threat of infecting the surgical wound during suture removal,[4] other local complications, as incidence of wound dehiscence and fistula reported in the practice.[5] So for intra-oral wound closure, a variety of suture materials with different structures and compositions are

being employed to avoid the complications such as antibiotic(triclosan)coated suture material, chlorhexidine coated suture material, knotless barbed suture materials.[6]

Conventional suture material needs knot to be placed to secure the suture material to the mucosa to provide adequate tensile strength. The barbed suture is a relatively new design of suture material with cutting barbs which provide good tensile strength without the need of knot. The Knotless, barbed, self-anchoring suture devices are becoming more widely accepted for being equally safe and well tolerated as traditional suture materials for tissue closure. In fact this suture material takes less time consumption for wound closure, provide good tissue healing, eliminate knot placement in difficult accessible areas like retro molar trigone or palate, prevent wound dehiscence due to slippage of knot, knot associated tissue soreness and necrosis. Knot act as centre for accumulation of food particles and bacterial colonisation so knotless barbed suture prevent infection and inflammation of wound by avoiding knots.[5]

This suture has showed positive results when used for extra-oral wound closure in gynaecology, general surgery, plastic surgery and orthopaedics. But only few studies have been done in oral cavity of humans. So, this research will help us to evaluate the effectiveness of unidirectional barbed sutures intra orally.

AIMS & OBJECTIVES OF THE STUDY

AIM OF THE STUDY:

To assess the effectiveness of intra-oral use of knotless barbed suture after Open reduction & internal fixation of maxillofacial fractures.

OBJECTIVES:

To assess following parameters on wound after open reduction & internal fixation of maxillofacial fractures.

- To compare the time required for placement of knotless barbed suture and monocryl suture during wound closure.
- To compare the loosening of suture thread/tissue approximation after suturing with knotless barbed suture material and monocryl suture material.
- To compare wound healing around incision line after suturing with knotless barbed suture material and monocryl suture material.

NULL HYPOTHESIS-

There is no difference in time required for placement of suture, tissue approximation and wound healing after suturing with barbed suture and monocryl suture.

ALTERNATIVE HYPOTHESIS-

There is significant difference in time required for placement of suture, tissue approximation and wound healing after suturing with barbed suture and monocryl suture.

REVIEW OF LITERATURE

Sriram Kasi Ganesh, et al 2018 conducted a case study on knotless barbed suture for closure of intra oral wound, in this study the incision closure after bilateral lefort1 was performed with bidirectional barbed suture on right side and with vicryl suture on left side. Result showed that knotless barbed suture is a potent option for wound closure intraorally.[7]

Corinne L. Durand, et al in 2017 have conducted a research on knotless barbed suture application in the oral cavity of cats to check time of wound closure and wound healing on 2^{nd} & 4^{th} weeks postoperatively, in full mouth extraction cases, a prospective research was conducted on 19 cats. Results were noted the closure time for monofilament suture was 8.7 minutes and for barbed suture was 5.1 minutes. The common problems were found as wound dehiscence and ranula kind swelling associated with suture.[8]

Bhuvaneswari Krishnamoorthy, et al 2015 led a study to compare monofilament knotted sutures with barbed sutures in wound suturing of the donor leg in coronary artery bypass surgery. A randomized controlled trial was done between 2012 march to June 2014 involving 142 patients who required coronary artery bypass surgery with saphenous vein graft harvest from donor leg. All patients were allotted into 2 groups, monofilament sutures placed in 1^{st} group (n-70) and barbed sutures placed in 2^{nd} group(n-72). All wounds were checked on post-operative days 3 and 5 and week 2, 4 and 6 using authenticate wound scoring system. Result showed that suturing times were significantly shorter in study group 2 than group 1 ($p<0.001$). Excessive scarring, irritation, itching, and unfavourable tissue responses were more common in

group 1 than in group 2.. They have concluded that In the Furnas procedure, the application of bidirectional barbed sutures is straightforward and quick, with minimal problems. The benefits which they found in this technique were the less irritation caused by this suture and no resurgery was require for recurrence in study group.[9]

Eric l. Smith, et al 2013 led a research on placement of barbed sutures in Arthroplasty cases to check the wound suturing time, expense of suture, and wound healing in total joint Arthroplasty. A total of 34 numbers of patients were taken in a prospective RCT And retrospective reviews of previous 100 patients was done. And the conclusion they found as barbed sutures were linked with shorter time for wound closure following surgery and as well as the financial benefits of saving time in the operating room.

Antonio Taboada-Sua´rez,et al(2014) conducted a study on Polypropelene suture versus Knotless Bidirectional Barbed Absorbable Sutures(BBAS) for esthetic surgery of protruding ear in 48 patients which distributed into group 1 and group 2. In group 1 total 25 patients undergone furnas technique of OTOPLASTY with polypropylene suture and in group B of 23 patients undergone OTOPLASTY surgery using BBAS included. Patients reviewed after 6months, 1 year, and 3 years, for postoperative problems and level of satisfaction. So they have concluded that in study group discomfort produced by this BBAS was less and requirement of resurgery was not present. so The knotless BBAS are associated with lesser complications plus it is fast and simple to use,.11 K A

Ramkumar Ceyar, et al(2020) have done study on efficacy of barbed suture for wound suturing after surgical extraction of third molar, the study was split mouth RCT. Total 25 patients with bilateral impacted 3rd molars with same index were

included in the study. Suturing was done using 3-0 knotless barbed suture (30 cm) for the study group and in control group with 4-0 polyglactin 910 (vicryl) suture following extraction. The patients were followed up on 1st, 3rd and 7th day post-operatively. Pain, maximum mouth opening and edema they checked on follow up. They found that the mean time taken for wound approximation and pain was less for the study group then control group, reduction in edema and mouth opening improvement noticed on first and seventh post-operative day in the study group compared to the control group.12

A. K. Sharma, et al 2020 have done randomised control trial to check effect of barbed suture material in mandibular angle fracture cases who requires intraoral incision for "open reduction and internal fixation". They have compared with vicryl suture. Total 40 patients taken in this study which were allotted into two groups, study group includes wound closure with knotless Bidirectional barbed suture material and control group includes wound closure with vicryl suture material. Patients were reviewed on 1st, 3rd and 7th day postoperatively for wound healing and results showed that wound healing proved better in study group as compared to control group, time required for wound closure also found less in study group than control group.[13]

Yifei Lin et al, have done systematic review and meta-analysis on effectiveness and safety of barbed knotless suture in surgical field in 2016. Data were collected from pubmed, EMBASE, clinical trial.gov for RCTs up to 2015. Sensitivity analysis plus subgroup analysis were done total 17 RCTs study were included. Compared with conventional suture, barbed sutures could reduce closure time but post-operative complications are noted more in barbed suture group then conventional group. So the safety evidence of barbed sutures are still not sufficient. [14]

E. Crosetti et al, 2019 have escorted the prospective (cohort) study to compare the efficacy of V-Loc unidirectional barbed suture with conventional monofilament suture (Vicryl) for suturing of a free flap to recipient site in head and neck oncosurgery. They have evaluated the time for closure, post operative complications, length of hospitalization and cost. Total 20 patients were distributed in two groups A group (barbed suture) and B group (vicryl suture). This analysis demonstrated that using a barbed stich to suture the free flap to recipient area reduces complication rates, particularly dehiscence and fistula occurrence, as well as intra-operative time and hospitalisation length. Based on these findings and the literature, they came to conclusion as unidirectional barbed stitches are safe approach.[5]

Roberto Cortez et al, have organized a study in 2015 to check the incidence of complications after wound approximation in plastic surgery, which altered when different brands of barbed versus non barbed conventional sutures were used. A retrospective review was done in 2015 in 1011 total surgical techniques including 713 surgeries with traditional non barbed sutures and 298 surgeries with barbed sutures. When the 2-layer closure technique was used, the barbed sutures were linked with significantly greater rates of minor wound problems. Compared to V-Loc barbed sutures, quill barbed sutures were linked with considerably greater incidence of erythema.[15]

Mark T. Villa et al, 2008 the authors have conducted a literature study in order to estimate many clinical parameters related to barbed thread suspensions. The authors performed a MEDLINE search and they found six papers that addressed midface elevation with barbed thread suspension and matched their criteria. Suspension of the

ageing face with barbed sutures has the potential to be a minimally invasive procedure with fewer side effects.[16]

Malcolm D. Paul et al, has done a review article on Evolution and Applications of Bidirectional Barbed Sutures for Wound Closure in 2009, in which they found following benefits of barbed sutures such as faster the placement of the sutures, no need for knot tying, no need of assistant during suturing, distribute the even tension along the suture line and the potential for enhanced scar cosmesis.[17]

Imran Ahmed et al, have done systematic review and meta-analysis on surgical site infection prevention in 2019. They have included studies from "EMBASE, MEDLINE, AMED (Allied and complementary medicine database) and CENTRAL". Total Twenty-five studies were involved with 11957 patients. In 6008 patients Triclosan covered sutures were applied and in 5949 patients non triclosan sutures were applied. Triclosan covered sutures will reduce the surgical site infection more efficiently as compared to other sutures in clean and contaminated surgeries. [4]

Mohamed Rashwan et al, have done study in 2018 on soft palate surgeries for obstructive sleep apnea to check the outcomes of soft palate tissue preservation techniques such as "expansion sphincter pharyngoplasty (ESP)" and "barbed reposition pharyngoplasty (BRP)" for patients with obstructive sleep apnea (OSA) to classic "uvulopalatopharyngoplasty (UPPP)". Total 75 patients from this study were divided in three groups ESP, UPPP and BRP group. Polysomnography test was done to evaluate the sleep 6 months pre and post operatively. And they found that BRP is superior approach then other approaches.[18]

Allen Rosen has done research on recent applications of barbed sutures in cosmetic surgery. And he has stated that different shapes of barbed sutures are available for different types of tissues such as the skin, fascia, joint capsule, cartilage, and viscera according to their properties. Barbs on suture material will make microsurgical procedures easy to be performed without knots. Plastic surgeons, as well as many other surgical specialties, have found benefits of barbed sutures which are elimination of surgical drains postoperatively and shortened time for surgical wound closure.[19]

James Greenberg et al, have done A Review on the recent technology and clinical applications of barbed suture in obstetrics and gynaecology in 2013. The clinical data reviewed here shows that the performance of absorbable barbed sutures for soft tissue closure in obstetrics and gynaecology is almost equal to that of standard absorbable non barbed sutures. Furthermore, the assessment of the literature revealed that the barbed sutures use can save operative time and perhaps intraoperative blood loss.[20]

N. P. INGLE has done review on barbed suture technology in 2013. In this review he has summarized its history, materials utilised, structure and manufacturing, testing and qualities, and applications.[21]

Federico Costantino et al, have conducted a research for unidirectional barbed single filament and multifilament resorbable suture comparison in laparoscopic gastric bypass, where barbed V-Loc 180 unidirectional suture was shown to be superior to multifilament absorbable suture. The Study was prospective cohort in 315 patients from 2009 to 2012. Multifilament absorbable suture were used in76 patients to evaluate the gastrojejunal anastomosis and the antecolicojejunal closure, unidirectional barbed monofilament suture was applied in remaining 239 patients. The author has noticed that the use of interlocking V-Loc barbed sutures are safe and

efficient and lesser total operative time required for anastomosis. No remarkable differences were noticed in early or late postoperative problems between the multifilament absorbable and V-Loc suture patients.[22]

STUDY DESIGN:

Prospective Randomised Control Trial.

STUDY POPULATION:

The study was conducted in KLES DR. PRABHAKAR KORE HOSPITAL, K.A.H.E.R, Belagavi, Karnataka with due permission of the institutional ethical committee. Total 40 patients with complaints of maxillofacial trauma who met the following inclusion criteria and who consented by their own free-will were included in the study

INCLUSION CRITERIA:

- Patients age below 80 years.
- Any mid face fractures which requires intra-oral approach (incision length-2.5 to 6 cm)
- Mandibular angle and body fracture.
- Medically fit patient.

EXCLUSION CRITERIA:

- Patients unwilling to participate in the study
- Mandibular Symphysis/Parasymphysis fractures

INVESTIGATIONS:

- Complete blood count
- Mini renal test

- Liver function test
- Coagulation profile
- Viral markers (Hiv, HbsAg, Hcv)
- Electrocardiogram
- Chest X-ray

MATERIALS AND ARMAMENTARIUM:

Surgical Armamentarium:

- Surgical gloves
- Surgical Drape
- Towel Clip
- Kidney Tray
- Mouth Mirror
- Dental Explorer
- Tweezer
- Langenbeck Retractor
- Needle Holder
- Adson's Tissue Forceps
- Suture Cutting Scissors
- Suction Tip
- Gauze Piece
- Monocryl Suture
- Knotless V-loc Barbed Suture

METHODOLOGY:

The randomized control trial study was performed on 26 patients with maxillofacial trauma who fulfilled the exclusion and inclusion criteria and was done in KLES Dr. Prabhakar Kore's Hospital, Belagavi.

A thorough clinical and radiological examination was done by a trained examiner. As the study was a comparative study, patients were divided into two equal groups randomly by chit system.

Group A included patients who received knotless barbed suture material (case group)

Group B included patients who received monocryl suture material (control group)

After proper examination and investigations patients diagnosed with midface or mandibular fractures were taken up for surgical procedure (open reduction and internal fixation).

All the surgeries were done under general anesthesia.

Patients included in this study were subjected to surgical procedure in oral and maxillofacial surgery unit by the same experienced surgeon (1^{st} investigator).

After ORIF, before mucosal closure incision length was measured.

In the group B mucosal closure was done by using continuous suturing method with monocryl suture and knot was placed to secure the suture to the tissue.

In the group A mucosal closure was done by using continuous suturing method with unidirectional barbed suture, the end of the suture material was pulled in

the opposing directions to activate the suture material, which assisted the barbs to engage firmly in the tissue layer and gave close proximity to the border.

Suturing time was measured with stopwatch and noted by 2nd investigator.

Depending on the surgery post-operative instructions and medications were given to the patient.

Clinical follow up was done after 1 week and after 2 weeks post operatively for clinical examination of the wound site.

Patients were examined with following evaluation criteria.

EVALUATION CRITERIA:

- Loosening of suture material and wound dehiscence was assessed by clinical examination by investigator 2(result in two parameters: yes or no).
- Wound healing assessment was done by using the Southampton scoring system. The wounds were assessed based on characteristics such as signs of inflammation, colour of mucosa, bleeding on palpation, epithelisation of the incision line and clear, serosanguineous or pus(present/absent) discharge from wound site. The scores ranged from 0-5.

Table:9 Southampton score

	GRADE	APPEARANCE
0	Normal healing	
1	Normal healing with mild bruising or erythema	A-some bruising B-considerable bruising C-mild erythema
2	Erythema plus other signs of inflammation	A-at one point B-around suture C-along wound D-around wound
3	Clear or serosanguineous discharge	A-at one point (<2 cm) B-along wound (>2cm) C-large volume D-prolonged(>3days)
4	Pus/purulent discharge	A-at one point only(<2cm) B-along wound(>2cm)
5	Deep or severe wound infection with or without tissue breakdown	

The data were analysed with parametric and non-parametric tests.

1. Comparison of mean time of suturing in control and case group were assessed by independent t test.
2. Comparison of loosening of suture material was assessed by fisher's exact test.
3. Comparison of wound dehiscence in controls and cases was done by Fishers exact test.
4. Comparison of wound healing at 1st week and 2nd week with status of Southampton scoring in controls and cases were assessed by Fishers exact test.

Figure 1: Armamentarium

Figure 2: Measurement of incision length with sterile scale.

Figure 3: Wound closure done with Monocryl suture

Figure 4: wound healing after 1 week in monocryl group

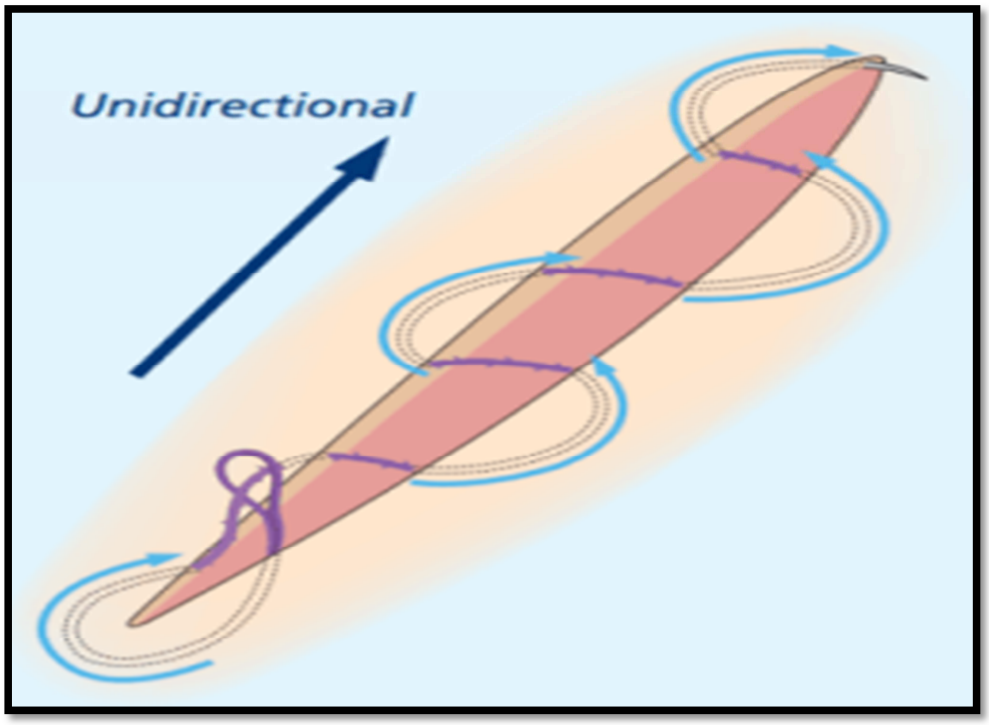


Figure 5: Schematic diagram of unidirectional barbed suture placement over wound

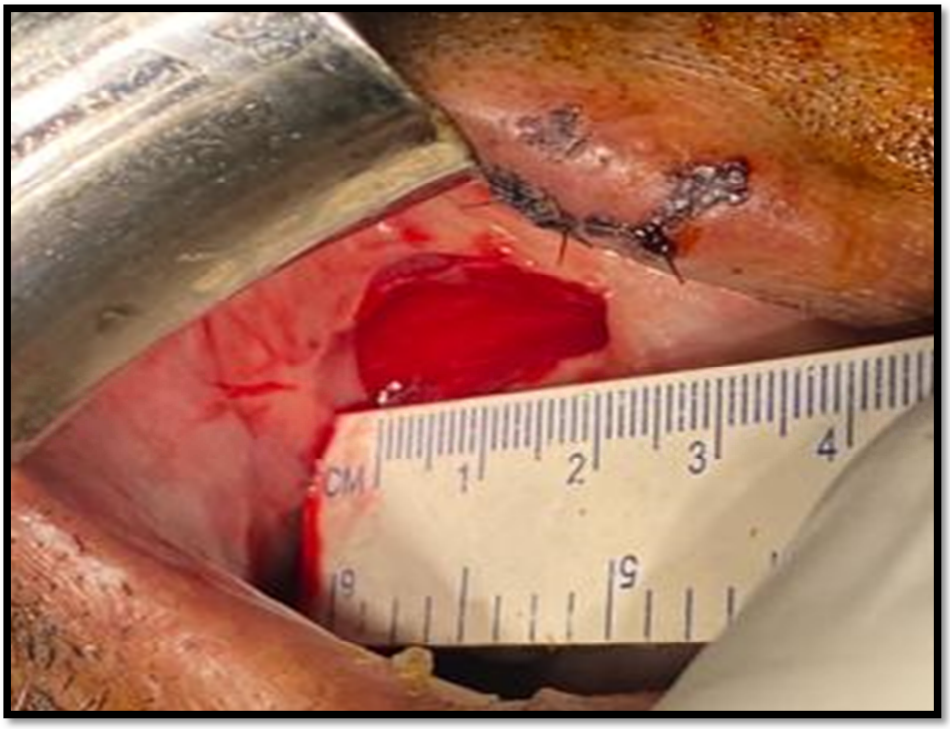


Figure 6: Measurement of incision length with sterile scale.

Figure 7: barbed suture used for wound closure

Figure 8: wound closure done with barbed suture

Figure 9: wound healing after 1 week with barbed suture

RESULT

This study involved total 40 incision sites in 26 patients (25 males and 1 female) with maxillofacial trauma, (table-2) case group (barbed suture) involved 13 patients with 20 sites and control group (monocryl) involved 13 patients with 20 sites. Mean age of 37.23 + 13.96 years (table-1). Mean incision length was 3.36mm in control group and 3.35mm in study group (table-7).

Table 1: Comparison of controls and cases by age groups

Age groups	Controls	%	Cases	%	Total	%
<=25yrs	2	15.38	2	15.38	4	15.38
26-35yrs	5	38.46	4	30.77	9	34.62
36-45yrs	2	15.38	5	38.46	7	26.92
>=46yrs	4	30.77	2	15.38	6	23.08
Total	13	100.00	13	100.00	26	100.00
Mean	38.46		36.00		37.23	
SD	17.21		10.31		13.96	
Chi-square= 2.0630 p = 0.5590						

Figure 1: Comparison of controls and cases by age groups

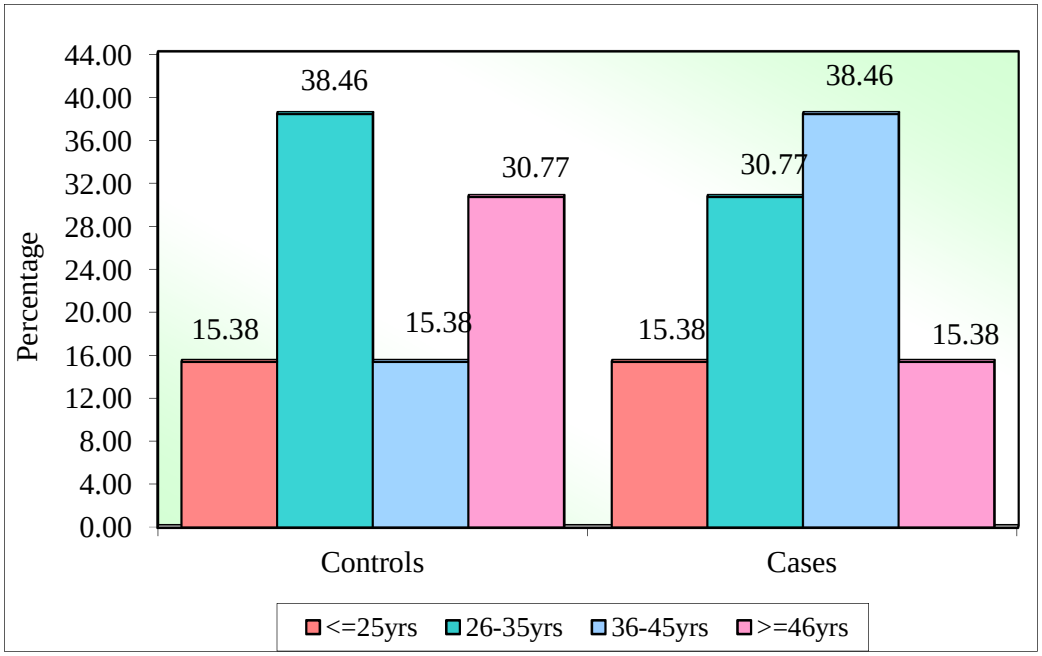


Table 2: Comparison of controls and cases by gender

Gender	Controls	%	Cases	%	Total	%
Male	13	100.00	12	92.31	25	96.15
Female	0	0.00	1	7.69	1	3.85
Total	13	100.00	13	100.00	26	100.00
Fishers exact test, p=1.0000						

Figure 2: Comparison of controls and cases by gender

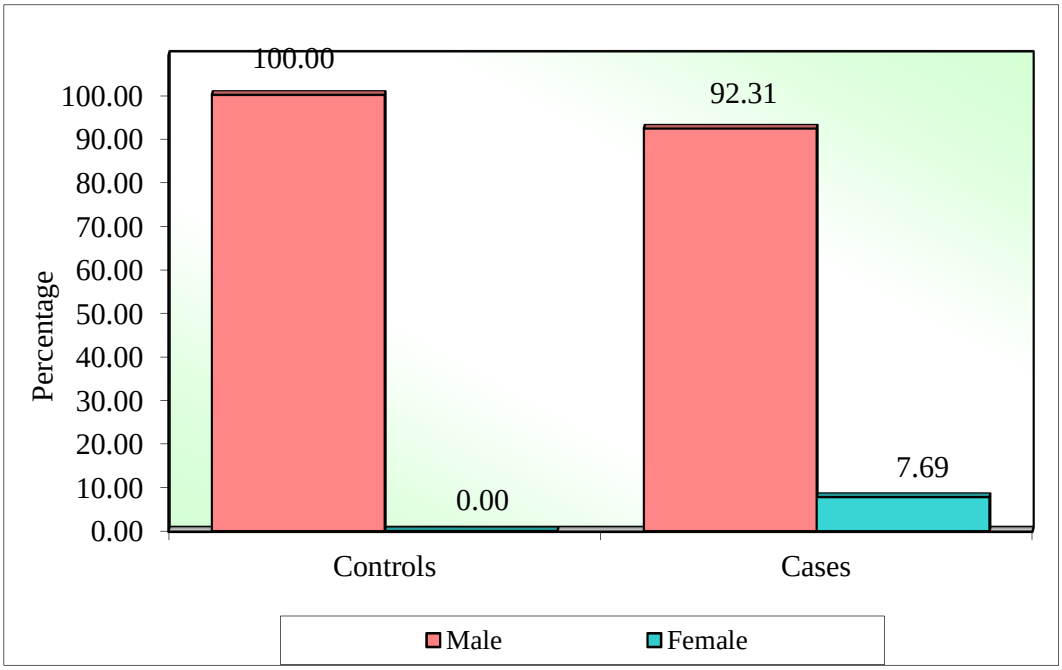
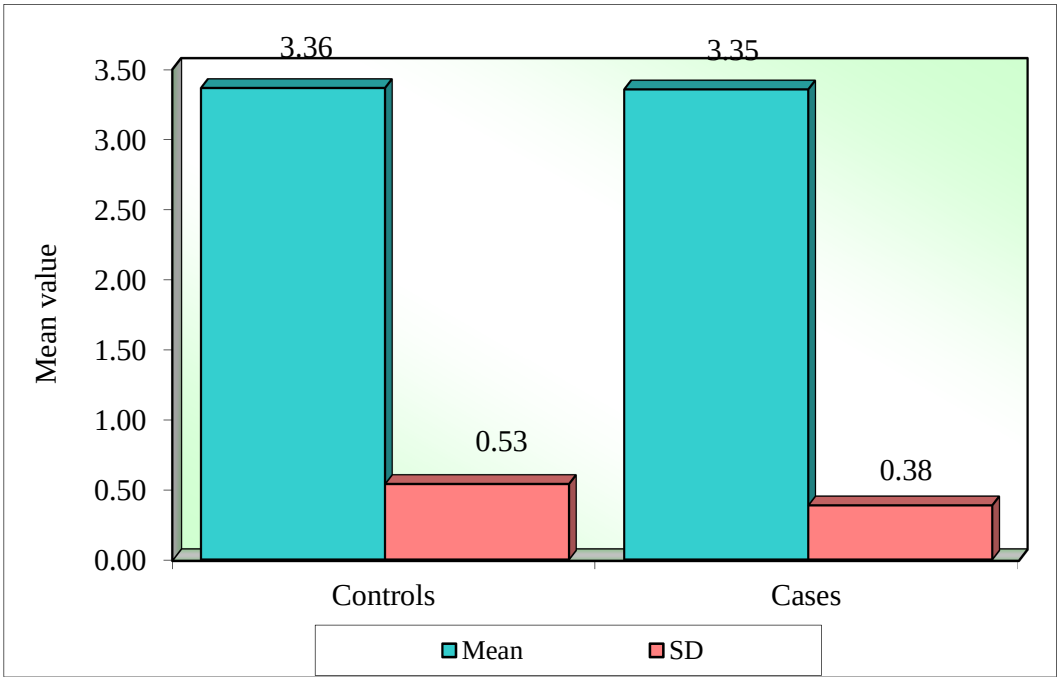


Table 3: Comparison of controls and cases with mean incision length by independent t test

Groups	N	Mean	SD	SE	t-value	P-value
Controls	20	3.36	0.53	0.12	0.0345	0.9727
Cases	20	3.35	0.38	0.09		

Figure 3: Comparison of controls and cases with mean incision length by independent t test

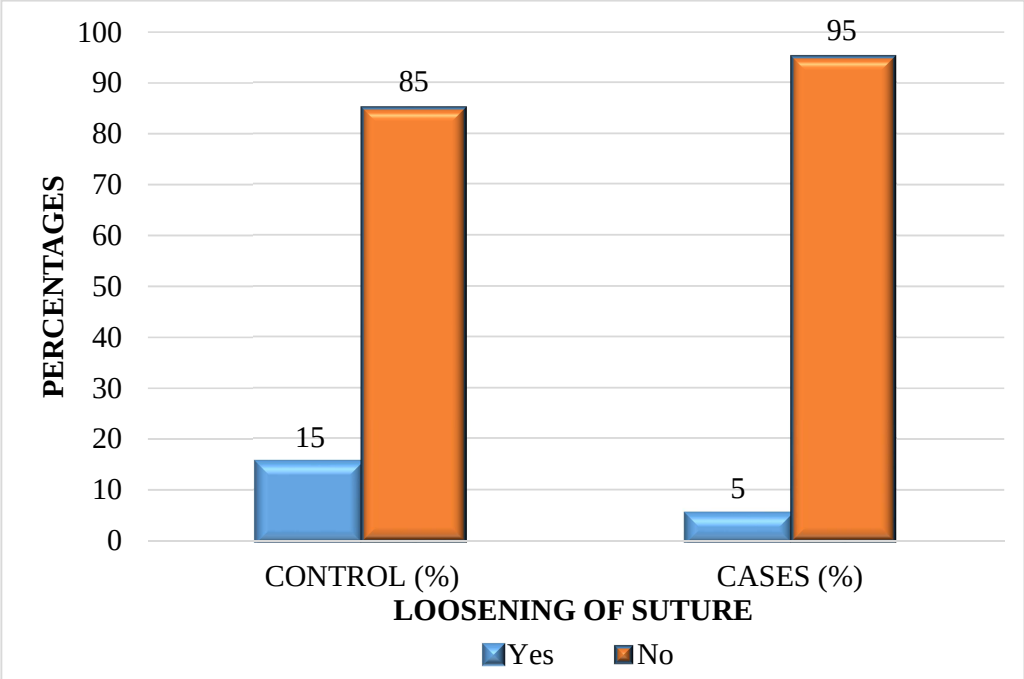


1. Loosening of suture material was checked by fisher exact test and we have noticed that in case group it was seen in 1 case whereas in control group in 3 cases suture loosening were seen, But the difference was not statistically significant(p-1.0).

Table 4: Comparison of controls and cases by loosening of suture

Loosening of suture	Controls	%	Cases	%	Total	%
Yes	3	15.00	1	5.00	4	10.00
No	17	85.00	19	95.00	36	90.00
Total	20	100.00	20	100.00	40	100.00
Fishers exact test, p=0.605						

Figure 4: Comparison of controls and cases by loosening of suture

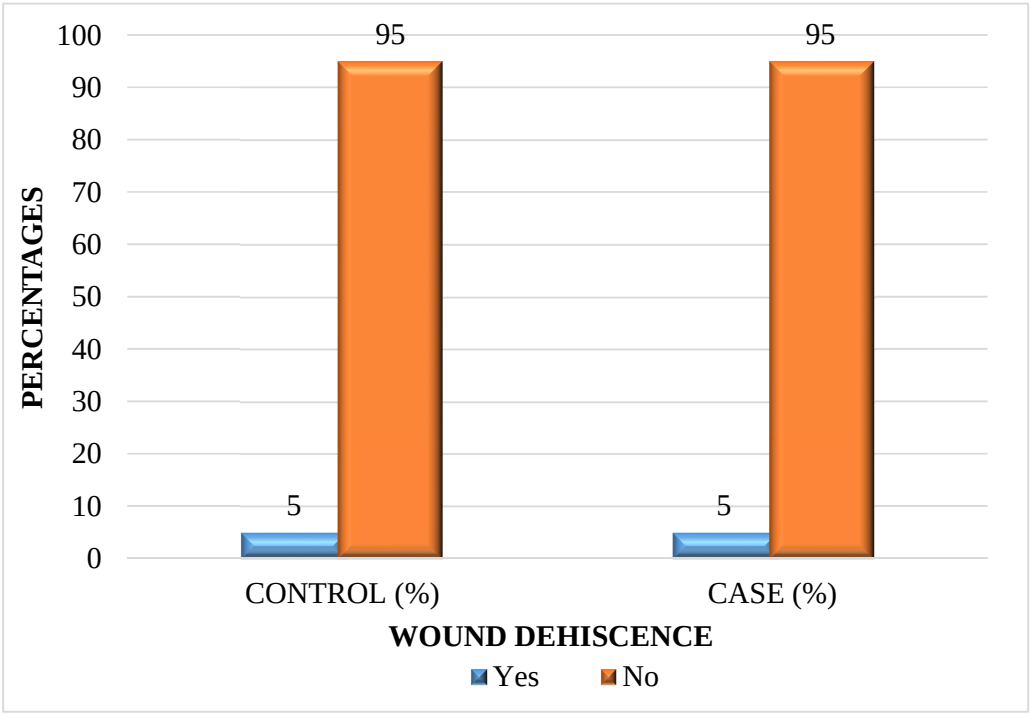


2. Wound dehiscence over suture line was equal in both groups. There was no difference in wound dehiscence in control group and case groups (p-1.0). which was evaluated by fisher exact test.(table-5)

Table 5: Comparison of controls and cases by wound dehiscence

Wound dehiscence	Controls	%	Cases	%	Total	%
Yes	1	5.00	1	5.00	2	5.00
No	19	95.00	19	95.00	38	95.00
Total	20	100.00	20	100.00	40	100.00
Fishers exact test, p=1.0000						

Figure 5: Comparison of controls and cases by wound dehiscence



3. Wound healing was checked by Southampton scale on 1st week and 2nd week,

(A) On 1st week in case group 16 patients had 0 score, 3 patients had 1A score, 1 patient had 2B score where as in control group 8 patients had 0 score, 5 patients had 1A and 7 patients had 1B scores. Which suggests wound healing was good in case group as compared to control group (table-6).

(B) On 2nd week in case group 1 patient had 1A score and 19 patients had 0 score where as in control group all 20 patients had 0 score (table-7).

The wound healing difference between study group and control group was significant as assessed by chi-square test (p-0.011). Which suggest that wound healing with barbed suture is better as compared to monocryl suture.

Table 6: Comparison of controls and cases by Southampton scoring at 1st week

Southampton scoring	Controls	%	Cases	%	Total	%
Score 0	8	40.00	16	80.00	24	60.00
Score 1A	5	25.00	3	15.00	8	20.00
Score 1B	7	35.00	0	0.00	7	17.5
Score 2B	0	0.00	1	5.00	1	2.5
Total	20	100.00	20	100.00	40	100.00
Chi-square= 11.167 P = 0.011*						

Figure 6: Comparison of controls and cases by Southampton scoring at 1st week

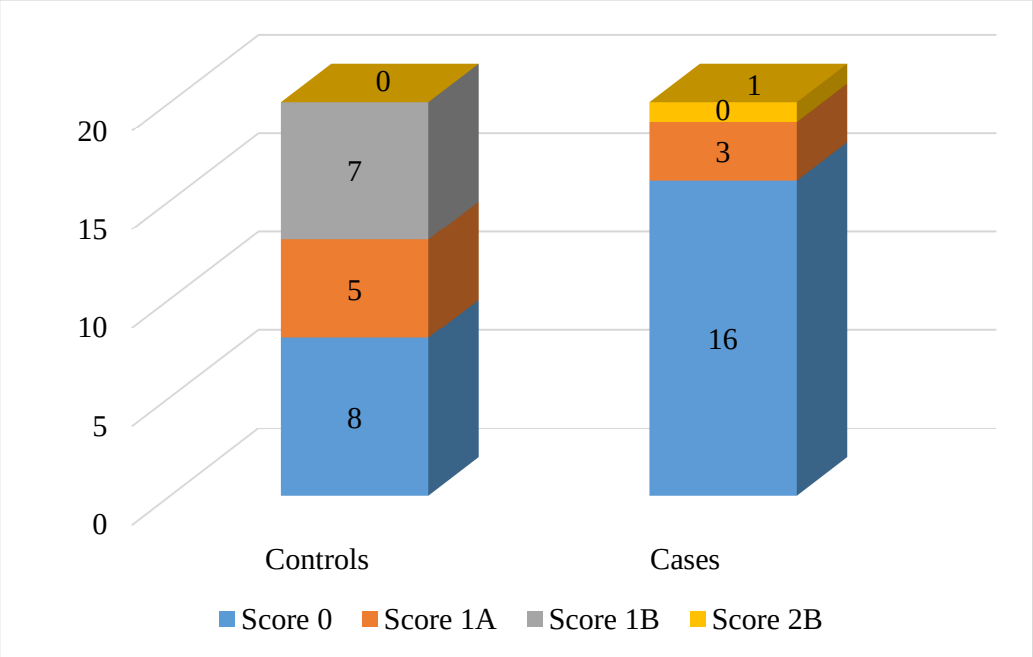


Table 7: Comparison of controls and cases by Southampton scoring at 2nd week

Southampton scoring	Controls	%	Cases	%	Total	%
Score 0	20	100.00	19	95.00	39	97.5
Score 1A	0	0.00	1	5.00	1	2.5
Total	20	100.00	20	100.00	40	100.00
Fishers exact test, p=1.0000						

Figure 7: Comparison of controls and cases by Southampton scoring at 2nd week

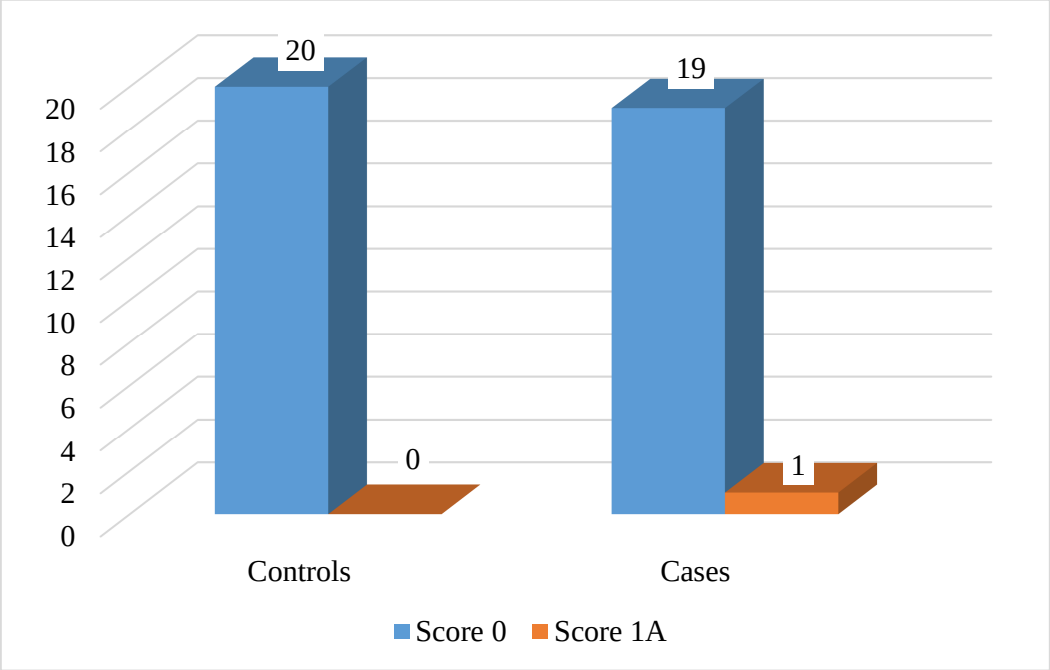


Table 8: Comparison of 1st week and 2nd week with status of Southampton scoring in controls and cases

Groups	Changes from	Z-value	p-value
Controls	1st week to 2nd week	4.790	0.000*
Cases	1st week to 2nd week	2.032	0.056

*p<0.05

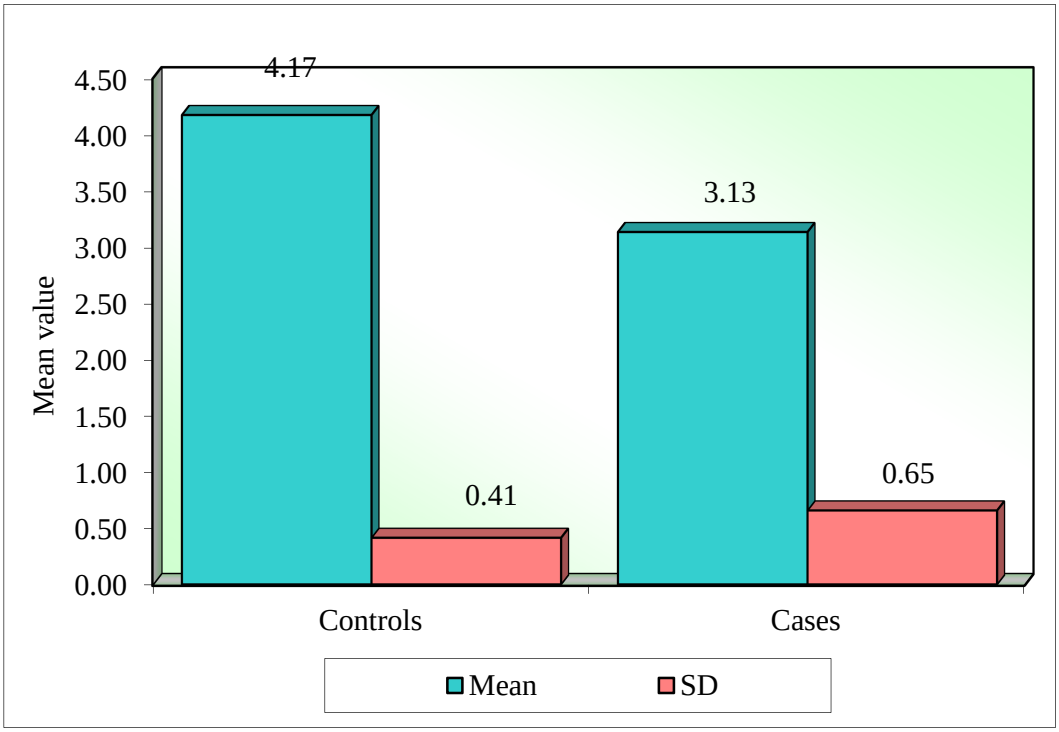
4. In this study mean suturing time with barbed suture in case group was 3.13 Minutes and with monocryl suture was 4.17 Minutes in control group, which was relatively less in case group as compared to control group. This difference was statistically significant between case and control group (p-0.0001) (table-9)

Table 9: Comparison of controls and cases with mean time of suturing by independent t test

Groups	n	Mean	SD	SE	t-value	P-value
Controls	20	4.17	0.41	0.09	6.0508	0.0001*
Cases	20	3.13	0.65	0.15		

*p<0.05

Figure 8: Comparison of controls and cases with mean time of suturing by independent t test



DISCUSSION

For Maxillofacial trauma open reduction & internal fixation is proven as the best option especially when the fracture is displaced. Intraoral incision is preferable approach as it is aesthetically pleasant and has less post-operative complications. Suturing is the most commonly employed option for intraoral closure of the wound.[13] Selection of suture material will depend on some parameters such as anatomical position, wound category, tissue handling technique.[7] A recent barbed suture technology has gained success in many fields like in general surgery for closure of the donor site[9] laparoscopic surgery,[22] breast and cervix surgeries,[23] and in plastic surgery for eye brow lifting, face lift, neck lift procedures.[17] But very few studies have been done for intraoral use of barbed sutures. So we have done this study to evaluate the effectiveness of knotless barbed sutures intra orally.

Problems associated with traditional suture with knots.

Intra oral suturing is difficult as there is limited access for instrumentation and it is technique sensitive. An alternative for suturing and to avoid the difficulties that come with it, staples, fibrin glue, sticky tapes, and other devices have been developed. However, due to different disadvantages, their indications are limited. Staples, fibrin glue, and sticky tapes should not be utilised in dynamic areas with a lot of muscle movement or in areas where there is a lot of bleeding. In addition, fibrin glue is related to transmissible blood borne infections and hypersensitivity responses. So these options are not readily useful now a days.

The strength of traditional suturing procedures is entirely dependent on the knots used to anchor the suture. Knots, on the other hand, cause distinct clinical issues because they attract debris, loosening of suture material, wound dehiscence and other complications result from knot slippage during tissue approximation. Due to deformation of shape of the suture material, knotting reduces the tensile strength of the conventional suture by 35 to 95 percent.[20] Knotless sutures are a good alternative for intra-oral wound closure for the reasons stated above.

Barbed suture technology evolution

Dr. John H. Alcamo, on March 3, 1964 had received US Patent number 3,123,077, for "...a suture so structured that it inhibits gliding in sutured incisions or closed wounds..."[24] Despite the fact that Dr. Alcamo outlined the concept for this suture, it was not used clinically until 1967 that Dr. A.R. McKenzie described its clinical use in vitro in humans cadavers and in dogs in vivo for the healing of lengthy flexor tendons. [25] This patent was accepted by quill medical in 2002. In 2004, the “US Food and Drug Administration (FDA)” approved the Quill knotless tissue closure device. V loc “barbed unidirectional suture device with fixed loop” was introduced by Covidien in 2009. For the production of barbed sutures they used blade to cut the smooth surface of the suture which facilitates the engagement into tissue while suturing.[21] So the wound margins can be approximated without needs of knot placement. Various types of barbed sutures are available in the market now a days, unidirectional barbed sutures have a single needle with barbs presents in single direction, whereas bidirectional barbed sutures have needles on both ends and the barbs adaptations reversed at the midline of the suture. Barbs can also be arranged in a spiral fashion.[21,23] McKenzie was the first to establish the use of barbed sutures in

human cadavers and animals. Following FDA clearance in 2004, knotless barbed sutures were widely employed in a variety of surgical procedures including laparoscopic surgery, dermal wound closure, and facial cosmetic procedures like brow raising and face lifting and for obstructive sleep apnoea, they were more successful than traditional suturing approaches. [10,11,15,19,22,26]

Ganesh et colleagues reported the initial use of knotless barbed sutures for wound closure intraorally in 2 cases of ORIF of maxillofacial fractures, where knotless sutures simplified the suturing method and eliminated debris formation at the surgical site[7]. Here we have done study to evaluate the wound closure time, loosening of sutures, wound dehiscence, and wound healing of barbed suture to compare with monocryl suture material.

Wound closure time

Eric smith et al have noticed that time required for wound closure in total knee replacement with barbed suture was 9.72 minutes less than conventional suture.[10] Crosetti et al also have found the significant difference in wound closure 30 minutes between unidirectional barbed suture and monocryl suture for oral cancer reconstructive surgeries.[5] Here in our study we have found that time required for intraoral wound closure is significantly less(1.04 minutes) with unidirectional barbed suture than monocryl suture as it avoids the placement of knot.

Wound healing

For better wound healing few parameters are required such as long term tissue approximation of wound margins, adequate tensile strength of suture material, wound hygiene to avoid microorganism accumulation.[27]

Here in barbed sutures, the barbs along the suture thread will prevent tissue gliding and offer equal tension distribution throughout the wound borders, with greater than 20 places of fixation per inch of tissue which eliminate the need for knot placement. When Greenberg et al have compared the barbed PDS sutures of same size, the relative tensile strength of the monocryl has been observed to be lower.[23] Plus time taken for absorption of barbed sutures are 180-240 days in comparison to monocryl sutures, which take 14-30 days to absorb so the barbed suture will stay for longer time along the wound margins and provide better wound healing. Knot elimination will prevent microorganism accumulation over knots prevent surgical site infection.[20,23] Fowler et al examined the bacterial accumulation in infected wound models between barbed knotless monofilament stiches and traditional nonbarbed braided stiches and noticed that knotless barbed stiches had the less bacterial accumulation.[28] Rettenmaier et al and Seidhoff et al have observed that barbed sutures caused less wound dehiscence than traditional sutures in laparoscopic procedures.[29,30]

In our present study, the wound healing with unidirectional barbed suture found better than monocryl suture as on 1st week follow up we noticed 16/20 wounds in case group had no signs of inflammation whereas in control group 8/20 wounds had no signs of inflammation. As application of barbed suture is technique sensitive, in our study initially one patient from barbed suture group had loosening of suture, wound dehiscence and inflammation over wound site due to improper suture placement, which was managed by periodic irrigation of wound and oral antimicrobial drugs. Rest all patients from barbed sutures group had better wound healing as compared to monocryl group.

Advantages of barbed suture

The study found that knotless sutures have the following advantages: convenience of suturing, shorter suturing time, absence of knots leading to fewer knot-related problems like wound infection and dehiscence , Enhanced patient's comfortness as a result of reduced tissue irritation, and the barb's deep anchoring allows for a better approximation of tissue margins.[6,31,32]

Disadvantages of barbed suture

Knotless barbed suture is not useful for interrupted suturing techniques or mattress suturing technique, because numerous sites of tissue anchoring are required for suture retention. Removal and reapplication of the barbed suture are not possible as its tight engagement into tissue can leads to trauma. Cost of the barbed suture material is high than standard suture. Due to its long resorption time, suture will stay over wound for long time which can cause tissue irritation.[13,16]

CONCLUSION

This study demonstrated better wound healing with barbed sutures compared to monocryl sutures because it has less complications like loosening of sutures and wound dehiscence. Also barbed suture saved time during surgery by reducing suturing time and making wound closure easier in less accessible areas. As well the placement of barbed suture requires experience of surgeon as in our initial cases we have found the loosening of suture which lead to wound inflammation, which we have managed by frequent irrigation and follow ups. As common inference cannot be drawn, we suggest more studies to be done with larger sample size for common conclusion.

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ANNEXURE – I – PLAGIARISM CHECK REPORT

Scientific Correspondence and Review Committee

KLE VK Institute of Dental Sciences
A Constituent Unit of KLE Academy of Higher Education and Research
(Deemed-to-be-University u/s 3 of the UGC Act, 1956)
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Date : 30.12.2021 Serial No. : 079

PLAGIARISM CHECK REPORT

Name of the Applicant : DR. SAPNA. PATEL
UG / PG / Ph.D / Staff : POSTGRADUATE
Batch & Year : 2019-22
Department : ORAL AND MAXILLOFACIAL SURGERY

The soft copy of Research Work / Manuscript by ...DR. SAPNA. PATEL... entitled "...COMPARISON OF KNOTLESS BARBED SUTURE VERSUS MONOCRYL SUTURE FOR INTRAORAL USE IN MAXILLOFACIAL FRACTURE ...: A RANDOMIZED CONTROL TRIAL..." under the guidance of ...DR. SHRIDHAR D. BARIGA.....has been submitted for Anti-Plagiarism check to the Scientific Correspondence & Review Committee of KLE VK Institute of Dental Sciences using "Turn-it-in" software.

The scan has been carried out and the scanned output reveals a Similarity Index of .....8.....%, which is **within** / **not within** the acceptable limits of 10% as per the UGC guidelines.

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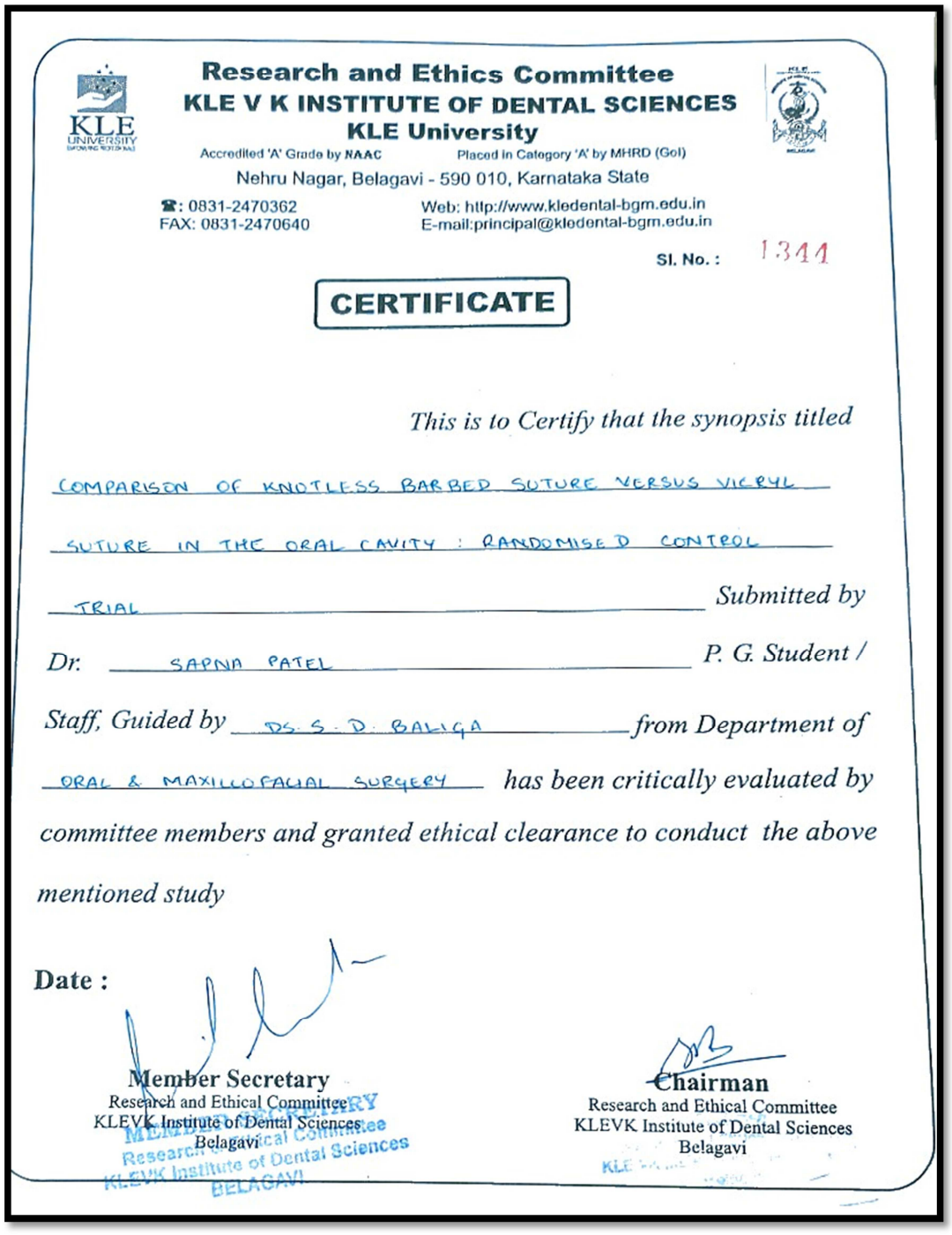
Scientific Correspondence and Review Committee
KLEVK Institute of Dental Sciences
KAHER-Belagavi

Chairman
Scientific Correspondence and Review Committee
KLEVK Institute of Dental Sciences
KAHER - Belagavi

ANNEXURE – II – ETHICAL CLEARANCE LETTER



Research and Ethics Committee
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Sl. No. : 1311

CERTIFICATE

This is to Certify that the synopsis titled

COMPARISON OF KNOTLESS BARBED SUTURE VERSUS VICRYL SUTURE IN THE ORAL CAVITY : RANDOMISED CONTROL TRIAL

Submitted by

Dr. SAPNA PATEL *P. G. Student /*

Staff, Guided by DR. S. D. BALIGA *from Department of* ORAL & MAXILLOFACIAL SURGERY *has been critically evaluated by committee members and granted ethical clearance to conduct the above mentioned study*

Date :

Member Secretary
Research and Ethical Committee
KLEVK Institute of Dental Sciences
Belagavi

MEMBER SECRETARY
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BELAGAVI

Chairman
Research and Ethical Committee
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Belagavi

ANNEXURE – III – BIOSTATISTICS CLEARANCE LETTER

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Biostatistics Clearance Certificate

This is to certify that the Biostatistics aspect of the Dissertation / Research work of **Dr. SAPNA PATEL, Post Graduate Student**, under the guidance of **Dr. SHRIDHAR D. BALIGA** M.D.S, **Professor and Head, Department of Oral and Maxillofacial Surgery**, entitled **"Comparison knotless barbed suture versus monocryl suture for intraoral use in maxillofacial fractures: A Randomized Control Trial"** has been done under my guidance and considered satisfactory.

Place: Belagavi
Date: 06/12/2021

Name & Signature of Biostatistician
(Dr. S. B. Javali)

ANNEXURE – IV

CASE HISTORY PROFORMA

NAME: **AGE/ SEX:**

OCCUPATION: **O.P.NO.:**

ADDRESS: **DATE:**

CHIEF COMPLAINT:

HISTORY OF PRESENTING ILLNESS:

PAST DENTAL HISTORY:

PAST MEDICAL HISTORY:

DRUG ALLERGY:

PERSONAL HISTORY:

Smoking/ Alcohol/ Tobacco chewing

GENERAL PHYSICAL EXAMINATION:

EXTRA-ORAL EXAMINATION:

- Facial Symmetry:
- Facial bone mal-alignment:
- TMJ:
- Lymph Node:
- Mouth Opening:

INTRA-ORAL EXAMINATION:

- Malocclusion:
- Intraoral bony mal-alignment:
- Swelling:

- Discharge:
- Pain/ Difficulty In Chewing:

PROVISIONAL DIAGNOSIS:

INVESTIGATIONS:

Complete blood count

Mini renal test

Liver function test

Coagulation profile

Viral markers (hiv, hbsag, hcv)

Electrocardiogram

Chest x-ray

RADIOGRAPH AND CLINICAL CORRELATION:

DIAGNOSIS:

TREATMENT PLANNING:

DETAILS OF SURGERY:

DATE:

SURGICAL PROCEDURE:

General Anaesthesia:

ORIF:

Closure of Site:

Follow up:

MEDICATION:

GROUP ALLOTED:

FOLLOW UP:

ANNEXURE – V – CONSENT FORM

K.L.E.'s V.K. Institute of Dental Sciences
Department of Oral and Maxillofacial Surgery, Belagavi
CONSENT TO SURGERY & ANAESTHETICS

Date: Time:

a.m./ p.m.

1. I, _____ aged_____ years have been informed about my involvement in the study.
2. I agree to give my personal details like Name Age, Sex, Address, Past dental history and any other details required for the study to the best of my knowledge.
3. I will cooperate with the surgeon for examination and also for various investigations that may be required.
4. I permit the operator to utilize the information given by me and the results obtained from this study for presentation and publication.
5. I permit the surgeon to take my photographs to utilize the same for study and presentation purpose.
6. I am participating in this study with my own wish and will and the surgeon has explained the nature and the effect of surgical procedure and suture placement.
7. The nature and purpose of the operation and the materials being used, possible alternative methods of treatment, the risk involved and the possibility of complications have been fully explained to me in my vernacular language. No guarantee or assurance has been given by anyone as to the results that may be obtained. (Cross out any paragraphs in the preceding forms which do not apply)
8. I have read and understood the above information given by surgeon about the study and willingly agree to participate in the study.

Name: Date:

Signature: Mob. No:

Name of doctor: Dr. Sapna Patel

Doctor's contact: 9904178869, Hospital contact**:** 08312551732

K.L.E.'s V.K. Institute of Dental Sciences
Department of Oral and Maxillofacial Surgery, Belagavi
CONSENT TO SURGERY & ANAESTHETICS

तारीख: वेळ:

1. मी, _____ वय _____ वर्ष ला माहिती दिली गेली आहे □ भ्यासात माझ्या सहभागाबद्दल.

2. मी माझे वैयक्तिक तपशील जसे की माझे नाव, वय, लिंग आणि मागील उपचारांचा इतिहास आणि □ भ्यासासाठी आवश्यक □ सलेल्या इतर तपशीलांना माझ्या माहितीनुसार सर्वोत्कृष्ट माहिती देण्यास सहमत आहे.

3. मी वैद्यकीय तपासणीसाठी आणि विविध तपासणीसाठी सहकार्य करीन.

4. मी ऑपरेटरला माझ्याद्वारे दिलेली माहिती आणि या □ भ्यासाद्वारे प्राप्त झालेला परिणाम सादरीकरण आणि प्रकाशनासाठी वापर करण्याची परवानगी देतो.

5. मी सर्जनला माझे फोटो सादरीकरण आणि प्रकाशनासाठी वापर करण्याची परवानगी देतो.

6. मी माझ्या स्वत: च्या इच्छेने या □ भ्यासात भाग घेत आहे आणि सर्जनने मला शस्त्रक्रिया बद्दल आणि टाक्यांचा गरजे आणि साहित्य बद्दल व त्याच्या परिणामाबद्दल पूर्ण माहिती दिली आहे.

7. ऑपरेशनचे स्वरूप आणि उद्देश आणि वापरली जाणारी सामग्री, उपचारांच्या संभाव्य पर्यायी पद्धती, त्यातील जोखीम, माझ्या स्थानिक भाषेत मला पूर्णपणे स्पष्ट केली आहे. प्राप्त झालेल्या निकालांबद्दल कोणतीही हमी किंवा आश्वासन दिले गेले नाही आहे.

8. □ भ्यासाबद्दल सर्जनने दिलेली वरील माहिती मी वाचली व समजली आहे आणि □ भ्यासात भाग घेण्यास स्वेच्छेने सहमत आहे.

नावः तारीखः

स्वाक्षरी: मोबाइल नंबरः

डॉक्टरांचे नाव: डॉ. सपना पटेल
डॉक्टरांचा संपर्कः 9904178869
हॉस्पिटल संपर्कः 08312551732

K.L.E.'s V.K. Institute of Dental Sciences
Department of Oral and Maxillofacial Surgery, Belagavi
CONSENT TO SURGERY & ANAESTHETICS

ದಿನಾಂಕ: ಸಮಯ:

1. ನಾನು, _____ ವಯಸ್ಸಿನ _____ ವರ್ಷಗಳಿಗೆ ತಿಳಿಸಲಾಗಿದೆ ಅಧ್ಯಯನದಲ್ಲಿ ನನ್ನ ಪಾಲ್ಗೊಳ್ಳುವಿಕೆ ಬಗ್ಗೆ.

2. ನನ್ನ ವಯಸ್ಸಿನ ವಯಸ್ಸು, ಸೆಕ್ಸ್, ವಿಳಾಸ, ಕಳೆದ ಹಲ್ಲಿನ ಮತ್ತು ನನ್ನ ಜ್ಞಾನದ ಅತ್ಯುತ್ತಮ ಅಧ್ಯಯನಕ್ಕೆ ಬೇಕಾದ ಯಾವುದೇ ಇತರ ವಿವರಗಳಂತಹ ನನ್ನ ವೈಯಕ್ತಿಕ ವಿವರಗಳನ್ನು ನಾನು ಒಪ್ಪುತ್ತೇನೆ.

3. ನಾನು ಶಸ್ತ್ರಚಿಕಿತ್ಸಕ ಪರೀಕ್ಷೆಗೆ ಮತ್ತು ಹಲವಾರು ತನಿಖೆಗಳಿಗೆ ಸಹಕರಿಸುತ್ತೇನೆ.

4. ನಾನು ನೀಡಿದ ಮಾಹಿತಿ ಮತ್ತು ಪರಸ್ತುತಿ ಮತ್ತು ಪ್ರಕಟಣೆಗಾಗಿ ಈ ಅಧ್ಯಯನದಿಂದ ಪಡೆದ ಫಲಿತಾಂಶಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳಲು ನಾನು ಆಯೋಜಕರು ಅನ್ನು ಅನುಮತಿಸುತ್ತೇನೆ.

5. ಅಧ್ಯಯನ ಮತ್ತು ಪರಸ್ತುತಿ ಉದ್ದೇಶಕ್ಕಾಗಿ ಶಸ್ತ್ರಚಿಕಿತ್ಸಕನನ್ನು ನನ್ನ ಛಾಯಾಚಿತ್ರಗಳನ್ನು ತೆಗೆದುಕೊಳ್ಳಲು ನಾನು ಅನುಮತಿಸುತ್ತೇನೆ.

6. ನನ್ನ ಸಮಂತ ಆಶಯ ಮತ್ತು ಇಚ್ಛೆಯೊಂದಿಗೆ ನಾನು ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುತ್ತಿದ್ದೇನೆ ಮತ್ತು ಶಸ್ತ್ರಚಿಕಿತ್ಸಕನು ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯ ವಿಧಾನ ಮತ್ತು ಹೊಲಿಗೆ ನೀಯೋಜನೆಯ ಸ್ವರೂಪ ಮತ್ತು ಪರಿಣಾಮವನ್ನು ವಿವರಿಸಿದ್ದಾನೆ.

7. ಕಾರ್ಯಾಚರಣೆಯ ಸ್ವಭಾವ ಮತ್ತು ಉದ್ದೇಶ ಮತ್ತು ಬಳಕೆಯಲ್ಲಿರುವ ವಸ್ತುಗಳು, ಚಿಕಿತ್ಸೆಯ ಸಂಭವನೀಯ ಪರ್ಯಾಯ ವಿಧಾನಗಳು, ಒಳಗೊಂಡಿರುವ ಅಪಾಯ ಮತ್ತು ತೊಡಕುಗಳ ಸಾಧ್ಯತೆಯನ್ನು ನನ್ನ ಮಾತೃಭಾಷೆಯಲ್ಲಿ ಸಂಪೂರ್ಣವಾಗಿ ನನಗೆ ವಿವರಿಸಲಾಗಿದೆ. ಪಡೆಯಬಹುದಾದ ಫಲಿತಾಂಶಗಳಂತೆ ಯಾರಿಗೂ ಗ್ಯಾರಂಟಿ ಅಥವಾ ಭರವಸೆ ನೀಡಲಾಗಿಲ್ಲ.
(ಅನ್ವಯಿಸದ ಹೆಂದಿನ ರೂಪಗಳಲ್ಲಿ ಯಾವುದೇ ಪ್ಯಾರಾಗಳನ್ನು ಕ್ರಾಸ್ ಮಾಡಿ)

8. ಅಧ್ಯಯನದ ಬಗ್ಗೆ ಶಸ್ತ್ರಚಿಕಿತ್ಸಕ ನೀಡಿದ ಮೇಲಿನ ಮಾಹಿತಿಯನ್ನು ನಾನು ಓದಿದ್ದೇನೆ ಮತ್ತು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ಇಷ್ಟಪಡುತ್ತೇನೆ.

ಹೆಸರು: ದಿನಾಂಕ:
ಸಹಿ: ಮೊಬೈಲ್‌ನಂಬರ:

ವೈದ್ಯರಹೆಸರು: ಡಾ. ಸಪ್ನಾ ಪಟೇಲ್
ವೈದ್ಯರಸಂಪರ್ಕ: 9904178869, ಆಸ್ಪತ್ರೆಸಂಪರ್ಕ: 08312551732

ANNEXURE –VI– MASTER CHART

CONTROL GROUP

SR. NO	PT NAME	AGE	INCISION LENGTH	FRACTURE SITE	TIME OF SUTURING	LOOSENING OF SUTURE	WOUND DEHISCENCE	SOUTHAMPTON SCORING	SOUTHAMPTON SCORING
1	NISAR SANADI	27/M	3.1 CM	LEFT ZMC #	4.25 MINUTES	NO	NO	1A	0
2	PRAKASH	40/M	3.5 CM	LE FORT 3 ON LEFT SIDE	4.30 M	NO	NO	0	0
3	RAJU	27/M	2.6 CM	LEFT MANDIBULAR BODY #	4.15 M	NO	NO	0	0
4	IRAPPA	37/M	4.1 CM	RIGHT ZMC #	3.8M	NO	NO	1B	0
5	IRAPPA	37/M	3.2 CM	RIGHT MANDIBULAR BODY #	4.50 M	NO	NO	1B	0
6	PRATIK KADULKAR	19/M	3.4 CM	LEFT MANDIBULAR ANGLE #	4.15M	YES	NO	1B	0
7	PRATIK KADULKAR	19/M	4.2CM	LEFT MANDIBULAR BODY #	4M	YES	NO	1B	0
8	NADEEM BAGWAN	27/M	2.5 CM	MANDIBULAR BODY #	3.5M	NO	NO	0	0
9	BASAVRAJ HARIMATH	34/M	3.3 CM	LEFT ZMC #	4.5M	NO	NO	0	0
10	JAGADISH PATIL	55/M	3.5 CM	RIGHT ZMC #	4.12M	NO	NO	0	0
11	APPASO KHOT	48/M	4.2 CM	LEFT MANDIBULAR BODY #	5.10M	NO	NO	1A	11
12	APPASO KHOT	48/M	3.5 CM	MALUNITED LEFT LEFORT 3	4.28M	NO	NO	1A	12
13	APPASO KHOT	48/M	2.6 CM	MALUNITED RIGHT LEFORT 3	3.4M	NO	NO	1A	13
14	SHANKAR KATTI	34/M	2.8CM	RIGHT MANDIBULAR BODY#	4.5M	NO	NO	1B	14
15	SHANKAR KATTI	34/M	4.2CM	LEFT MANDIBULAR ANGLE #	3..5M,	NO	NO	1B	15
16	RAMANGAUDA PATIL	19/M	3CM,	RIGHTL LEFORT 2	4M,	NO	NO	0	16
17	RAMANGAUDA PATIL	19/M	3.2CM	LEFT LEFORT 2	4.5M	NO	NO	0	17
18	MARUTI PATIL	81/M	3.2CM	LEFT ZMC #	4.5M	YES	YES	1B	18
19	MARUTI LOKHANDE	52/M	3.5CM	RIGHT ZMC#	4M	NO	NO	1A	19
20	NIVEDITA SHANKAR	26/F	3.5CM	LEFT ZMC #	4.5M	NO	NO	0	20

CASE GROUP

SRNO	PT NAME	AGE	INCISION LENGTH	FRACTURE SITE	TIME OF SUTURING	LOOSENING OF SUTURE	WOUND DEHISCENCE	SOUTHAMPTON SCORING	SOUTHAMPTON SCORING
1	RUDRAPPA KATHI	50/M	3 CM	RIGHT ZMC #	2.39M	NO	NO	1A	0
2	SUBHARAO KALE	25/M	3.1 CM	RIGHT MANDIBULAR BODY #	2.20M	YES	YES	2B	1A
3	POOJA	27/F	4.1 CM	RIGHT ZMC #	2.45M,	NO	NO	0	0
4	POOJA	27/F	3.3 CM	RIGHT MANDIBULAR ANGLE #	3.28M,	NO	NO	0	0
5	POOJA	27/F	2.7 CM	LEFT MANDIBULAR BODY#	2.50M	NO	NO	0	0
6	ANNAPPA KHATEDAR	45/M	3.5 CM	RIGHT BODY, LEFT ZMC, LEFT SUBCONDYLAR#	2.8M,	NO	NO	0	0
7	ANNAPPA KHATEDAR	45/M	3.3 CM	RIGHT BODY, LEFT ZMC, LEFT SUBCONDYLAR#	2.42M,	NO	NO	0	0
9	RUDRAPPA DESHNOLL	29/M	3.5CM	RIGHT MALUNITED ZMC#	3.5M	NO	NO	0	0
10	MALLAPPA YELLATHI	45/M	3.5CM	RIGHT MANDIBULAR BODY #	3.5M	NO	NO	0	0
11	MALLAPPA YELLATHI	45/M	4CM	LEFT ANGLE#	4.5M	NO	NO	0	0
12	MAHESH CHOGALE	50/M	3.3CM	RIGHT ZMC#	3M	NO	NO	1A	0
13	KEMPAYYA	45/M	3.5 CM,	INFECTED LEFT ZMC PLATE	3 M	NO	NO	0	0
14	VIJAY BHOVI	36/M	3CM	RIGHT ZMC#	4.2M	NO	NO	0	0
15	KASHINATH	29/M	3.5CM,	RIGHT LEFORT 2	4M	NO	NO	0	0
16	KASHINATH	29/M	4CM,	LEFT LEFORT 2	3.8M	NO	NO	0	0
17	KASHINATH	29/M	3.2CM	RIGHT MANDIBULAR BODY #	3.5M	NO	NO	0	0
18	KANIP	21/M	2.8CM	RIGHT LEFORT 2 FRACTURE	2.5M	NO	NO	0	0
19	KANIP	21/M	3.2CM	LEFT LEFORT 2 FRACTURE	3M	NO	NO	0	0
20	VINAYAK	4O/M	3CM	INFECTED RIGHT ZMC PLATE	2.8M	NO	NO	1A	0