

### **Autologous Fibrin Glue: Milestone in Periodontal Flap Surgery**

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#### **Abstract**

In the changing era of periodontal surgery, one inventive fix ended the inconvenience of suturing and enabled the clinician to meet today's dental patient's growing expectations and demands, and the remedy is fibrin glue. When periodontal plastic surgical procedures are performed or implants placed in an esthetic area fibrin sealant may be a variable alternative to suture and flap closure.

**Key words:** Fibrin glue: autologous; periodontal surgery; suture less method.

#### **Introduction**

Periodontal treatment is aimed at improving and preserving overall health and lifespan. With each passing decade, the surgical approach to periodontal therapy has become more important. Since years, the reconstruction of damaged periodontal structures has been a topic of interest in the dental profession and remains an ongoing problem for those who treat periodontal disease.

Goldman and Cohen, in 1980, had reported that the touchstone of periodontal therapy is good gingival sulcus, which is the foundation for pocket removal. Other than medical surgical techniques, surgical periodontal therapy relies on many biological factors (Ricchetti 1980). Periodontal surgery's "quid-pro-quo" involves asepsis, haemostasis and correct coaptation of the surgical flap which decides an ideal outcome.

The elimination of local etiologic factor is the ultimate importance in determining the success of periodontal therapy. therapy has evolved many years to include an initial non-surgical treatment which includes scaling and root planing. In some cases, only non-surgical alone cannot eliminate the etiologic factors. In such types of cases, the surgical method has to be used. Open flap debridement is characterized by raising full-thickness flap or partial flap, debridement followed by root planing and then the flap is approximated and stabilization of tissues is achieved using sutures.

The correct approximation of edges of a wound during flap periodontal surgery is essential for a good prognosis. Because it favours haemostasis, nutrition and repair.

Suturing is a common procedure undertaken to approximate the tissues. Sutures results in accumulation of plaque, bacteria and cause irritation of tissues.

To overcome these disadvantages, the possibility of sutures alternatives for flap approximation has been explored. Fibrin glue is a sealed synthetic substance used to create fibrin clot. It is composed of fibrinogen and thrombin where thrombin acts as an enzyme and converts the fibrinogen to fibrin which can act as a tissue adhesive.

### **Fibrin glue**

Fibrin is a 'Fibrin fibronectin fixing gadget.' It comes up in two sections. The main part incorporates exceptionally focused fibrinogen, factor XII, fibronectin and hints of different proteins in plasma. There is the subsequent

segment containing thrombin, calcium chloride, and antifibrinolytic operators, for example, aprotinin. Blending of these two segments advances cross-connecting of fibrin

### **Mechanism of Action**

Once the clotting cascade is triggered, the selectively hydrolyses prothrombin to thrombin by activated factor X. The fibrinogen is changed to fibrin in the presence of thrombin. Thrombin also activates factor XIII (present in the fibrinogen portion of the glue), which stabilizes the clot by facilitating polymerisation and cross-linking of fibrin chains in the existence of calcium ions to form long fibrin strands. This is the last typical mechanism for both extrinsic and intrinsic in vivo clotting pathways, which is mimicked by fibrin glue to trigger adhesion to the tissue. There is corresponding fibroblast proliferation and granulation tissue development within hours of clot polymerization. The resultant fibrin clot degrades physiologically after two weeks of its application<sup>2,3</sup>.

### **History of Fibrin Glue**

Bergel began the use of fibrin glue in 1909. He used emulsions of fibrin to accelerate the healing of wounds. Earlier, in 1940, Grey (1915) made use of fibrin tampons and fine fibrin plaques. In 1940, Young and Medawar used fibrinogen to repair animals which had their nerves severed. Fibrin sealant was first used in the year 1944 to repair skin grafts covering burnt soldiers by allowing thrombin to activate an isolated fibrinogen solution<sup>14</sup>. The use of Fibrin glue in various surgical procedures has increased. It has been used by Bösch P et al to retain heterogeneous bone grafting in periodontal defect<sup>15</sup>, while Bartolucci et al (1982) fixed periodontal flaps<sup>10</sup>. Prato GP et al found the excellent haemostatic and tissue-adhesive capability of the fibrin sealant will be useful in periodontal surgical wounds, and less discomfort in comparison with silk sutures<sup>1</sup>.

## Commercially Available Fibrin Glues

Tisseel R(Baxter Healthcare, Deerfield, Illinois, USA)
crossealR (omeix biopharmaceuticals, Ltd, Israel)
Europe Evice1R (Johnson and Johnson )
QuixilR (Johnson and Johnson)
beriplastR (ZLB Behring )
TachosilR (Nycomed)
RelisealR (Reliance industries, India)

Tisseel R, a commercially accessible fibrin sealant, it comes in five unit kit. Tissue (fibrinogen, clottable protein, plasma fibronectin, factor XII, and plasminogen): thrombin, 4NIH (National Institute of Health) or 500NIH thrombin, aprotinin arrangement, calcium chloride. Crosseal and Quixil use tranexamic corrosive as their antifibrinolytic specialist, rather than bovine aprotinin. The utilization of human thrombin over bovine thrombin makes the manufactured fibrin sealant more secure than the blood sealant.

### Limitations

The fibrin glue has certain drawbacks in spite of its advantage for example, fibrin glue is donor-made sealant which may increase the risk of disease transmission<sup>2</sup>. The donor screening and pathogen control measures such as vapor heating and liquid detergent cleaning to minimize the risk of pathogens interacting should be done before using the fibrin glue. In contrast, due to the presence of factor XIII, which stimulates neutrophil chemotaxis, an extreme inflammation may occur at the surgical site within the first few days following application of fibrin sealants.<sup>5</sup>

### Autologous Fibrin Glue

#### Preparation of Autologous Fibrin Glue

The fibrin glue (autologous) can be made from the patient's own blood. Autologous fibrin sealant does not

offer any risk of pathogen transmission. 10 ml of blood will be drained by venous puncture into sodium citrate vials from a healthy adult human donor, and Platelet-poor plasma (PPP) will be centrifuged at 1200 g for 30 min. (fig:1), (fig 2)

### Applications in Dentistry

- Local haemostatic measures in patients with bleeding disorders and patients on anticoagulants.
- Sealing of orofacial fistula.
- Correction of periodontal bony defect.

### Application In Periodontal Flap Surgery

Fibrin—the sealing device is useful for closing tissue during periodontal surgery, since fibrin glue is simpler to use and faster than sutures. The suture will cause inflammation around itself while fibrin glue will promote early wound healing. This gives better performance in aesthetically significant areas than sutures in periodontal plastic surgery.<sup>4</sup>

Fibrin sealant is a better alternative to tissue fixation as compared with sutures. The stabilization of the flaps was more consistent compared to the sutures, since Fibrin sealant can provide better fixation by sealing the entire surface of the flap than just the potential marginal fixation with sutures where approximation is mainly present in the interproximal area, resulting in better healing after surgery for 1 or 2 weeks.<sup>6</sup>

Application of fibrin glue requires minimal time, while providing strong adhesion that decreases pocket depth and plaque accumulation<sup>7</sup>.

Fibrin sealants advance early wound healing and connective tissue recovery by advancing revascularisation and fibroblast relocation<sup>8</sup>. Organically, the sealant is reliable with restricted incendiary reaction. It might prompt angiogenesis, a progressively impervious to proteolytic proteins, an exceptionally steady interface between the epithelium and the connective tissue. Fibrin

sealant has increasingly full-grown epithelium, connective tissue, expanded thickness of fibroblast, develop collagen following multi week of fibrin sealant recuperating, while inflammatory cells have expanded in sutured site<sup>9</sup>.

### Future of Fibrin Glue

At the point when fibrin stick is soaked with anti-toxins, the fibrin sealant item being used for periodontal infections might be viewed as the best option in contrast to anti chemotherapeutic agents Mader et al (2002) found that if the fibrin sealant was covered with anti-toxins osteomyelitis could be survived<sup>17</sup>. By hindering microbial etiology and helping the host with continued arrival of anti-infection agents at the fitting measurements alongside fibrin sealant, the fibrin sealant's injury recuperating properties would be appropriate for early goals of periodontal pathogens. The fibrin sealant can likewise be utilized effectively for bone recovery, related to bone grafts.

### Conclusion

Fibrin glue as a tissue adhesive has enormous potential for use both in periodontal and oral surgery. Research already underway indicate that fibrin glue is easier and faster to use than sutures. This improves early wound healing and provides tissue repair without damage, warranting expanded use even in periodontal regenerative procedures in periodontal flaps. After periodontal surgery, fibrin glue provides a better alternative and effective means for tissue fixation.

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Figure 2: (A) Centrifuge device Medifuge, Silfradent, Italy; (B) Components of centrifuged blood in the tube. Top to bottom layers respectively AFG layer, buffy coat and red blood cells; (C) Liquid form of AFG; (D) Membrane form of AFG.

### Legends Figure

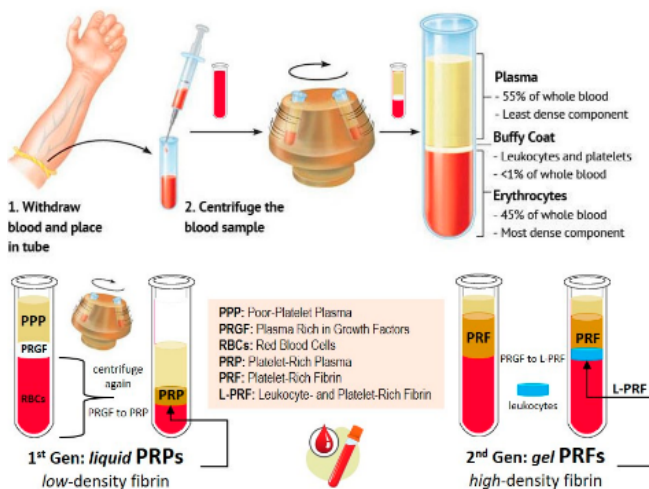


Fig 1: Platelet concentrates (Courtesy: researchgate.net)