

Use of Fibrin Sealant in Neck Contouring

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Background: The "suture suspension" platysmaplasty technique has been shown to be an effective and reliable procedure over the last decade.

Objective: We investigated the effectiveness of fibrin sealant in reducing the recovery time after suture suspension platysmaplasty.

Methods: After contouring the neck with our standard suture sling, hemostasis was assured. The instruments and gloves were wet with saline to prevent adherence to the sealant once it was applied. The 2 syringes were mounted on a Duploject applicator. The fibrin sealant was then sprayed simultaneously into the pockets in thin layers for 60 seconds, the time required for the liquid sealant to activate. Gentle manual pressure was applied over the neck skin, with the surgeon's fingers spread evenly over the whole neck, to prevent pooling of the fibrin sealant in any given area. This pressure was applied for 3 minutes, the time required for the tissue fibrin sealant to solidify. The incisions were closed in a standard fashion. Paper tape was used to cover the neck, and dressings were placed.

Results: In 60 patients who underwent neck contouring with lipoplasty and suture suspension and lipoplasty with fibrin sealant between January and July 2001, the time necessary to return to activities of daily living was reduced from 7 to 10 days to 2 to 3 days by the use of fibrin sealant. No complications were reported.

Conclusions: The use of fibrin tissue sealant has markedly improved the postoperative course of patients who underwent the neck suture suspension procedure by both eliminating most potential complications and decreasing recovery time. (Aesthetic Surg J 2002;22:519-525.)

Many techniques have been described to perform neck lifts as an isolated procedure or in conjunction with a rhytidectomy. In 1973 Guerrerosantos et al¹ described the muscular lift. Feldman² described the corset platysmaplasty in 1989. Furthermore, in 1993 Conrad et al³ described the Gore-Tex suspension cervical facial rhytidectomy. In 1995 Giampapa and Di Bernardo⁴ reported a neck recontouring technique involving the use of platysmal resection and 2 interlocking permanent sutures through a subcutaneous tunnel immediately below the submandibular border running from the midline to the bony fascia to create an artificial ligament. This was combined with lipoplasty of the neck to achieve the desired result.

A 10-year follow-up review of the early patients who have undergone neck recontouring with this suture suspension technique is currently underway. This review has prompted the search for ways to improve the established technique. In recent years, increased numbers of patients in their 30s to 50s with early signs of aging have been seeking isolated neck lifts. One goal has been to decrease the recovery period, thus enabling these active, professional people to return more quickly to activities of daily living, work, and exercise.

To improve the recovery phase of the suture suspension technique, a fibrin tissue sealant,

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Accepted for publication August 20, 2001.

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1090-820X/2002/\$35.00 + 0

70/1/129624

doi:10.1067/maj.2002.129624

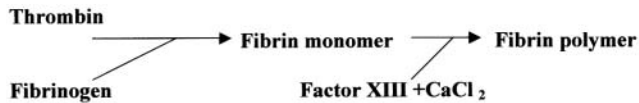


Figure 1. The Tisseel VH fibrin sealant mimics the natural coagulation cascade.

which may be applied in the subcutaneous layers, was used. In May 1998 Baxter International, Inc (Deerfield, Ill) received approval from the US Food and Drug Administration for its new fibrin tissue sealant product. In 2001 the Tisseel Vapor Heated (VH) fibrin sealant, a sealant prepared from human plasma, became available for clinical use in the United States. According to the manufacturer, this sealant has been used in treating more than 6 million patients in Europe without any incidence of viral transmission.⁵

Bioadhesives from the patients' own cryoprecipitate—autologous fibrin glues—have been used effectively in surgery.⁶ Although we have experience using such autologous fibrin glues, we chose the ready-to-use Tisseel tissue fibrin sealant because of its ease of use, relatively quick learning curve, and consistently reliable results.

The Tisseel Fibrin Sealant

The physiology of the fibrin glue mirrors that of the final common pathway of the normal coagulation cascade (Figure 1). Fibrinogen and thrombin develop a loose monomeric fibrin. The presence of factor XIII and calcium causes monomeric fibrin to form cross-links and become a polymeric fibrin, the “fibrin glue clot,” which appears similar to a natural fibrin matrix when examined under an electron microscope (Figure 2). The normal degradation of this mesh is blocked by the addition of aprotinin, an antiprotease, thus prolonging its sealant action.⁷

Preparing the Tisseel fibrin sealant required accuracy and attention to detail, but it was not difficult. The component fibrin sealant Tisseel contained the following substances in 4 separate vials:

Component 1:

- Sealer protein concentrate (human fibrinogen), dried powder; fibrinolysis inhibitor solution (bovine aprotinin)

Component 2:

- Thrombin (human) dried powder; calcium chloride solution

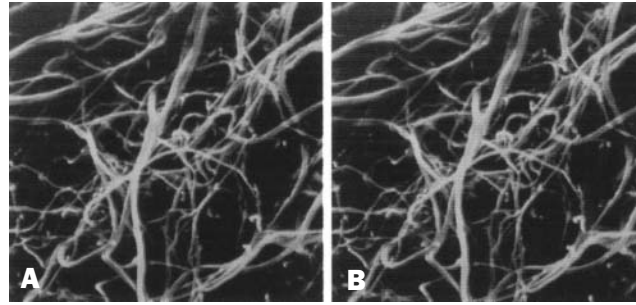


Figure 2. A, The fibrin matrix created by the Tisseel fibrin sealant (original magnification $\times 6000$) mimics **(B)** that of a natural fibrin matrix (original magnification $\times 6000$). (© 2000 by Baxter International. Used with permission.)

Initially, the 2 vials making up component 1 were mixed. The 2 vials making up component 2 were mixed as well. Component 1 and component 2 solutions were delivered simultaneously with a special syringe, the Duploject syringe (Baxter AG, Vienna, Austria), in the form of a “mist” application. They combined to form the fibrin tissue sealant. The advantages of such a system include a single-handed operation, thorough mixing of both components, and thin layer application.⁸ Because it takes the fibrin sealant only 1 minute to activate and 3 minutes to solidify, speed in application was crucial. Approximately 3 mL of the fibrin sealant was needed to coat the neck surface area.⁷

The goals of using the sealant were to:

- Eliminate dead space and avoid seromas/hematomas
- Support the healing process by decreasing tension on the incision sites
- Decrease edema
- Promote hemostasis
- Eliminate postoperative wrinkling or rippling of the skin

There has been ample evidence with regard to the safety and efficacy of the Tisseel fibrin sealant. In clinical trials, Tisseel VH fibrin sealant controlled significantly more bleeding episodes (65%, 159/246) within 5 minutes than conventional topical agents including Avitene, Gelfoam, Oxyce, Surgicel, and Thrombinar (31%, 76/243; $P = .0001$).⁹ Furthermore, fibrin sealant has been useful as an adjunct to hemostasis in surgery procedures involving cardiopulmonary bypass and treatment of splenic injuries caused by trauma and as an adjunct to closure of colostomies.^{5,9,10} Depondt et al¹¹ demonstrated a decrease in hematoma rates when the Tisseel fibrin glue was used in parotidectomies. However, caution should be exercised before this product is used to treat patients who have potential allergies to cow products, such as bovine collagen.

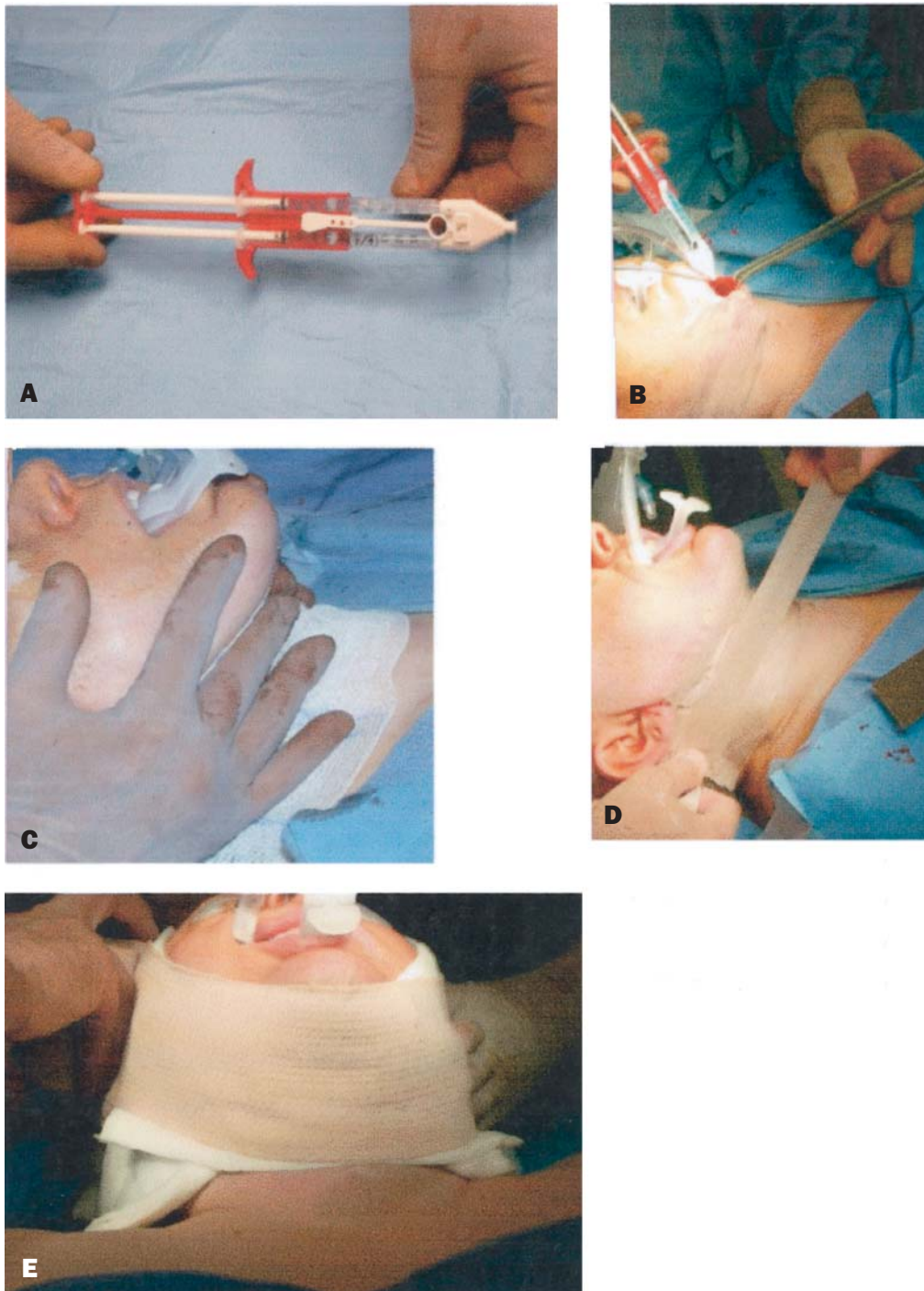


Figure 3. **A**, The Duploject syringe with the dual syringes. **B**, The Tisseel fibrin sealant is sprayed in the submental pocket after neck contouring has been accomplished. **C**, The surgeon's fingers press against the neck, distributing the fibrin sealant evenly and allowing the neck flaps to seal with the glue for 3 minutes. **D**, Paper tape is applied at the end of the procedure and is removed after 48 hours. **E**, Head dressings, including ABDs and Ace bandages, applied and kept in place for 24 hours after operation.

Indications

The indications for performing this procedure with fibrin sealant are identical to those for neck contouring with suture suspension and lipoplasty alone. They were well

delineated in the original article⁴ that described the neck suture suspension technique and are confirmed after 10 years of positive results with this procedure:

- Poorly defined cervicomental angle



Figure 4. **A,** Preoperative view of a 58-year-old woman with moderately severe skin and platysma muscle laxity with minor lipodystrophy of the neck. **B,** Postoperative view 24 hours after suture suspension procedure with fibrin sealant. **C,** Postoperative view 1 week after procedure.



Figure 5. **A,** Preoperative view of a 61-year-old man with redundant submental skin and platysma muscle laxity with no submental fat excess. **B,** Postoperative view 24 hours after neck suspension procedure with fibrin sealant. **C,** Postoperative view 1 week after procedure.

- Poorly defined submandibular border
- Absence of laxity in the midfacial structures, since no tightening of the underlying SMAS fibers and facial muscles in the midface is accomplished through this procedure.
- Small to moderate amount of jowl and neck fat
- Unwillingness to undergo a full face lift

Surgical Technique

Neck Recontouring

First, the patient underwent a standard neck recontouring with the suture suspension technique and lipoplasty as previously described.⁴ The neck was infiltrated in a fashion similar to a rhytidectomy. A curvilinear submental incision was made, and the skin immediately overlying the platysma muscle in the midline was elevated with face lift scissors. Redundant fatty tissue overlying the platysma muscle was suctioned. The area of the submandibular tunnel was suctioned along its dermal surface to help encourage skin contracture and better definition of the mandibular border. Next, the platysma border in the midline was usually resected in a triangular fashion. Platysmal bands were either resected for approximately 2 to 3 cm on each side of the platysma border or sewn together. Two interlocking permanent sutures were placed at the depth desired to create a new cervicomental angle, one in a horizontal mattress fashion and the other in a vertical mattress fashion. The ends of the 2 sutures

were removed from the submental incision and clamped separately. After that maneuver, an ellipse of redundant skin was excised behind the postauricular sulcus on each side. The skin was undermined to connect with the previously created submandibular tunnels. After the sutures were passed through the respective tunnels subcutaneously, the left mattress suture was tied to the right mastoid fascia, and the right interlocking mattress suture was tied to the left mastoid fascia. The sutures formed an artificial sling anchored to the mastoid bony fascia.

After excellent hemostasis was achieved, the fibrin sealant was applied. On the side table, the fibrin sealant was prepared simultaneously, or reconstituted, in 2 separate syringes. One syringe contained the sealer protein concentrate dried powder mixed with the fibrinolysis inhibitor solution to make the Tisseel solution. The other syringe held the human thrombin, which was freeze dried and mixed with the calcium chloride solution to form the thrombin solution. Once the reconstitution has taken place, the Tisseel fibrin sealant must be used within 4 hours.

The dissected neck pockets were reinspected to ensure excellent hemostasis in the submental and postauricular regions. The instruments and gloves used were wet with saline solution to prevent the adherence to the sealant once it was applied. The 2 syringes were mounted on a Duploject applicator. The fibrin sealant was then sprayed



Figure 6. A, Preoperative view of a 38-year-old man with a poorly defined cervicomental angle. **B,** Postoperative view 6 months after suture suspension neck lift with fibrin sealant.

simultaneously into the pockets in thin layers for 60 seconds, the time required for the liquid sealant to activate. Gentle manual pressure was applied over the neck skin, with the surgeon's fingers spread evenly over the whole neck, to prevent pooling of the fibrin sealant in any given area. Such pooling may result in overlying skin necrosis, hematomas, seromas, or skin wrinkling caused by interruption of the vascular supply to the overlying dermis. This pressure was applied for 3 minutes, the time required for the fibrin sealant to solidify. Past potential complications of rippling or fluid collections were avoided because the skin flaps adhered immediately to the underlying tissues. The incisions were closed in a standard fashion. Paper tape was used to cover the neck, and dressings were placed (Figure 3).

Postoperative Care

Postoperative care was minimal. The dressings were removed after 24 hours, and the paper tape was removed after 48 hours with minimal ecchymosis and edema. Male patients were advised not to shave for a week to 10 days after operation to avoid trauma to the neck flaps. Patients were instructed to resume activities of daily living in 2 to 3 days and strenuous activity, including exercise, in 3 to 4 weeks.

Results

Between January and July 2001, 60 patients, including 18 men and 42 women ranging in age from 33 to 70

years, underwent this technique (Figures 4 and 5). Some patients also had simultaneous procedures, such as chin augmentation, fat grafting, or blepharoplasties, as well as the suture suspension technique using fibrin sealant. No patients who underwent rhytidectomies were included in this study. The "recovery time,"—that is, the time necessary to return to activities of daily living and be cosmetically inconspicuous at work and at home—was reduced from 7 to 10 days to 2 to 3 days. There were no complications. The full recovery time was similar to that of the neck recontouring alone without the Tisseel fibrin sealant. Patients should be informed that it requires 6 months to allow for soft tissue contraction to reach its optimal state and for the fine edema resolution to be complete (Figures 6 and 7).

Because of the fibrin sealant's ability to immediately seal raw surfaces and stop bleeding, since we began using it we have not had any occurrences of hematoma/seroma that required aspiration, and the amount of swelling has been markedly diminished. Furthermore, because postoperative bleeding is minimized by the sealant, the degree of ecchymosis experienced by patients treated with fibrin sealant has been significantly less than in those not treated with the sealant.

Discussion

Fibrin sealant in surgery has been used for decades in surgical procedures. Grey¹² used it in intracranial



Figure 7. A, Preoperative view of a 38-year-old woman with redundant submental skin and platysmal laxity. **B,** Postoperative view 6 months after suture suspension neck lift with fibrin sealant.

surgery in 1915. Since then, fibrin glue has been widely used as a sealant in the various surgical specialties: In orthopedic surgery, it has been used for tendon repair and cartilage/bone grafting; in general surgery, for spleen and liver lacerations; in cardiovascular surgery, for vascular grafts and anastomoses; and in thoracic surgery, for sealing of seal thoracic duct leaks and esophageal anastomoses.⁶ In plastic surgery, fibrin glue has been used for skin grafts and for nerve and microvascular repair.

There are few reports of the use of the fibrin sealant in cervicoplasty in the aesthetic surgical literature. Tisseel glue has been used before for procedures by Ellis and Pelausa,⁶ who reported on 32 mostly aesthetic surgeries in 23 patients. They evaluated the outcome on the basis of the effectiveness of the glue. They reported “good” results in 81%, poor results in 12.5%, and ineffective use of the glue in 6.5%. Among the patients in our series, there was a noticeable improvement in recovery time, amount of edema and ecchymosis, and a quicker return to work. The clinical experience was so compelling and obvious in favor of the neck suspension technique with the Tisseel fibrin sealant that we believe a comparison study is unnecessary.

Conclusion

The safety profile, ease of administration, and consis-

tently good results obtained with Tisseel fibrin sealant make it an excellent adjuvant to any neck lift procedure, especially the suture suspension technique described in this study. Its use has decreased hematoma/seroma rates, minimized the need for neck dressings in patients, and shortened the recovery time in patients undergoing neck recontouring with the suture suspension technique. ■

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STATEMENT OF OWNERSHIP, MANAGEMENT, AND CIRCULATION (Required by 39 U.S.C. 3526). 1. Title of Publication: Aesthetic Surgery Journal 2. Publication number: 1090-820X 3. Date of filing: 9/15/02. 4. Frequency of issue: Feb, Apr, Jun, Aug, Oct, Dec 5. No. of issues published annually: 6. 6. Annual subscription price: \$112.00. 7. Complete Mailing Address of Known Office of Publication: Elsevier Science, 6277 Sea Harbor Drive, Orlando, FL 32887-4800, Orange County. 8. Complete Mailing Address of Headquarters or General Business Office of Publisher (Not printer): Elsevier Science, 655 Avenue of the Americas, New York City, NY 10010. 9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor: Publisher—Kathleen Gaffney, Elsevier Science, 655 Avenue of the Americas, New York City, NY 10010. Editor—Stanley A. Klatsky, MD, c/o ASAPS Communications Office, 36 West 44th Street, Suite 630, New York, NY 10036 Managing Editor—Paul Bernstein, c/o ASAPS Communications Office, 36 West 44th Street, Suite 630, New York, NY 10036. 10. Owner: The American Society for Aesthetic Plastic Surgery, Inc., Robert Stanton, Executive Director, 11081 Winners Circle, Suite 200, Los Alamitos, CA 90720. 11. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages, or Other Securities: None. 12. Not applicable to Mosby. 13. Publication Title: Aesthetic Surgery Journal. 14. Issue Date for Circulation Data Below: June 2002.

15. Extent and Nature of Circulation	Average No. Copies Each Issue During Preceding 12 Months	Actual No. Copies of Single Issue Published Nearest to Filing Date
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