Case Report

Periodontal flap closure using a simplified autologous fibrin glue preparation: A report of two successful cases

Bhumit Pradipbhai Dave, Sunil Sathyanarayana

Department of Periodontics, Dayanand Sagar College of Dental Science, Bengaluru, Karnataka, India

The work belongs to the Department of Periodontics Dayanand Sagar College of Dental Science, Bengaluru, Karnataka, India

Abstract:
Although suturing is an integral part of periodontal flap surgery, it has disadvantages such as difficulty in plaque control, increased postoperative discomfort, and higher infection rate. To overcome these problems, a search for alternatives and possibly a sutureless technique has continued. Fibrin glue is one such biological tissue adhesive, mimicking the final stages of coagulation with several advantages. This report shows the use of an autologous fibrin glue in two cases, prepared using a simplified method. At the end of periodontal flap surgery, the flaps were closed with sutures in two papillae and fibrin glue in other two papillae in both cases. The papillae closed with fibrin glue showed better healing and good stability after flap closure. This simplified preparation of autologous fibrin glue has not been reported till date as found from literature search.

Key words: Autologous fibrin glue, fibrin adhesive, fibrin glue, fibrin glue tissue adhesive, fibrin sealing system

INTRODUCTION

Suturing is an integral part of periodontal flap surgery which is used in flap closure and plays a very critical role in its success. However, sutures have disadvantages such as challenges in plaque control, increased postoperative discomfort, increased tissue reactivity, and higher infection rate.[1] These limitations have led the search for alternative methods and the possibility of sutureless techniques. Fibrin glue is one such sutureless flap closure technique, which is a biological tissue adhesive, mimicking the final stages of coagulation. It has advantages such as improved plaque control, less postoperative discomfort, lower infection rates, faster healing, no special skill needed for its application, and improved esthetics as compared to sutures.[2] It is simple, safe, atraumatic, and less time-consuming with better postoperative healing.[3] It has also been successfully used to immobilize the free gingival.[4]

Fibrin glue is available commercially or can be prepared by autologous methods. Both have certain disadvantages and hence not so commonly used. In case of commercial products such as Tisseel and Reliseal, increased cost, multiple components (fibrinogen, thrombin, afibrinolytics, fibronectin, and calcium chloride) involved in preparation, limited shelf life, not always available on demand, chances of allergic reaction to bovine protein, and transmission of viral infection are the limitations for their usage,[5,6] whereas the problems encountered with autologous preparations are difficulty in procuring the materials for preparation, multiple components involved (fibrinogen, thrombin, afibrinolytics, and calcium chloride), temperature-sensitive preparation procedures, difficult, and time-consuming chairside preparation methods.

This report shows the successful use of a simplified preparation of autologous fibrin glue, Bhumit and Sunil’s method-2016, with minimal components in a normal chairside setting and evaluated its effectiveness for flap closure during periodontal surgery.

Method of preparation and application of autologous fibrin glue

When the patient was ready for flap closure, 10 ml of patient’s blood was collected in sterile
0.9% sodium citrate containing vacutainers [Figure 1] for autologous fibrin glue preparation and centrifuged at 3000 rpm for 10 min. This vacutainer now had a top layer of platelet-poor plasma, a middle layer of platelet-rich plasma, and the bottom fraction of red blood cells (RBCs). The platelet-poor and platelet-rich plasma were aspirated into a sterile syringe and kept in another test tube without anticoagulant [Figure 2]. RBC fraction was discarded. Protamine sulfate 10 mg/ml [Figure 1] was added to platelet-rich and platelet-poor plasma for precipitation of maximum quantity of fibrinogen. This test
Dave and Sathyanarayana: A simplified autologous fibrin glue preparation

Table 1: Roll test for evaluating stability of flap closure (roll test - Placing the side of the periodontal probe at the base of each papilla, roll the probe in an apical direction, and evaluate the movement of the papilla as given below)

| Score | Criteria |
|-------|----------|
| 1     | Barely visible movement of the papilla |
| 2     | Clearly visible movement but no retraction of the papilla |
| 3     | Clearly visible movement with retraction of the papilla |

Table 2: Simplified healing index

| Score | Criteria |
|-------|----------|
| 1 - Good | Tissue color: All tissues pink |
|        | Response to palpation: No bleeding |
|        | Granulation tissue: None |
|        | Incision margin: No connective tissue exposed |
| 2 - Fair | Tissue color: <50% of gingiva red |
|        | Response to palpation: No bleeding |
|        | Granulation tissue: None |
|        | Incision margin: No connective tissue exposed |
| 3 - Poor | Tissue color: ≤50% of gingiva red |
|        | Response to palpation: Bleeding |
|        | Granulation tissue: Present |
|        | Incision margin: Not epithelialized, with loss of epithelium beyond incision margin |
|        | Suppuration might be present |

Table 3: Scores for simplified healing index

| Papilla | Simplified healing index scores at 1 week postoperative |
|---------|--------------------------------------------------------|
|         | Silk sutures | Fibrin glue |
| Papilla 1 | 2 (fair) | 1 (good) |
| Papilla 2 | 2 (fair) | 1 (good) |
| Papilla 3 | 1 (good) | 1 (good) |
| Papilla 4 | 2 (fair) | 1 (good) |

Table 4: Scores for roll test

| Papilla | Roll test scores-immediate after suturing | Roll test scores at 1-week postoperative |
|---------|------------------------------------------|------------------------------------------|
|         | Silk sutures | Fibrin glue | Silk sutures | Fibrin glue |
| Papilla-1 | 2 | 1 | 1 | 1 |
| Papilla-2 | 2 | 1 | 1 | 1 |
| Papilla-3 | 2 | 1 | 1 | 1 |
| Papilla-4 | 2 | 1 | 1 | 1 |

After nonsurgical therapy, these patients underwent periodontal flap surgery from the upper right canine to the second molar for case-1 and from the lower right canine to the second molar for case-2 [Figure 4]. In both cases, during flap closure, two papillae were closed by silk sutures, and two other papillae with autologous fibrin glue [Figure 5] (0.25 ml for each papilla) prepared from the patient’s blood using a simplified technique as described earlier above. The adhesion of the flap was checked using the roll test for stability of flap closure, criteria for which are given in Table 1. The postoperative healing was evaluated using the simplified healing index, Sunil and Bhumit-2016, a modification of the healing index given by Landry in 1988.[7] Due to subjective difficulty in the evaluation and to enable easier scoring, the index was simplified as given in Table 2.

All the roll test and simplified healing index scores for papillae closed with fibrin glue were better as compared to silk sutures immediately [Figure 6] after suturing and during suture removal at 1 week [Figure 7], as shown in Tables 3 and 4.

DISCUSSION

We tried to evaluate the effectiveness of flap closure using autologous fibrin glue and silk sutures, in these cases. The specialty of this report is the use of autologous fibrin glue, prepared using a simplified and new method (a combination and modification of Hartman’s and Altson’s methods).[5,6] The results showed better healing in the areas closed with fibrin glue as compared to sutures, similar to that obtained by Bimal et al. using Tisseel.[7] The healing was evaluated using the simplified healing index, and adhesion was evaluated with the roll test. The healing index was better than Landry et al.[7] index as it has more
clear scores, easy to identify, eliminate the subjective difficulty in evaluation, and more focused on periodontal healing. The roll test used here has not been used till date in any other studies. Fibrin glue was also less time-consuming during chairside use and easy to apply as shown by Pini Prato et al. using Tissuecol.[6] There are other tissue adhesives such as cyanoacrylate (synthetic in nature), but has been discarded due to high tissue toxicity, and fibrin glue appears a safer alternative.[6] Conventional sutures provide only a marginal fixation, whereas the fibrin glue makes the tissues adhere on its whole surface.[2] The limitations of this case report are that sutures and fibrin glue were used in the same quadrant instead of different quadrants. Although the flap closure is simpler and easier using fibrin glue, it requires expertise of phlebotomy, additional preparation time away from chairside at the laboratory, use of additional equipment such as a centrifuge, and materials for preparing the glue. The future research should focus on eliminating these disadvantages by further simplifying the process using minimal materials, which would make its usage more common.

Thus, in spite of few limitations, the present report shows the successful usage of a simplified fibrin glue preparation, which not only had all the advantages of previous fibrin glue preparations but also had additional advantages of reduced cost and a simplified procedure for preparation under normal chairside/laboratory conditions, without the use of complicated techniques or sophisticated equipment. This appears promising and should improve the usage of fibrin glue in the future giving it a more common place for flap closure and marking the beginning of a sutureless era.[7]

**CONCLUSION**

This autologous fibrin glue preparation is not only easy and simple to prepare but also provides good postoperative healing and stability in flap closure similar or better to silk sutures. It is also atraumatic, faster during chairside use, and requires lesser skills for its application than silk sutures.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**REFERENCES**

1. Pulikkotil SJ, Nath S. Fibrin sealant as an alternative for sutures in periodontal surgery. J Coll Physicians Surg Pak 2013;23:164-5.
2. Jathal B, Trivedi A, Bhavsar N. Use of fibrin glue in periodontal flap surgery. J Indian Soc Periodontol 2008;12:21‑5.
3. Eskan MA, Greenwell H. Theoretical and clinical consideration for autologous platelet-rich plasma, fibrin sealants, and plasma-rich growth factors. Clin Adv Periodontics 2011;1:142‑53.
4. Barbosa MD, Stipp AC, Passanezi E, Greghi SL. Fibrin adhesive derived from snake venom in periodontal surgery: Histological analysis. J Appl Oral Sci 2008;16:310‑5.
5. Alston SM, Solen KA, Broderick AH, Sukavaneshvar S, Mohammad SF. New method to prepare autologous fibrin glue on demand. Transl Res 2007;149:187‑95.
6. Hartman AR, Galanakis DK, Honig MP, Seifert FC, Anagnostopouloς CE. Autologous whole plasma fibrin gel. Intraoperative procurement. Arch Surg 1992;127:357‑9.
7. Landry RG, Turnbull RS, Howley T. Effectiveness of benzydamine HCl in the treatment of periodontal post-surgical patients. Res Clinic Forums 1988;10:105‑18.
8. Pini Prato GP, Corlellini D, Agudio G, Caluser C. Human fibrin glue versus suture in periodontal surgery. J Peridontol 1987;58:426‑31.