EFFECT OF APROTININ ON JOINT STIFFNESS IN RATS

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SUMMARY

Local aprotinin has been used following arthrotomy in the rat. Adhesion formation has been evaluated histopathologically.

The results show that aprotinin significantly reduces the amount of adhesion formation.

Key words: Joint stiffness, Aprotinin

INTRODUCTION

The precise mechanism by which stiffness is produced after surgical interventions around joints or following immobilization is 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 adhesions or even bony fusion).

Experimental and clinical studies using aprotinin have shown a reduction in the amount of intraperitoneal adhesions (1-5). Aprotinin is a proteinase inhibitor obtained from bovine lung sources (4).

The present study was designed to determine the effects of local aprotinin on extraarticular adhesion formation in the rat following arthrotomy.

MATERIALS AND METHODS

Thirty-seven adult male Swiss Albino rats, weighing approximately 200 g each, were divided into two groups, eighteen rats in the control group and nineteen rats in the experiment group.

Under Nembutal anesthesia, the left knee joint of each rat was dissected (Fig.1).In the experiment group, the wound was washed with aprotinin (Trasylol R) 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 Hematoxylene and Eosin. They were evaluated according to the criteria of Peacock (8). If there is a dense and abundant scar tissue, it is considered as healing with adhesion. In these sections dense fibrous tissue with a few inflammatory cells were seen (Fig. 2). On the contrary, a loose granulation tissue with less collagen and a few inflammatory cells is considered as healing without adhesion (Fig. 3).

RESULTS

The results were summarized in Table I.

Table I. The results of histopathologic evaluation. The difference between control and experiment groups was found to be important ($P<0.01$).

Group	Number of the rats with adhesion	Number of the rats without adhesion	Total
Control	12	6	18
Experimental	3	16	19
Total	15	22	37

DISCUSSION

A clear understanding of wound healing is vital to a rational approach to the practice of surgery. The major biologic processes of tissue repair include inflammation, collagen metabolism, and wound cantraction (6).

The results show that the proteinase inhibitor aprotinin used following arthrotomy significantly reduces the amount of adhesion formation. In another study,

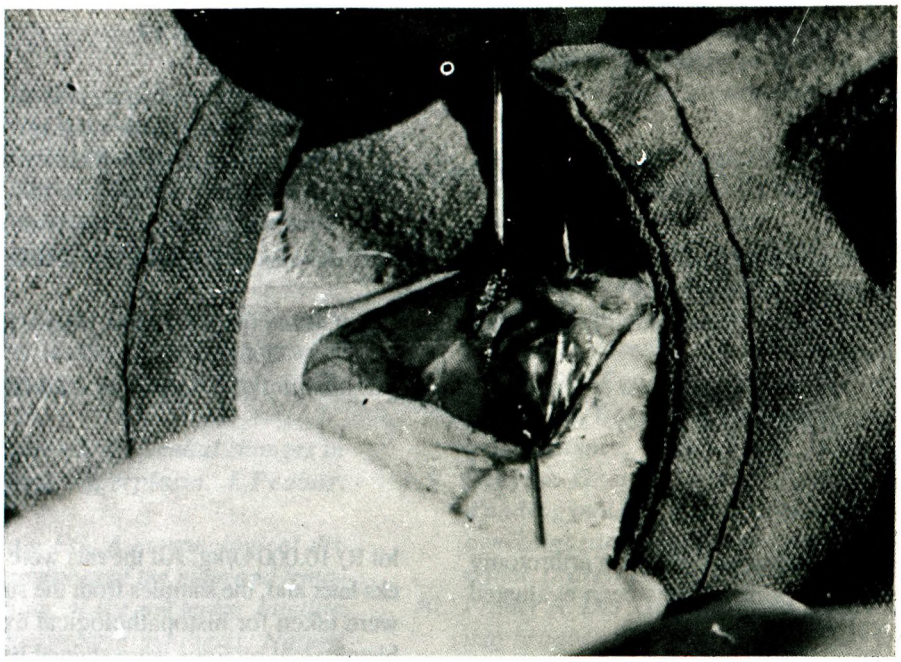

Fig. 1: Showing arthrotomy

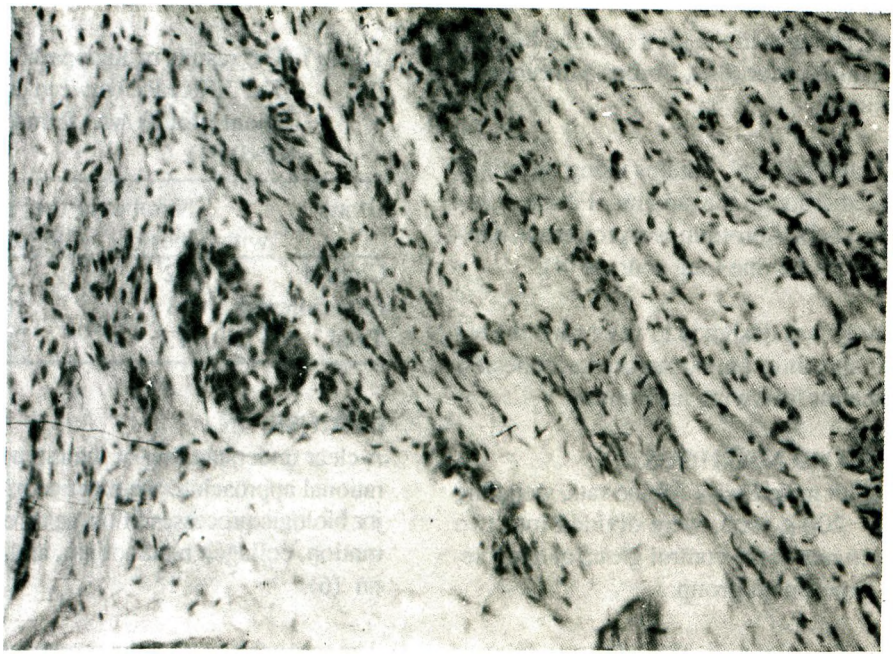

Fig. 2: Control group: dense and abundant scar tissue (H+E x 100)

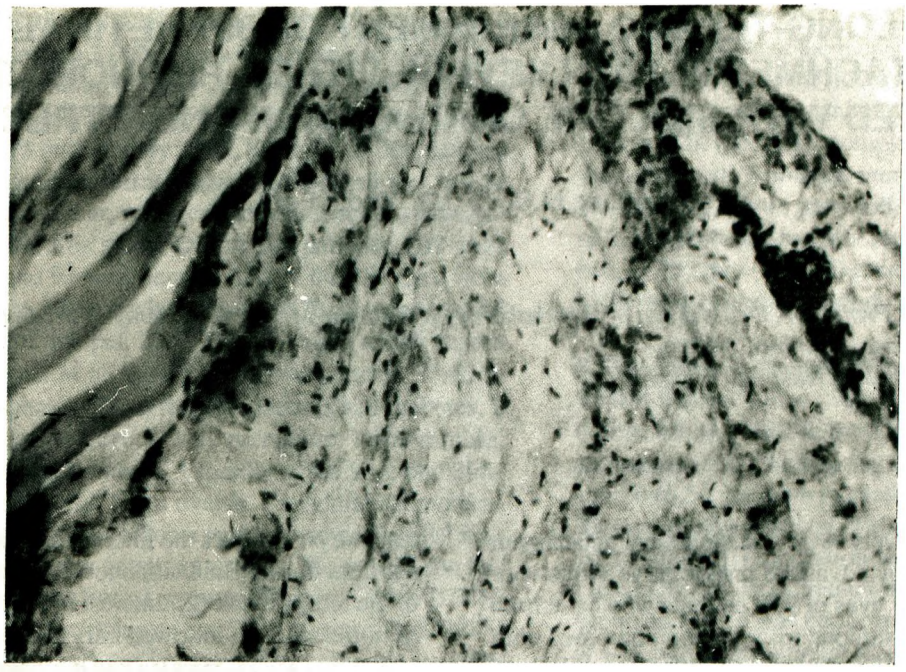

Fig. 3 : Experiment group: loose granulation tissue (H+E x 100)

it has been determined that locally applied aprotinin does not effect collagen synthesis (7). The mechanim by which aprotinin might reduce adhesion formation is unknown. Grundmann and Dai suggested that inflammatory granulation tissue development was prevented and that there was a reduction in the inflammatory response (2-3). Young suggested that aprotinin might act as an antiplasmin and promote the inhibition of fibrin formation (4).

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