



## Comparision Of Tissue Adhesive And Sterile 3-0 Silk Suture For Closure Of Surgical Wound After Removal Of Impacted Mandibular Third Molars: A Clinical And Microbiological Study

<sup>1</sup>Dr. K.Shravan Teja, <sup>2</sup>Dr. E.Rahul Kiran, <sup>3</sup>Dr. Moiz Ahmed, <sup>4</sup>Dr. Swetha Barapati, <sup>5</sup>Dr. Minhaj Afreen,

<sup>6</sup>Dr. Rakesh Damarapu, <sup>7</sup>Dr. Sindhusha Palem

<sup>1</sup>MDS and Senior Resident, <sup>6</sup>Assistant Professor, <sup>7</sup>Surgeon,

Department of Oral and Maxillofacial Surgery,

<sup>1,7</sup>Government Dental College and Hospital, Hyderabad, KNR University, Telangana

<sup>6</sup>Care Dental College And Hospital, Potturu

<sup>2,3,4,5</sup>Meghna Institute Of Dental Sciences, Nizamabad

**\*Corresponding Author:**

**Dr. K.Shravan Teja**

MDS and Senior Resident , Department of Oral and Maxillofacial Surgery, Government Dental College and Hospital, Hyderabad, KNR University, Telangana

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### Abstract

**Background:** Closing the surgical incision is an important step in the surgical procedures, the success of surgery is sometimes compromised by the defective suturing techniques or improper suturing materials, black silk sutures are more or less most often used materials in the day today surgical procedures, but these suture materials demand more time and effort from the surgeon and there is a need to substitute these materials with more user friendly and more successful wound closing materials such as cyanoacrylates. The purpose of the study is to compare 3-0 sterile silk suture and N-butyl-2 Cyanoacrylate for wound closure after surgical removal of impacted lower third molar clinically and microbiologically.

**Materials & Methods:** 50 patients of age group between 15-30 years who underwent unilateral surgical extraction were divided into two groups. one group was given 3-0 black silk sutures and the other group was given n-butyl-2cyanoacrylate adhesive for closure of the surgical site, and a clinical comparison was made on the 1st, 3rd, and 7th post-operative days, on the seventh postoperative day following removal of sutures, swab samples were obtained from the sites and were examined for microbiological assessment.

**Results:** Based on the clinical and microbiological study , patients significantly experienced lower levels of pain on visual analog scale (VAS) in Cyanoacrylate group. On assessment of soft tissue healing better and early soft tissue healing with less swelling is noted in Cyanoacrylate group when compared to sterile silk suture group and no other complications occurred in any of our cases. Increased mouth opening was observed post operatively in Cyanoacrylate group. Post operative bleeding was seen in sterile silk suture group. Time taken is very less in Cyanoacrylate group when compared to silk suture group. Decreased bacilli count is observed in Cyanoacrylate group microbiologically.

**Conclusion:** The study concluded that Tissue adhesive can be used for intra oral wound closure effectively. The procedure is relatively painless & quick. The material causes less tissue reaction and haemostasis. Added to this are benefits of protection from wound infection since the material is bacteriostatic.

**Keywords:** Cyanoacrylate glue, N-Butyl-2 Cyanoacrylate, 3-0 Silk sutures

### Introduction

The ideal wound closure material permits a precise wound closure with re approximation of wound edges, it is easily and rapidly applied, painless, protects underlying tissues from infection or other irritating factors, prevents postoperative hemorrhage, is inexpensive with less tissue toxicity, and results in minimal scarring. In oral and maxillofacial surgery, closure of soft tissue wounds is primarily done with mechanical devices, such as sutures and staples. Sutures being a classic method of wound closure have many advantages such as achievement of careful closure, low dehiscence rate and resilient tensile strength. However, sutures do have certain disadvantage namely prolonged duration of surgery and anaesthesia, tissue reactivity, risk of needle stick, undesirable trauma to the intact tissue on either side of wound, permanent suture tracts, early removal which results in dehiscence, anxiety and pain during removal and inadequate aesthetics

The ever striving search for an alternative procedure and materials has lead to the discovery and development of new biomaterials like staples, adhesive tapes, adhesive glue and fibrin sealant to overcome the disadvantage of suture and provide sufficient good wound healing.

Tissue adhesives can be broadly defined as any substance with characteristics that allow for polymerization. Polymerization can hold tissues together or serve as a barrier for leakage. Surgeons have been using tissue sealants and adhesives since the early nineteenth century. Tissue adhesives were invented in 1949 and were tried clinically for the first time . The past forty years have witnessed development and refinement of the tissue adhesive as a new era in wound closure. This procedure allows for normal wound healing and is accomplished without the need of local anesthesia or entry of foreign material.

They are also used in attaching grafts, management of CSF leak, during bone plating and widely used in lacerated skin and aesthetic skin closure. Presently in

oral and maxillofacial surgery, adhesives have a minimal role, but this is changing rapidly. Clinical trials are beginning for newly developed adhesives with the chemical characteristics, the safe reabsorptive profile, and the adhesive strength necessary to benefit oral and maxillofacial surgery patients in the near future. Despite the improvement in chemistry of Cyanoacrylates, there has been a dearth of clinical studies in literature regarding the intraoral use of Cyanoacrylates. Thus in view of the above mentioned features, the purpose of this study is to compare the clinical and microbiological responses of intraoral mucosal incisions closed with N-butyl-2-cyanoacrylates with incisions closed with 3-0sterile silk sutures in surgical removal of third molars in oral cavity

### **Material And Method:**

This study was carried out in the Department Of Oral And Maxillofacial Surgery, Meghna Institute of Dental Sciences, Mallaram, Nizamabad-Dist, Telangana.The inclusion criteria included 1. Unilateral partially impacted mandibular third molar which are advised for surgical removal 2. Patient within age group of 18-50 3.Both males and females 4. Patients with no medical history of Hypertension and Diabetes Patients with Impacted mandibular third molars were included in the study. Fifty patients were selected and divided into two equal groups of twenty five each for the study.

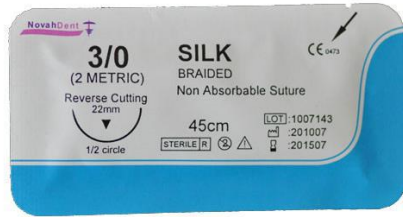
#### **Group A: 25 Patients/ 3-0 Sterile Silk Group**

Patients who are indicated for surgical removal of impacted mandibular third molar and mucosa is approximated and sutured using conventional sterile 3-0 silk suture. (fig1)

#### **Group B: 25 Patients/N-Butyl-2-Cyanoacrylate Group**

Patients who are indicated for surgical removal of impacted mandibular third molar and mucosa is approximated using N-Butyl-2-Cyanoacrylate (fig 2)

**Fig 1: Sterile 3-0 silk suture**



The procedure was carried on by elevating a mucoperiosteal flap under local anaesthesia, then root resection, tooth removal and removal of apical granulation tissue was done by curettage and haemostasis was achieved the mucoperiosteal flap was positioned in place and sutured in one group with 3-0 black silk suture (fig 3) and in the other group, n-butyl-2-cyanoacrylate (fig 4) was used by just delivering a drop of it in the incision line to seal the incision. Clinical examinations were made on the 1st, 3rd and 7th post-operative day, surgical site was evaluated for parameters like pain, oedema, bleeding, mouth opening, soft tissue healing, time taken. On the seventh post-operative day sutures were removed and cyanoacrylate remnants were removed by gentle irrigation with normal saline, sterile swab is taken and swab sample is collected from the extracted site and placed in sterile container with normal saline and sent for microbiological evaluation. Swelling assessment was done using gabka and matsumara criteria (fig 5). Facial measurements were taken in 3 planes using modified measuring tape method described by Ustun, Gabka, Matsumara, Schultze-

**Fig 2: N-Butyl 2 cyanoacrylate ampoule**



Mosgau and co-authors (Swelling measurement = Measurement at base line – Post-op measurement). The three facial planes (mm) were:

M1: Distance from the tragus of the ear to the corner of the mouth.

M2: Distance from the tragus of the ear to the pogonion

M3: Distance from lateral canthus of the eye to the angle of the mandible.

The sum of all these measurements were considered as the base line of that side, and the mean was extracted from them. The measuring was done post-operatively, on the 3rd and 7th days.

Pain was graded using visual analog scale as 1) Mild only when there was dull intermittent pain, 2) Moderate when there was throbbing intermittent pain, 3) Severe when there was continuous throbbing pain. Inter incisal distance is measured in millimeters with the help of Vernier callipers  $\geq$  between maxillary and mandibular central incisor in maximum mouth opening.

**Fig 3: Closure with Sterile 3-0 silk suture**



**Fig 4: Closure with N-Butyl 2 Cyanoacrylate**



**Fig 5: post operative swelling assesment**

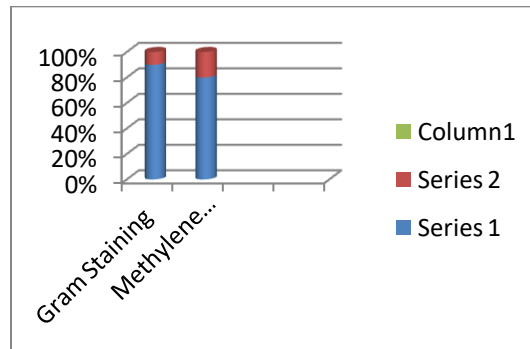


**Results:**

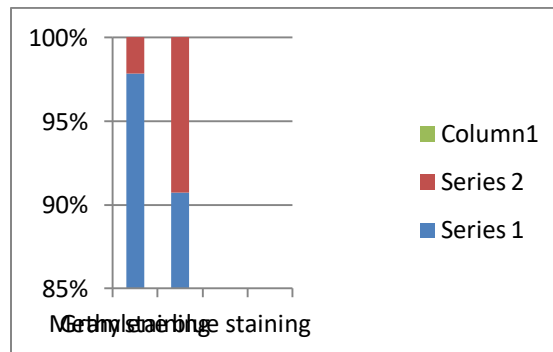
Based on the clinical and microbiological study , patients significantly experienced lower levels of pain on visual analog scale (VAS) in Cyanoacrylate group(table 2). On assessment of soft tissue healing better and early soft tissue healing with less swelling is noted in Cyanoacrylate group when compared to sterile silk suture group and no other complications

occurred in any of our cases(table 1). Increased mouth opening was observed post operatively in Cyanoacrylate group. Post operative bleeding was seen in sterile silk suture group. Time taken is very less in Cyanoacrylate group when compared to silk suture group. Decreased bacilli count is observed in Cyanoacrylate group microbiologicaly(graph 1&2).

**Graph 1: Comparision of bacilli count in study group**



**Graph 2: Comparision of cocci between two groups**



**Table 1: Swelling assessment comparison between Control and Study groups.**

Time	Group	mean	SD	Mean difference	T value	P value

3 <sup>rd</sup> day	Control group	10.96	2.30	1.56	1.898	0.064NS
	Study group	12.52	3.40			
7 <sup>th</sup> day	Control group	9.52	1.26	0.92	1.007	0.319NS
	Study group	10.44	4.39			

**Table 2: Pain assessment comparison between Control and Study groups.**

Time	Group	Mean	SD	Mean difference	T value	P value
1 <sup>st</sup> day	Control	3.00	0.00	0.04	1.000	0.322NS
	Study	3.04	0.20			
3 <sup>rd</sup> day	Control	2.72	0.54	0.76	3.193	0.002S
	Study	1.96	1.06			
7 <sup>th</sup> day	Control	0.92	0.28	0.28	2.488	0.016S
	Study	0.64	0.49			

**Discussion:**

Among the suture materials, **Black Braided Silk sutures (BBS)** is the most commonly used material for intra oral wound closure<sup>6</sup>. It is easily available, relatively inexpensive, provides the best knot security and can be used effectively to approximate wound edges (workability). Unfortunately, the braided nature or twisted black silk suture allows surface debris and bacterial accumulation, resulting in inflammation of the surrounding wound. Silk has the phenomenon of ‘wicking’ (exhibition of capillary action), which makes it a site for retention and ingress of bacteria into the tissues and thus acts as a potential reservoir of secondary infection. **Leknes et al.**<sup>67</sup> study showed that the braided silk sutures displayed a pronounced bacterial invasion in the interstices of the suture material attributing to the inflammatory reactions. As with all non-absorbable materials, this type Cyanoacrylate adhesive is an

acrylic resin which consists of two separate liquids, one for pouring into the mold and another used sparingly as hardener. In case of cyanoacrylate glue, the hardener is the water<sup>7</sup>. If cyanoacrylate glue is placed on a dry surface, it cannot form a bond with the surface. But in the presence of even the slightest amount of water, including moisture from the air, the molecules of the glue have a chemical reaction and form into tight chains between the two surfaces being bonded. This exothermic reaction occurs within seconds of the water and cyanoacrylate coming into contact with each other<sup>1,4</sup> and generates its own heat for faster curing<sup>1</sup>. This heat has the potential to damage soft tissue and hamper its blood supply<sup>10</sup>. To avoid this, long chains of methyl group have been incorporated into the glue, which increases the duration of the process of polymerization, which in turn prolongs the rate of heat generation. of suture has to be manually removed.

Among the tissue adhesives, N-butyl-2-cyanoacrylates have been in use for several decades but, it poses a low wound breaking strength, that restrict its use in areas of high tension like extraoral sites<sup>5</sup>. To overcome these problems, higher polymers like isoamyl and octyl cyanoacrylates have been developed<sup>2</sup>. A large number of polymer chains as seen in isoamyl 2- cyanoacrylate resulting in bonds with high tensile strength and also molecules, which are less toxic.

Though tissue adhesives have advantages over conventional wound closure techniques, they can be used as an alternative to sutures only in superficial incisions or lacerations<sup>9</sup>. In case of deep lacerations, the deeper tissues should be approximated with resorbable sutures and the superficial layer can be effectively closed using tissue adhesive. Its other limitations or disadvantages include:-

□ Clinical situations where too much of lateral tension could exist across the wound. Cases of class II position B, distoangular impactions where after the tooth removal, during closure, the buccal aspect of the interdental papilla cannot be easily approximated towards the lingual papilla leading to gaping in the wound<sup>3</sup>. The glue can't also be used in infected surgical site and large dead spaces underneath the closure. Accidental breakage of the Cyanoacrylate ampoule while loading into the syringe is also a disadvantage, as the Cyanoacrylate comes in small ampoules, the breaking and loading of the tissue glue into the syringe needs to be done with great care.

Some of the practical difficulties encountered during the current study were as follows:

□ A very small sized ampoule (0.25 ml) when compared to the regular sized ampoules lead to difficulty in handling the ampoule. Loss of tissue glue even before loading the material. Evaporation of the Cyanoacrylate glue due to the hot climate during the summer, which necessitated placement of the tissue glue in the refrigerator<sup>4</sup>. Materials like swabs, gloves and instruments had to be kept away from the tissue glue as there is every chance that the above mentioned materials may get stuck to the glue, leading to wastage of material. It cannot be used in patients with known history of allergy to Cyanoacrylates and formaldehyde<sup>8</sup>. On top of all, the cost of the tissue adhesives compared to

traditional black braided silk makes it more expensive<sup>11</sup>.

Large sampled, randomized controlled clinical trials needs to be conducted to give a conclusive evidence of the benefits of Cyanoacrylate tissue glue used during the closure of the incisions placed in mandibular impacted third molar surgeries

### Conclusion:

The study concluded that Tissue adhesive can be used for intra oral wound closure effectively. The procedure is relatively painless & quick. The material causes less tissue reaction and haemostasis. Added to this are benefits of protection from wound infection since the material is bacteriostatic

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