Simplified Application of Fibrinous Glue in Middle-Ear Surgery

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Abstract

The use of fibrinous glue in middle-ear surgery is gaining more and more in importance, since it increases the surgical possibilities for tympanoplasty and leads to fewer unsuccessful operations.

Experience with the use of fibrinous glue in middle-ear surgery is reported and a special technique for application in the tympanic cavity, by means of a special fibrinous glue applicator, is explained. This technique permits measured application of the glue in the middle ear, especially for gluing of individual portions of the auditory ossicles or implanted cartilage, bone or plastic materials and middle-ear structures.

Introduction

Since its introduction, the use of fibrinous glue has become widespread not only for general surgical purposes [2], but also in the ear, nose and throat (ENT) area [5, 10], for example, in oesophageal sutures, following neck dissection operations, in plastic and cosmetic nose surgery, as well as in microsurgery, in ear operations. The use of fibrinous glue in the ENT field is still very much a topical theme. With the extension of its range of application to include the sensitive area of the middle ear, a whole new field was opened up.

It was very soon shown that the healing quotients after tympanoplasty and after aural plastic surgery were better if fibrinous glue had been used. According to Strauss, although there is no significant effect on the often residual sound-conduction components in the normal speech range [11], only partial recovery in the area of the tympanoplastic sealing or also in the closure of the epitympanic space was rather rare. The method has also been used in outpatient reoperations for perforated eardrum and following tympanoplasty [3, 10].

Experimental studies of the use of fibrinous glue in the middle ear, in animals, show a clearly more pronounced cicatization in the glued area [11] than in the non-glued areas. With the use of histoacryl, adhesions and general reactions, for example, inflammation, formation of chambers, degeneration and foreign-body reactions, do not occur if the glue is applied in only very small amounts [8, 9]. Nevertheless, Siedentop found small foreign-body granulomas in the glued tissue after very small applications of histoacryl.
With fibrinous glue, on the other hand, this type of foreign-body reaction can be excluded. The fibrinous glue may thus be considered as inert or compatible with the tissue.

Animal experiments with the use of fibrinous glue in the middle ear gave the following results:
1. The glue is biologically compatible.
2. It is not ototoxic.
3. It does not cause inflammation.
4. It does not lead to any foreign-body reaction.
5. It causes no alteration in the mucous membrane of the middle ear.
6. It produces a firm binding of the glued parts.

In tympanoplasty certain not inconsiderable difficulties occur in connection with the gluing, due to the narrowness of the cavity and the often almost inaccessible angles and recesses in the area of the auditory canal and the middle-ear cavity.

In 1981 Schobel and Pauler [6] had asked: “What happens to the fibrinous glue in the postoperative phase, when it is used in the area of the middle ear, and especially during and after operations to improve the hearing, with implants to restore the sound-conduction chain?”

Difficulties occur with the application of fibrinous glue in the middle ear due to the special anatomical factors, and therefore the danger exists that permanent adhesions may appear in a small cavity. This is also understandable since the fibrinous glue causes proliferation of fibroblasts and capillaries.

**Material and Method**

In the last 3 years we have used fibrinous glue in 425 tympanoplasty operations and for the most part we can only confirm the good results reported by earlier authors [1, 3, 4, 10].

Following ear operations it is only rarely necessary to check the situation in the middle ear, to determine whether increased adhesions, fusions and cicatrization have occurred or whether they are present in the same proportions as they would probably have occurred without the use of fibrinous glue. This seems to indicate that the fibrinous glue does not have a negative effect on the healing or on the functional outcome of the operation. For obvious reasons this question cannot be studied more closely in humans.

Unfortunately the possibility of carrying out a “second look” operation following a tympanoplasty arises only occasionally. Our own experience with second operations confirms a slight increase in the adhesions, particularly in the epitympanic space.

Prerequisites for optimal gluing are:
1. Warming of the components to approx. 37°C
2. Dry contact surfaces, for better adhesion
3. Thorough mixing of the two components
4. Only a thin film of the glue, for optimization of the healing process
5. Optimal thrombin concentration
6. Freedom from tension to be maintained for several minutes after the gluing