**EFFECT OF HYALURONIC ACID IN THE EXCURSION RESISTANCE OF THE TENDON GRAFT: A BIOMECHANICAL IN VITRO STUDY IN A HUMAN MODEL**

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Introduction: Postoperative finger function after flexor tendon graft is occasionally unsatisfactory. Postoperative adhesion inhibits the restoration of excursion and strength of the grafted tendons. Hyaluronic acid (HA) is not only a lubricant but also a factor to prevent adhesion. The purpose of this study is to evaluate the changes of excursion resistance between potential graft donor sources for the flexor digitorum profundus tendon and intact proximal phalanx annular pulley (A2 pulley) after administration of HA in a human model.

Materials and Methods: Six tendons in two adult human hands (index, middle and ring finger) that were amputated for malignant tumor of the upper arm were used in this study. Informed consent was obtained for using the specimens. These specimens were fresh-frozen after amputation and thawed at room temperature immediately before testing. The concept of friction measurement and its application to the tendon-pulley unit has been verified and validated, as reported previously (An et al.). The tendons tested were the flexor digitorum superficialis (Group S), the portion of the extensor digitorum communis beneath the extensor retinaculum (Group R), the palmaris longus (Group P) and the extensor digitorum communis distal to the extensor retinaculum (Group E).

Groups S and R were considered intrasynovial tendons, while Groups P and E were considered extrasynovial tendons. The flexor digitorum profundus tendon (Group C) was used as a control. All specimens were kept moist in a saline bath throughout the testing procedures, and these tests were performed in random sequence. After initial testing, evaluations of the same tendons soaked in HA were performed, again in random sequence. Each tendon was soaked in HA for 5 minutes before testing, and kept moist in a HA bath throughout the testing procedure, as Groups SH, RH, PH, EH, respectively. Three trials were performed for each of the 5 angle positions (20-60 degrees). As the trials were generally identical, and the first run was considered to be preconditioning, the average of the last two runs was selected for analysis for each angle. Significant differences in excursion resistance between tendons and at different angles were assessed with two-factor repeated-measures ANOVA. Tukey’s honestly significant difference test was then used for a post hoc comparison of individual means in the mean effects. The level of significance was set at p=0.05.

Result: The mean values of excursion resistance of the specimens were summarized in Figure 1 and 2. The excursion resistance of these tendons decreased after administration of HA. It was statistically significant for the extrasynovial tendons. Excursion resistance of these tendons after administration of HA were not significantly different from the control values.

Discussion: Many factors may contribute to the final result of tendon graft. A critical factor contributing to poor function after surgery is postoperative adhesion. We considered that early setting rehabilitation is an important factor to prevent the adhesion. Another factor may be the lubricant. The evidence we collected suggests that the administration of HA may decrease the frictional resistance between tendon and pulley after tendon graft and possibly improve the clinical outcome of flexor tendon graft.


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