EFFECT OF APROTININ ON JOINT STIFFNESS

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SUMMARY: Local aprotinin has been used during arthrotomy both expedimentally in the rats and clinically in the meniscectomy procedure.

Adhesion formation has been evaluated both histopathologically and clinically using the measurements of the Joints' range of motion.

In rats, adhesion rate was 66.66% in the control group, and 15.78 % in the aprotinin treated group P 0.05. Clinically, postoperative rehabilitation period was shorter in the aprotinin treated patients.

The results show that aprotinin significantly reduces the amount of adhesion formation but it does not effect collagen synthesis.

Key Words: Aprotinin-Arthrotomy-Adhesion Formation.

INTRODUCTION

The mechanisms by which stiffness is produced after surgical interventions around joints are unknown. The main factor in the production of stiffness is probably shortening and adhesion of the surrounding musculature and, to a lesser degree, changes in the joint capsule. Intraarticular changes also occur (e.g. fibrous adhesion or even bony fusion).

Experimental and clinical studies using aprotinin have shown a reduction in the amount of intraperiteneal adhesions. Aprotinin is a proteinase inhibitor obtained from bovine lung sources (9).

The present study was designed to determine the effect of local aprotinin on extra-and intraarticular adhesion fermation following arthrotomy.

MATERIALS AND METHODS

1. Local aprotinin application in the rats: Thirty-seven adult male swiss Albino rats, Weighing 200 g each, were divided into two groups, eighteen rats in the control group and nineteen rats in the experimental group. Under Membutal anesthesia, the left knee joint of each rat was dissected. In the experimental group the wound was washed with aprotinin 10.000 u/kg.

All the rats were killed three weeks later and, the samples from the surrounding tissue were taken for histopathological examination. The histological sections were stained by Hematoxilen and Eosin. They were evaluated according to the criteria of Peacock (7). If there is a dense and abundant scar tissue, it is Considered as healing with adhesion. On the contrary, a loose granulation tissue is considered as healing without adhesion.

Table 1: The results of histopathological evaluation. The difference between control and experiment groups was found to be important (P<0.05).

Group	Number of the rats		
	with adesion	without adesion	Total
Control	12	6	18
Aprotinin treated	3	16	19
Total	15	22	37

2. Local aprotinin application during meniscoctomy: The study included 11 patients (nine men and two women), ranging in age 18-48

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years (mean 26.4), and aprotinin 1500 U/kg was applied locally during meniscoctomy of these patients. 53 patients (30 men and 23 women) served as control group, without application of aprotinin. The age range of these patients was between 16 and 55 years (mean 25.8).

The effect of aprotinin was evaluated using following criteria:

a) The range of motion,

b) The period of time to reach to that degree of motion.

RESULTS

1. Experimental findings are summarized in Table 1.

2. The same range of motion was obtained in both groups. It was full flexion and full extension of the knee joint. But the period of time to reach to that degree of motion was quite different ($P<0.05$). It was about one week in the patients who had local aprotinin treatment. On the other hand, it was more than two weeks in the control group (1).

DISCUSSION

The mechanisms that lead to joint stiffness are still unclear; however, there are not one but many diverse factors which affect adhesion formation. A clear understanding of wound healing is vital to a rational approach to the practice of surgert. The major processes of tissue repair include inflammation, collagen metabolism, and wound contraction (3,7).

The results show that the proteinase inhibitor aprotinin used during arthrotomy significantly reduces the amount of adhesion formation and shortens postoperative rehabilitation period. In another study, we found that locally applied aprotinin does not effect collagen synthesis (2).

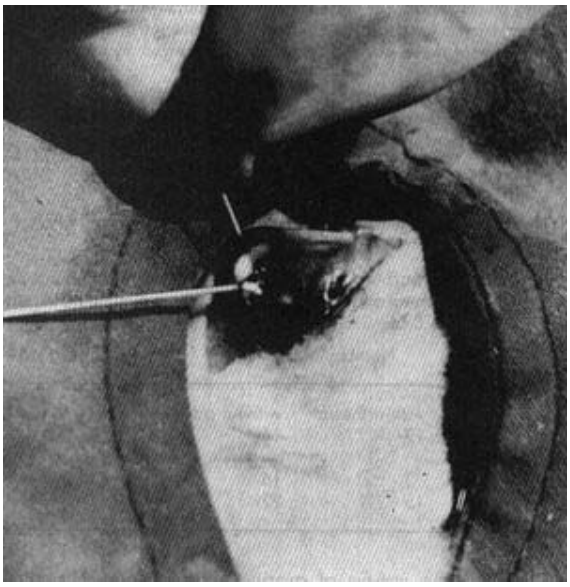

Figure 1: Local aprotenin application during arthrotomy in the rat.

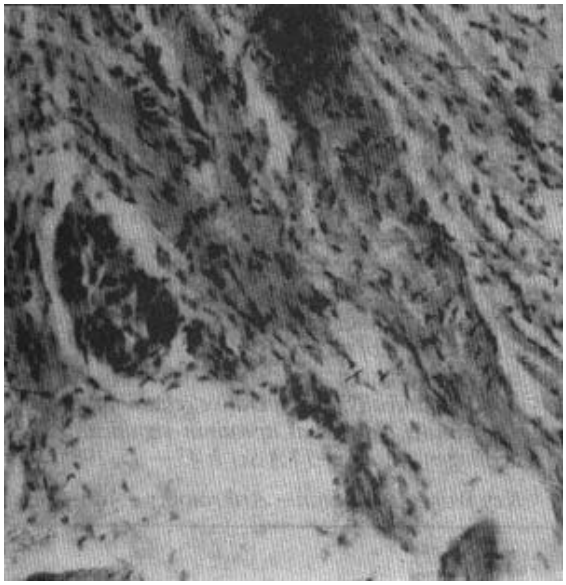

Figure 2: Dense and abundant scar tissue in the control group.

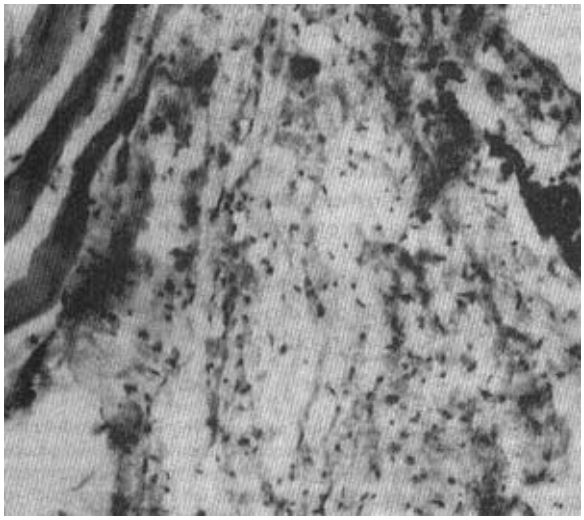

Figure 3: Loose granulation tissue in the aprotinin treated group.

The mechanism by which aprotinin might reduce adhesion formation is unknown. Grundmann and Dai suggested that inflammatory gronulation tissue development was prevented and that there was a reduction in the inflammatory response (4,5). Young suggested that aprotinin might act as an antiplasmin and promote the inhibition of fibrin formation (9).

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