Free Gingival Grafting; Epiglu VS. Silk Thread Suturing A Comparative Study

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Statement of the Problem: The routine procedure for immobilization of free gingival graft (FGG) is suturing. Due to the successful application of tissue adhesives their employment has also become the subject of interest.

Purpose: The aim of present clinical trial was to compare using Epiglu (E.g) versus silk thread suturing in FGG.

Materials and Methods: This study was a split mouth clinical trial. The study group comprised of 12 patients with symmetrical loss of attached gingiva whom were referred to Faculty of Dentistry, Tehran University of Medical science. In test group, the gingival graft were placed on cellophane and after applying one drop of Eg then placed in the proper position. In control group silk suturing was used.

Results: The degree of pain had no significant differences in two groups (P>0.05). The rate of bleeding was insignificant at the first day (P=0.5), but in the second (P=0.0425) and the third day (P=0.0313) less bleeding was observed in the test group. 10 days after the surgery, grafts in the test group had better healing (P=0.0425), while 3 month later no significant differences observed (P>0.05). Although the mean tissue shrinkage were 41% and 38% for control and test group respectively, Wilcoxon test showed no significant differences 30 days after surgery (P>0.05). The tissue shrinkage also was not significant 3 months after surgery. In addition, no displacement, infection or hypersensitivity were noted in either of two groups.

Conclusion: In FGG, Epiglu is more effective than suturing.

Key words: Free gingival graft; Tissue adhesives; Attached gingival; Sutures; Cyanoacrylates; Epiglu

Journal of Dentistry, Tehran University of Medical Sciences, Tehran, Iran (2004; Vol. 1, No. 2)

The most classical and routine clinical procedure in mucogingival surgery is Free Gingival Grafting (FGG), which was introduced in 1968.⁽¹⁾ One of the factors involved in tissue healing process and lead to a successful grafting is immobilization of gingival graft. Improper immobilization may lead to a delay in the tissue revascularization process and eventually tissue necrosis could happen. The conventional technique in FGG is suturing. However it should be certain that the graft is correctly positioned and can not be moved, in order to prevent any damages to the graft, the number of sutures must be reduced to minimum.

2004; Vol. 1, No. 2

On the other hand sutures can arise the foreign body reaction in the graft area. Also, the prolongation of the suturing process can lead to graft dehydration.

Tissue adhesives, as an alternative, were first synthesized and introduced by Ardis in 1949.⁽²⁾ In 1959, Coover et al chemically analyzed and examined the performance of cyanoacrylate adhesives and proposed their application in surgical procedures.⁽³⁾ This suggestion was proposed in the early 1960's, unfortunately the outcomes, which included chronic and acute inflammatory reactions were not so favorable. As a result, changes were made to reduce their adverse inflammatory effects. The improper use because of lack or insufficient knowledge and inadequate training in this field were another problems encountered in the use of adhesives. result of further research As the and technological advances, the quality of tissue adhesives were improved and have been approved and licensed by FDA.

Following the widespread use of Cyanoacrylates in medicine, the use of tissue adhesives was also examined in dentistry. Positive results were noticed in clefts, deep pocket tetracycline fiber fixation, membrane fixation in periodontal defects, and reduction of sensitivity in teeth with exposed root.

In 1974, Binnie and Forrest histologically compared Butyl Cyanoacrylates and silk sutures which were used in the immobilization of periodontal flaps.⁽⁴⁾ The results indicated minimal edema and swelling; and better gingival contour by using Butyl- Cyanoacrylat.

The suture- free FGG technique was first introduced by Hoxter in 1978.⁽⁵⁾ He believed that it is possible to achieve immobilization, asepsis, and homeostasis even without the use of sutures, only if the graft has been positioned and fixed in place correctly. In 1978,

Reatzke, reported 60-80% covering of the localized root exposure with the palate's connective tissue using tissue adhesives, via the envelope technique.⁽⁶⁾

Epiglu (E.g) is a Cyanoacrylate type tissue adhesive. It has numerous applications in the epithelial and mucosal grafting, excision of epithelial tumors, and nevous removal.

Researches in 1987 indicated no side or adverse effects 2-7.5 years following the use of E.g in the treated patients. If E.g either intentionally or accidentally absorbed in the body, it will be eliminated through the lungs and urine. Also many studies have confirmed that its products, namely Formaldehyde and Cyanoacetate, are not carcinogenic.⁽⁷⁻⁹⁾

E.g is well tolerated by the tissue and has great applications in plastic surgery and dermatological treatments, especially for children's wound closure because it doesn't need anesthesia and removal of sutures. Fast healing process (5-6 days), in comparison to suture (7-9 days), is attributed to Epiglu's strong bonding, hemostatic and bacteriostatic properties. By using microorganisms such as the E.coli, Streptoccuus pyogenes, Streptococcus mitis and Staphyloccous euroten, the bacteriostatic effects of E.g have been demonstrated ^(9,10,11).

The aim of present study was to compare pain, bleeding, wound healing and shrinkage of FGG using E.g with silk thread suturing.

Materials and Methods

This split-mouth clinical trial was conducted on 12 patients (18-45 years old) whom were referred to Department of Periodontics, Faculty of Dentistry, Tehran University of Medical Science. All candidates had symmetrical attached gingival deficiencies (less than 1mm) and free gingival grafting was the recommended treatment for them (Fig 1).

The exclusion criteria consisted of poor oral hygiene, immunosuppressive drug use, alcoholism, smoking, a history of drug allergy, and lack of cooperation.

Recipient site was prepared according to partial thickness technique, and grafts thicknesses were 1-1.5 mm (Fig 2). In control sites, grafts were fixed as follows:



Fig 1- The site with loss attached gingival



Fig 2- Recipient site prepared by partial thickness flap Two interrupt sutures for initial immobilization of the graft and 1 cross mattress suture into the periosteum. In test group, E.g was employed for graft immobilization.

All patients were subjected to allergy test prior to the study. E.g characteristics were explained for all the patients and consent form was collected from them.

In the test group each recipient site was prepared with the same method explained for the control group. Then a sterile and transparent piece of cellophane, was cut about 1-2cm, larger than the graft size on all sides except epical, since it would have interfered with the healing process of the vestibule. Cellophane tested on the recipient site and then graft was immobilized on it using a drop of E.g.

The outer edge of the cellophane, around the graft was also covered with a thin layer of E.g, and finally cellophane, which is holding the graft, fixed on the bed. So from outer surface inward, it was cellophane, E.g, and at the graft positioned right on the bed (Fig 3).



Fig 3- Graft stabled with E.g



Fig 4- Ten days after surgery

The possibility of graft displacement during setting time of E.g was prevented.

Surgical sites were covered with Coe pack. Amoxicillin (500 mg) and Mephenamic acid were prescribed for all the patients. Post operative instructions were given to patients along with questionnaires, and they were scheduled for a check-up visit in 10-days (Fig 4). Amount of pain and bleeding were scored subjectively, through the questionnaire. the However, degree of immobilization, hypersensitivity and rate of healing was objectively assessed by three professionals: a dental student, a periodonties resident, and a periodontist, 10, 20 and 90 days after the surgery.

For estimating percentage of tissue shrinkage, the width and length of grafts were measured immediately after its removal from the palate, and 90 days after surgery by a periodontal probe. The collected data were analyzed using Wilcoxon sign test rank and Freedman's statistical analysis.

Results

Analyzing the pain factor showed no significant difference between the control and the test groups. The probability levels, (P-values) just after the surgery, the second, and the third day were 0.5, 1.0, and 1.0, respectively. This trend remained the same in the subsequent days (Fig 5).

The rate of bleeding in both groups was not also statistically significant in the first day after the surgery (P=0.5). However, in the second (P=0.0425) and the third (P=0.0313) day, significant differences were observed. It means subjects in the test group demonstrated less bleeding in the following days (Fig 6).

By evaluating the wound healing process in 10, 20, and 90 days after surgery, a significant difference was observed within the each group. The freedman test showed P-value of 0.0004 and 0.001 for control and test group respectively.

The comparison between the two techniques, 10 days after the surgery, demonstrated a statistically significant difference (P<0.05), however, it was not significant 20, and 90 days after the surgery (P<0.05) (Fig 7).

Due to dissimilarity in graft size used in the control and the test groups, Wilcoxon test was used and graft size was not statistically significant different (P=1.0) observed. Although the mean value of grafts shrinkage were 38% and 41% for control and study group respectively30 day after surgery, the difference in graft shrinkage was not significant (P=0.19) (Fig 8).

Good immobilization, and no displacement, seems to have been achieved in both groups. Neither any indication of hypersensitivity response nor any infection was observed in both groups.

Discussion

In the present study, the amount of pain was not significantly different between the two groups. This result, however, are contrary to that reported by Fegler and Fegler,⁽¹²⁾ claimed a 28% reduction in the pain experienced by his subjects, as the result of the application of tissue adhesives, E.g in particular. The difference that exists in the two studies may be attributed to the type of tissues involved, skin in one study and mucous membrane in another.

















Fig 8- Mean of shrinkage in different times related to type of surgery

In the present study the pain was evaluated subjectively by patients. Since the surgical procedures of both techniques were employed on the same patient by the same surgeon in one appointment, the pain evaluation could be considered reliable.

Hoxter emphasized the coagulatory effect of tissue adhesives.⁽⁵⁾ The present study also demonstrated less tissue bleeding, which can be attributed to the hemostatic properties of the E.g.

The rate of healing was significantly different 10 days after grafting procedures. However, in three months time the tissues exhibited similar morphological appearances, and showed no significant difference in the rate of tissue healing between the two study groups.

It should be mentioned that faster rate of tissue healing in the initial days following the surgery might be due to the absence of sutures which can act as foreign particle. Furthermore, the uniform application of pressure by cellophane on all graft's surfaces led to reduction in the incidence of edema and inflammation at the recipient site.

Fegler and Fegler study showed better healing process by using tissue adhesives, 12 days and 3 months after surgery. 55% and 38% better healing was observed respectively in their study. Moreover, scar formation was reduced by 38% in the tissue adhesive group.⁽¹²⁾

In the present study, virtually all subjects in the control group exhibited some bleeding and inflammation, which might be related to the presence of foreign particles, the sutures, or the suture's wicking effect.

While grafting with the use of tissue adhesives resulted in a reduction in inflammation, swelling, and edema, resulted in better clinical appearance. These results are similar to Lahiffe et al ⁽¹³⁾ finding which was on Rhesus monkeys.

James and Mefall in a study on FGG, with an average graft thickness of 0.9mm, reported a 24% and 39% rate of shrinkage 3-months after the surgery by using the Full Thickness Flap (FTF) and Partial Thickness Flap (PTF) techniques respectively.⁽¹⁴⁾

In this study, the rate of graft, shrinkage with a thickness of 1-1.5mm, 3 months after the surgery, was 38% in the test group, and 41% in the control group, employing the PTF technique. This insignificant difference might be due to gentle management of tissue. Displacement of grafts was not observed in any of cases. The use of clear and transparent cellophane, allowed better maneuverability of the graft by the surgeon, and provided a better assurance of immobilization.

Also, due to the haemostatic property of tissue adhesives, absence of any bleeding and clot formation allowed better visual clarity of the surgical procedure. The suturing technique, on the other hand, confronts surgeons with numerous difficulties.

For example, the inherent elastic property of tissue grafts might pose some difficulty in easy handling and possibly in its immobilization. Furthermore, the mere use of sutures can lead to tear of the connective tissues and to the excessive stretching of the tissue graft, the problems not to be expected with the use of tissue adhesives.

In addition to the bacteriostatic property of E.g, used in the test group, the absence of any infection in either of the two study groups can be attributed to the prescription of antibiotics and aseptic surgical procedures.^(9,10)

Conclusion:

In today's medicine, introducing a new drug,

instrument or a new method cannot be accomplished without any consideration of its cost-effectiveness.

In comparison to the suturing technique, the use of E.g offers many advantages;

• Introducing a replacement for the costly nonabsorbable sutures

• Reducing the number of patient's visits

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- Patient's comfort
- Easy application
- Suitable for the elderly, disabled, and those with busy work schedules

• Minimizing the rate of transmission of bacterial and viral hematological infections, e.g. Hepatitis and HIV to the clinician