

Compare the Effectiveness of Fibrin Glue as Fixing Tissue After Periodontal Surgery Against Sutures

Sapan Patel^{1*} Bansari Shah² Shivani Dwivedi³

¹Reader, Department of Periodontology, Goenka Research Institute of Dental Sciences, Gandhinagar, Gujarat, India.

²Senior Lecturer, Department of Periodontology, Goenka Research Institute of Dental Sciences, Gandhinagar, Gujarat, India.

³Reader, Department of Periodontology, People's College of Dental Sciences, Bhopal, Madhya Pradesh, India.

ABSTRACT

Background: In the changing era of periodontal surgeries one innovative remedy has ended the inconvenience of suturing and has allowed the clinician to meet growing expectations and demands of today's dental patient, and the remedy is fibrin glue. Objectives of this study were to evaluate ease of application, time & type of recovery obtained and to evaluate pain during & after application of fibrin glue. 10 subjects will be selected from the OPD of Dept. of Periodontics, K.M.S.D.C.H, where in one quadrant sutures will be used and in other quadrant Fibrin Glue will be used. It is easier and quicker than sutures, better early haemostasis and a whole surface adhesion of tissue. It is effective as a means of fixing tissues after periodontal surgery. Only disadvantage is cost as compare to sutures.

Keywords: Fibrin Glue, Implantology, Periodontal surgery.

INTRODUCTION

In the changing era of periodontal surgeries one innovative remedy has ended the inconvenience of suturing and has allowed the clinician to meet growing expectations and demands of today's dental patient, and the remedy is fibrin glue. When periodontal plastic surgical procedures done or implants placed in aesthetic zone, fibrin sealants may be variable alternative to closing flaps with sutures and with histologic benefits and has potential uses in field of medicine. Fibrin sealant is an excellent beginner in the era of sutureless periodontal flap surgery.

It is available as two component system: First component contains highly concentrated fibrinogen, factor XIII, fibronectin, and traces of other plasma proteins. The second component contains thrombin, calcium chloride, and antifibrinolytic agents such as aprotinin. Mixing of two components promotes clotting with the

formation and cross-linking of fibrin. Fibrin glue is commercially available as Tisseel VH (Baxter, U.S.A.) and Fibrin glue (Termotrattato, Wien.)

Objectives of this study were to evaluate ease of application, time & type of recovery obtained and to evaluate pain during & after application of fibrin glue.

STUDY DESIGN

10 subjects will be selected from the OPD of Dept. of Periodontics, K.M.S.D.C.H, where in one quadrant sutures will be used and in other quadrant Fibrin Glue will be used. Quadrant selection will be decided using flip of the coin.

MATERIALS AND METHODS

In the department of Periodontics, 10 adult subjects participated in this study. All subjects should be in good health & and should be not taking any medication that would alter pain perception as

Received: Oct. 20, 2015; Accepted: Jan. 14, 2016

*Correspondence Dr. Sapan Patel.

Department of Periodontology, Goenka Research Institute of Dental Sciences, Gandhinagar, Gujarat, India.

Email: drsapanpatel@gmail.com

determined by a written health history and oral questioning.

Inclusion Criteria

- 1) Patient of age above 30years, who are diagnosed as Chronic generalized Periodontitis.
- 2) Patient having minimum of 20 natural permanent teeth.
- 3) Patient who desire to participate in the study.
- 4) Good physical health (ASA classification I or II, Ref. periodontology 2000, edition '08)
- 5) Informed consent granted.

Exclusion criteria:

- i) Allergies and idiosyncratic responses to lidocaine or sulfites.
- ii) History of significant medical problem (ASA classification III or greater, Ref. Periodontology 2000, edition'08), pregnancy or inability to give informed consent.
- iii) Whether patient has undergone periodontal therapy in preceding 3 months.
- iv) Fibrin sealant cannot be used in individuals who are known to be Hypersensitive to bovine protein.
- v) Fibrin sealant cannot be indicated for the treatment of massive and brisk arterial or venous bleeding.

METHOD

Method of preparation and application: Nowadays fibrin sealant kit contains four separate vials:

- (1) Sealer protein concentrate (human) vapour heated, freeze dried;
- (2) Fibrinolysis inhibitor solution (bovine);
- (3) Thrombin (human) vapour heated freeze dried; and (4) calcium chloride solution.

Freeze dried sealer protein concentrate and thrombin are reconstituted in fibrinolysis inhibitor solution and calcium chloride solution respectively, by using fibrinotherm heating and stirring device, a standard incubator or a water bath. Solutions are then combined by using duploject and applied on average 0.1 ml per tooth on each side (0.2 ml in cases of flap procedure on both buccal and lingual aspects) Once the periodontal surgery is completed, sutures are placed in one quadrant while Fibrin Glue is applied on the other quadrant as per the instruction of the manufacturer. {Fibrin glue is

commercially available as Tisseel VH (Baxter, U.S.A.)}

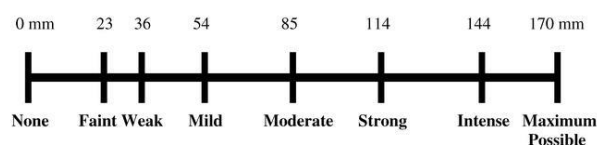
A visual analogue scale will be used to access the discomfort during this procedure. Patient is recalled after 3 days for follow up. Patient is again recalled after 7 days to examine healing on the Fibrin Glue applied quadrant & for the removal of suture on the other quadrant. Then patient is recalled after 3 months for follow up and examine healing on both the quadrants.

Precautions and limitations: To avoid risk of allergic anaphylactic reaction and/or thromboembolic events, which may be life threatening, fibrin sealant, should not be applied intravascularly or into the tissues.

VISUAL ANALOGUE SCALE BY HEFT & PARKER

Visual analogue scale is scale used to analyse the pain. Patient is showed & explained to place a mark along the line to indicate their current pain level. Wait for a verbal reply or for the patient to mark their current level of pain. Repeat the directions if the patient is having difficulty; use words other than "pain": aching, cramping, sore, uncomfortable, stiff, dull, pressure, burning, shooting. If the patient does not like it or understand it. Patient is asked to differentiate between pain & pressure, patient is explained the difference between them to determine pain.

Place a mark on the line below to show the amount of pain that you feel.



Subjects rated their pain for each phase of the injection on a 170-mm Heft-Parker visual analogue scale. The visual analogue scale was divided into 4 categories. No pain corresponded to 0 mm. Mild pain was defined as greater than 0 mm and less than or equal to 54 mm. Mild pain included the descriptors of faint, weak, and mild pain. Moderate pain was defined as greater than 54 mm and less than 114 mm. Severe pain was defined as equal to or greater than 114 mm. Severe pain included the descriptors of strong, intense, and

maximum possible. The phases of the injection were initial needle insertion into the alveolar mucosa, placement of the needle to the target site, and

deposition of the anesthetic solution at the target site.

RESULTS

Table 1: Clinical time and values.

Patients	Time needed to prepare fibrin glue	Time needed to fix the flap with fibrin glue	Time needed to fix the flap with the sutures and to remove it	Bleeding after 1 min(fibrin glue)	Bleeding after 1 min(sutures)
1	14	Approx. 1 min	Approx. 3 min	absent	present
2	13	Approx. 1 min	Approx. 3 min	absent	present
3	13	Approx. 1 min	Approx. 3 min	absent	present
4	13	Approx. 1 min	Approx. 3 min	absent	present
5	13	Approx. 1 min	Approx. 3 min	absent	present
6	13	Approx. 1 min	Approx. 3 min	absent	present
7	13	Approx. 1 min	Approx. 3 min	absent	Present
8	13	Approx.1 min	Approx.3 min	absent	Present
9	13	Approx.1 min	Approx.3 min	absent	Present
10	13	Approx.1 min	Approx.3 min	absent	present

Table 2: Score on 170-mm Heft-Parker visual analogue scale.

Patients	Quadrant With Sutures			Quadrant With Fibrin Glue		
	Immediately Post Surgery	3 Days Post Surgery	7 Days Post Surgery	Immediately Post Surgery	3 Days Post Surgery	7 Days Post Surgery
1	0	23	23	0	23	0
2	0	23	23	0	0	0
3	0	54	36	0	23	23
4	0	23	23	0	23	0
5	23	36	54	23	36	36
6	0	54	23	0	36	36
7	23	23	36	23	0	23
8	0	23	0	0	0	23
9	0	36	23	0	54	36
10	0	23	0	0	23	0

Results shows time needed to fix the flap is less with fibrin glue but preparation of it takes longer time than sutures. (Table 1) Score on Heft-Parker visual analogue scale shows considerable less discomfort and pain with fibrin glue than sutures immediate after surgery, 3 & 7 days post surgery. (Table 2)

DISCUSSION

To evaluate the fibrin-sealing system in the clinical trial, noncapillary 4-0 silk sutures were used as a control since the latter is the usual means of fixing tissues in periodontal surgery. Synthetic adhesives (cyanoacrylates) have been discarded because of toxicity, stiffness and lack of acceptance by clinicians. However, from a biological standpoint, the fibrin glue seemed both innocuous and effective, also bringing about early wound healing. This behaviour is substantially different from that produced by the use of cyanoacrylates, which affect wound healing negatively. Resorbable sutures are sometimes used in periodontics, but they are known to cause strong inflammatory responses⁴. Monofilament nonabsorbable synthetic sutures give the least tissue reaction⁴, but they are extremely awkward for routine use in periodontics.

To fix flaps or grafts by fibrin glue does not require any special skill; it is sufficient to pour the glue into the involved area using the double syringe. The glue quickly adheres to tissues. The amount of Fibrin glue needed to fix tissues averages less than 0.1 ml per tooth on each aspect (buccal or lingual). There is a trend toward an inverse relation between the number of teeth involved and the amount of Fibrin glue per tooth. However, even for procedures on a single tooth, one or two drops (less than 0.1 ml) are usually enough. If some glue drops away from the operative field, it is quite harmless and can be removed easily by a gauze. Fibrin glue and thrombin, once reconstituted, remain usable for 4 hours, which allows the use of the same kit for the same or different patients. For safety, it is necessary to change the needles after every application and because coagulation occurs in the needle itself and can start the coagulation of the remaining solution inside the syringe.

Bleeding, if any, stops soon after the application of the fibrin glue making it possible to position flaps or grafts precisely. Both haemostatic and adhering effects can be modulated using

thrombin in different concentrations: 4 NIH thrombin allows 20 to 30 seconds to adjust flaps or grafts before clotting. Five hundred NIH solution reduces operative and clotting times and is especially useful with small flaps since positioning of tissues must be accomplished in less than 5 to 10 seconds. With the lower concentration of thrombin, full adhesion of tissues requires 3 minutes under finger pressure with wet gauze to complete the chemical links inside the clot. With the highest concentration, minimum pressure is enough to obtain stability.

The concentration of aprotinin can be varied in order to obtain the desired persistence of the fibrin coagulum if the different fibrinolytic activities of the various tissues⁵ are taken into account. In fact, the persistence of the coagulum should not exceed a few days; at the end of a week, remnants of the coagulum should hardly be found histologically. According to previous experimental work, this result can be accomplished using aprotinin at full concentration⁶; indeed, the human gingiva is reported to display high fibrinolytic activity⁷. Conventional suturing provides only a marginal fixation, while the fibrin-sealing system makes the tissue adhere on its whole surface. This total adhesion, together with fast haemostasis, helps in preventing displacement and hematoma formation.

The fibrin glue provides tissue fixation virtually without any injury, while suturing causes mechanical stress. Such trauma is potentially harmful to tiny flaps especially when the blood supply is critical in the postoperative period, as in root coverage procedures. It is also worth noting that it is much easier to fix flaps and grafts in difficult areas (e.g., upper molars, lingual aspect) using the glue. The greater ease with which this is done reduces operative time and also makes the procedure less uncomfortable for the patient and the surgeon. There are further advantages on the patient's side: the removal of sutures is sometimes annoying or even painful. Some patients, especially children, felt more comfortable on the sutureless side in the days after surgery. The only patient who felt worse on the test side had had an extreme apical positioning of tissues on that side where a small bony area was uncovered; this could well account for the additional discomfort.

The appearance of tissues 1 week postoperatively was consistently better on the test side; this fact can be accounted for both by direct effect of Fibrin glue on wound healing⁸ and by less trauma during fixation. During the clinical trial no postoperative failure or complications occurred on either side. It should be pointed out that conventional periodontal surgery was performed on both sides, without any attempt to test Fibrin glue in especially critical procedures or in patients with coagulation problems. Because of this, potential advantages of the new technique could have been overlooked.

All of the results of this comparative study confirmed opinions that fibrin glue could be used successfully in periodontal surgery. The overall convenience of the use of the fibrin-sealing system should also be evaluated on the basis of its cost and benefits. On one hand the thermostat and kit are expensive; on the other hand, the use of the glue saves time during surgical procedures and avoids time wasted in suture removal. Moreover, the fibrin-sealing system saves the cost of preparing, sterilizing and storing instruments, as well as the cost of the sutures themselves. Fibrin glue is a cryoprecipitate of human plasma, but vapour heating during manufacturing prevents any risk of transmitting AIDS. In spite of the widespread use of Fibrin glue in Europe, no evidence of transmission of infectious hepatitis has been reported at this time.

CONCLUSION

- It is easier and quicker than sutures
- Better early haemostasis and a whole surface adhesion of tissue.
- Sutures --inflammation and infection,
- Fibrin glue --early wound healing.
- It is effective as a means of fixing tissues after periodontal surgery.
- Only disadvantage is cost as compare to sutures.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCE

1. Bimal Jathal, Neeta Bhavsar: Use of fibrin glue in periodontal flap surgery. Journal of Indian Society of Periodontology- Vol 12, Issue 1, Jan-Apr 2008
2. Pini Prato GP, Corlellini D, Agudio G, Clauser C. Human fibrin glue versus suture in periodontal surgery. J Periodontol 1987;58:426-31.
3. Emmanuel Soffer, A Jean Pierre Ouhayoun: Fibrin sealants and platelet preparations in bone and periodontal healing. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2003;95:521-8
4. Scohen, F. J.: Surgical sutures. New Phys 25: 40, 1976.
5. Dingers, H. P., Redl, H., and Kuderna, H.: Histopathologie nach Fibrinklebung. Hefte Unfallheilkd 148: 792, 1980.
6. Pini Prato, G., De Paoli, S., Cortellini, P., et al.: On the use of a biologic sealing system (Tissucol®) in periodontal therapy. II. Histologic evaluation. Int J Periodont Rest Dent 3: 33, 1985.
7. Pini Prato, G. P., Cortellini, P., Agudio, G., et al.: L'attività fibrinolitica della gengiva umana: nota tecnica. Mondo Odontostomatol 27: 39, 1985.
8. Pini Prato, G., De Paoli, S., Clauser, C., and Bartolucci, E.: On the use of a biologic sealing system (Tissucol®) in periodontal surgery. Int J Periodontol Rest Dent 4: 49, 1983.