Tissue-Adhesion Techniques in the Treatment of Extensive Postoperative Cavities and Fistulae

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Abstract

Artificial tissue adhesion with the help of the two-component fibrin glue has proved an effective aid in the treatment of large wounds and fistulae. The selection of patients and the mode of treatment are discussed and illustrated by the histories of typical cases.

Introduction

Large wounds are not only treated by plastic surgeons, but are quite frequently sequelae of reconstructive operations (myocutaneous flaps, extensive skin-movements of local flaps). They are a necessary part of the operation and common even in aesthetic surgery (rhytidectomies and abdominal lipectomies). Haematomas, seromas and undue swelling can impede the adhesion of opposing surfaces and thus produce complications. Therefore these and various forms of fistulae, liquor (Kunze) or lymphogenic complications can pose quite a problem (Cohen at al.). Increased morbidity of the patients out of proportion with the planned operation and difficulties of primary healing are the result. Since adequate fibrinogen concentrations had been available since 1972 (Matras, Dinges et al.), tissue adhesion seemed to be a possible solution for problem cases.

Material and Methods

During the last 7 years an increasing number of cases with various expected wound-healing problems have been treated in our unit with the locally applied two-component tissue adhesive (Tissucol, Immuno). These components are:
1. Highly concentrated fibrinogen with factor XIII and other proteins, to be dissolved in Aprotinin (bovine) 3000 K/U/ml
2. Thrombin (500 IU) to be dissolved in calciumchloride (40 mg mol/ml)

When these are brought into a wound and mixed, coagulation occurs. The activated factor XIII component produces cross-links of the fibrin elements, thus favoring the cross-linking of collagen and enhancing the rigidity of the forming clot.
However, a minimum of 5 mmol mol/ml CaCl₂ is necessary to produce a satisfactory rate of cross-links (Shen at al.). Aprotinin still works at a concentration of 100 IU/ml and is used at this low concentration mainly for nervegluing (Kuderna). Quick dissolution of the glue is desirable here to ease growth of fibrillae through the sutureline. We have always used thrombin 500 because we cannot see any advantage in the slow clotting rate of thrombin 4 in our field of work. To get the best out of this preparation it must be freshly prepared for each case and the two mixed components will not retain their effectiveness for more than about 4 h. During the last 7 years, tissue adhesion has been used in many suitable cases with large subcutaneous wounds and in fistulae which were difficult to treat.

The main indications are:

1. Large subcutaneous wounds
   a) Rhytidectomies
   b) Myocutaneous flaps (latissimus dorsi)
   c) Extensive skin flaps
   d) Abdominal lipectomies
   e) Flap closure of decubitus ulcers

2. Bocdissection of inguinal lymph nodes

3. Lymphatic fistulae

4. Chronic lymph “seromas”

The following are typical situations where the tissue adhesive has proved effective:

1. After latissimus dorsi myocutaneous flaps were used for breast reconstruction, large subcutaneous pockets remained on the back of the patient. Even suction drainage after meticulous haemostasis was not very effective in controlling postoperative seromas. The introduction of tissue adhesive into these cavities has remarkably reduced postoperative leakage and discomfort to the patient. Note that the opposing tissue surfaces must be firmly pressed together by external pressure for about 3-4 min to secure firm adhesion (Fig. 1).

2. Traumatic cysts had an unfortunate tendency to recur. Even after appropriate skin excisions to get rid of the surplus skin and produce adequate skin tension, the cavity remaining after excision of the capsula tended to refill with serum. The tissue adhesive proved an advantage (Fig. 2).

3. For the treatment of fistulae in the chest wall remaining after resolution of chronic empyema, extensive skin flaps are sometimes necessary. To adapt these to the rigid, very concave defect was often difficult. The use of tissue adhesive to “glue” them to the chest wall, even with some infection present, was very effective in our last three cases.

4. Another successful use of this adhesive has been in treatment of paraplegics with their various forms of decubitus ulcers and fistulae. Fibrin tissue adhesive has reduced considerably the postoperative rate of formation of fistulae and secondary cavities under covering flaps. It has become a standard adjunct to our treatment of these conditions. If, as it may occasionally occur, the adhesion between a flap and its base is not stable enough, and some dead space remains or reestablished itself, the tissue adhesive can be introduced into the cavity at a