

PREVENTION OF ADHESIONS FOLLOWING TENDON REPAIR WITH APROTININ

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SUMMARY

Local aprotinin has been used following tendon repair in the rat. Adhesion formation has been evaluated histopathologically. The results show that aprotinin significantly reduces the amount of adhesion formation and, it does not effect collagen synthesis.

Key Words: Aprotinin, tendon repair.

INTRODUCTION

In the search for pharmacological prevention of tendon adhesions several drugs have been used. But, there is still no agent available in clinical practice.

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 effect of local aprotinin on adhesion formation in the rat following tendon repair.

MATERIALS AND METHODS

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

Under Nembutal anesthesia, the right knee joint of each rat was dissected and patellar tendon was exposed (Fig.1). Patellar tendon was cut transversally and then repaired by two simple sutures using 5/10 silk. In the experiment group, aprotinin (Trasylol (R)) 10.000 U/kg was applied locally. All the rats were killed three weeks later and, the samples from the repaired tendon were taken for histopathological and biochemical examination. The histological sections were stained by Hematoxilene 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. On the contrary, a loose granulation tissue considered as healing without adhesion. The sections were evaluated on coded specimens.

On biochemical examination, the amount of total protein was determined by the method of microbiuret after homogenization and sonication of the tissue samples (6). The amount of hydroxyproline was determined by the modified method of Stegman after hydrolysis of tissue samples (7).

RESULTS

The results were summarized in Table I and II. Table I. The results of histopathologic evaluation.

The difference between control and experiment groups was found to be important ($P < 0.01$). In cases healing with adhesions sections showed dense fibrous tissue with abundant collagen and few inflammatory cells in the stroma. In cases healing without adhesions the stroma was loose with less collagen and moderate vascularity. There were scattered inflammatory cells.

Group	Number of the rats		Total
	with adhesion	without adhesion	
Control	10	9	19
Experiment	1	15	16
Total	11	24	35

Table II. The amount of hydroxyproline in control and experiment groups. The difference between groups was not found to be important ($P > 0.05$).

Group	The amount of hydroxyproline (μg) per unit protein per unit wet weight of the tissue
Control No: 18	12.11 \pm 10.37
Experiment No: 15	11.78 \pm 11.57

DISCUSSION

Surgical repair of tendon injuries is frequently unsatisfactory because of the adhesions which restrict motion. This clinical problem of hand surgery have stimulated numerous investigations to clarify the mechanism of tendon healing and to reduce the amount of adhesions. "One wound-one scar" concept-

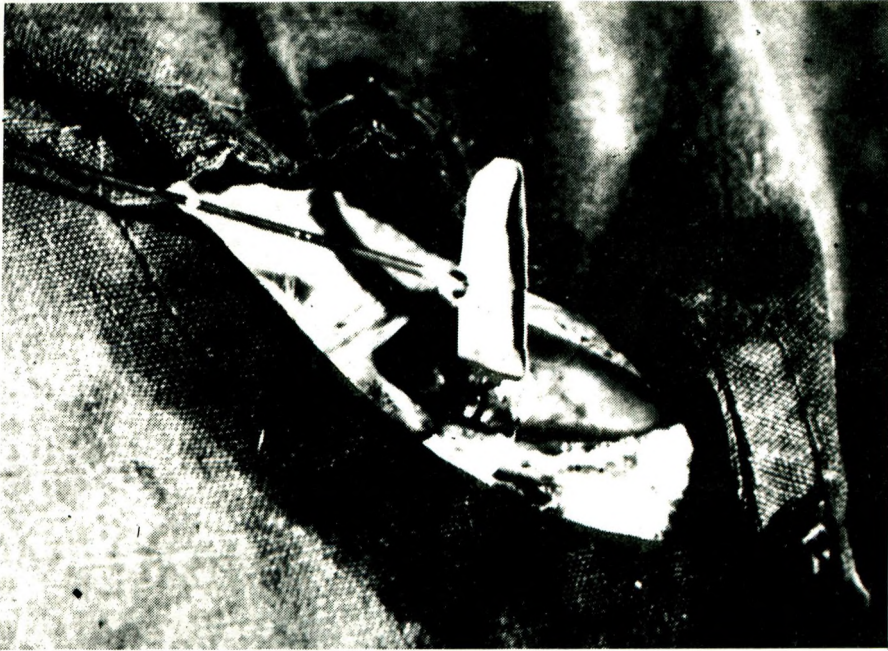


Fig 1. Showing tendon repair



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

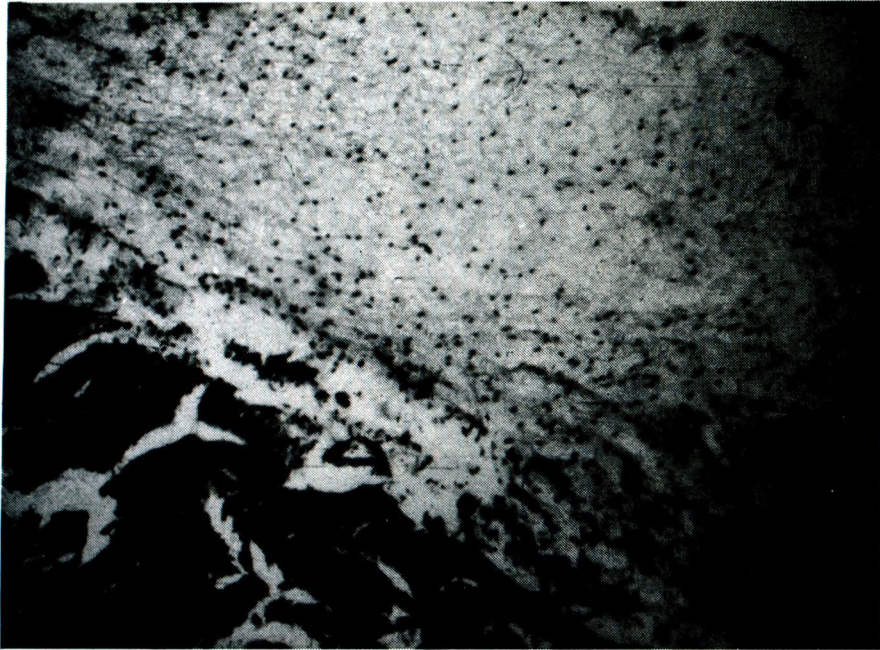


Fig 3. Experiment group: loose granulation tissue
(H+E× 100)

is an important general principle in the biology of tendon healing (8). A tendon should be considered part of a compound wound. Although there is an increase in number of many types of cells soon after injury to a tendon, it seems likely that these cells are mostly inflammatory cells delivered by the intrinsic blood supply, or multipotent cells which have migrated into the region of repair from outside the tendon. The most striking microscopic features in restricting adhesions are regular organization, compact arrangement of granulation tissue. These are very similar to that in normal tendon (Fig. 2). In contrast, a loose areolar tissue is found in nonrestrictive adhesions (Fig.3).

The results show that the proteinase inhibitor aprotinin used following tendon repair significantly reduces the amount of adhesion formation. The results also show that locally applied aprotinin following tendon repair does not effect collagen synthesis.

The mechanism 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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