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# Postoperative Adhesion Formation following Ovarian Reconstruction with Fibrin Glue in the Rabbit

## Key Words

Fibrin glue  
Postoperative adhesion  
Ovary  
Microsurgery

## Abstract

To compare postoperative adhesion formation following ovarian reconstruction with fibrin glue or the microsurgical suturing technique, an experimental study was performed on sixteen adult female rabbits. While left ovaries were reapproximated with 6-0 coated polyglactin using a microsurgical technique, right ovaries were reconstructed with fibrin glue following ovarian bisection. Four weeks later, second-look laparotomies were performed to evaluate the adnexal adhesions. These were scored according to the American Fertility Society classification. Mean adnexal adhesion scores were  $8.2 \pm 2.3$  in the sutured ovary and  $5.0 \pm 1.1$  in the glued ovary ( $p > 0.05$ ). Ovarian reconstruction with fibrin glue does not reduce postoperative adhesion when compared with the usual suturing technique.

## Introduction

Ovarian cystectomy is one of the most frequent gynecologic operations performed in young women. Preservation of fertility is extremely important in these conservative operations. Postoperative adhesions following wedge resection for polycystic ovaries might impair fertility in up to one third of cases [1]. An improved surgical technique in ovarian closure might decrease adhesion formation and result in higher fertility rates. Concentrated human fibrin glue is recommended for adherence in tubal surgery and bowel anastomosis [2, 3], and there are some reports indicating inhibition of intra-abdominal adhesions using this glue [4, 5]. In our opinion, postoperative adhesion formation following different ovarian reconstruction techniques including fibrin glue has not been studied thoroughly. We, therefore, decided to study the role of fibrin glue in ovarian surgery and compare it with the classical microsurgical technique in the rabbit.

## Materials and Methods

Sixteen adult female white New Zealand rabbits, weighing 3,000–3,500 g were used for the study. An intravenous line at the lateral ear vein was started and anesthesia was induced and maintained with 20 mg/kg sodium thiopental IV, after an overnight fast. Ceftriaxone 80 mg/kg was given preoperatively for prophylaxis. The abdomen was shaved and prepared with betadine solution. A lower midline incision was performed and the ovaries were brought into the operative field under clean but not sterile conditions. A bisection was performed on the left ovary with a scalpel and the cortex was reapproximated using a nonlocking stitch of 6-0 coated polyglactin (Vicryl; Ethicon, Edinburgh, UK). The suture was placed such that no suture could be seen at the ovarian surface.  $3 \times$  magnification was provided by an operating microscope (Olympus MTX-SV 1, Tokyo, Japan). On the opposite ovary, the cortex was reapproximated using fibrin glue (Tisseel Kit, Immuno, Vienna, Austria) after performing bisection with a scalpel. The ovary was kept closed with fine forceps until a fibrin clot had been observed and each side of the wound had adhered. The abdominal wound was closed using 4-0 coated polyglactin in the peritoneal-fascial layer and 4-0 chromatic catgut subcuticularly in the skin.

**Table 1.** Distribution of adnexal adhesion scores

Ovarian reconstruction	Minimal (0-5)	Mild (6-10)	Moderate (11-20)	Severe (21-32)
Left ovary (sutured)	6	5	3	1
Right ovary (glued)	9	4	2	0

The composition and preparation of fibrin glue are as follows. Fibrin glue contains concentrated pooled human fibrinogen (total protein approximately 120 mg/ml), fibrinolysis inhibitor (aprotinin, 3,000 KIU/ml), lyophilized thrombin 500 IU/ml and calcium chloride (40 mmol/l). The aprotinin and thrombin are bovine derived. After preheating to 37 °C using Fibrinotherm (Immuno), the aprotinin solution is transferred to fibrinogen, and calcium chloride to thrombin for activation. The two solutions are then drawn up into two separate syringes. The syringes are placed into a duploject system to allow their simultaneous application and mixing.

A second laparotomy was performed 4 weeks later to evaluate adnexal adhesion under the same conditions. Adnexal adhesions were scored according to the American Fertility Society adnexal adhesion classification [6] by an author (CC) blind as to which technique was used on a given ovary. Adhesions were defined as filmy when they were transparent with minimal vascularity and dense when they were not transparent and showed high vascularity. The abdominal wound was closed as usual to keep the animal alive.

The mean adhesion scores between the two adnexa were compared using the Wilcoxon signed-rank test.

## Results

One of the rabbits died in the early postoperative period. Mean adnexal adhesion scores were  $8.2 \pm 2.3$  on the left (sutured) ovary and  $5.0 \pm 1.1$  on the right (glued) ovary. Although scores were lower in seven animals for the

glued ovary in contrast to three animals for the sutured ovary, there was no statistical significant difference between the two techniques ( $p > 0.05$ ). The distribution of the adnexal adhesion scores is given in table 1.

## Discussion

Different techniques are used for ovarian reconstruction in order to decrease adhesion formation. Oelsner et al. [7] have compared three different techniques in the rabbit ovary using fine suture materials. The incidence of adhesions was lower when the sutures were placed entirely inside the ovary [7]. Complete avoidance of sutures such as linear salpingostomy for ectopic pregnancy may further decrease adhesions [8]. Fibrin glue can be used effectively for ovarian reconstruction and is a good means to completely avoid sutures. Although there are some reported animal studies in which fibrin glue inhibits intra-abdominal adhesion formation [4, 5], Gauwerky et al. [9] could not find any significant difference between covering the peritoneal defects with fibrin glue and not doing so.

It is obvious that ovarian reconstruction with fibrin glue is easier than suturing. Moreover, fibrin glue sets rapidly and saves time.

Since we have found comparable results with the glued and sutured ovarian reconstruction, further studies should be designed to compare the glued reconstruction with leaving the ovary open. Despite these advantages, it should be kept in mind that fibrin glue is obtained from pooled human plasma and serious viral infections may be transferred.

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