Towards better results after flexor tendon repair in the hand

A study of suture techniques and postoperative mobilization methods

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Results after flexor tendon repair in the hand have improved during the last few decades but are still far from satisfactory. Dehiscence (gap formation) of the repair and adhesions between the repair site and the surrounding tissues are considered the main causes of poor results. The aim of this prospective study was to examine how early controlled motion, the most common postoperative treatment method today, affects tendon excursions and gap formation, and how these variables in turn affect clinical results after flexor tendon repair in zone II of the hand. The information thus gained was used to develop new treatment methods.

Metal markers, placed in the flexor digitorum profounds (FDP) tendon during operation, and postoperative radiographic examinations, were used to measure tendon excursions and gap formation in 3 groups of consecutive patients with flexor tendon injuries in zone II. Linear regression analysis was used to examine the relationships between excursions, gap formation and subsequent active interphalangeal (IP) joint range of motion recorded during a one year follow-up period (6 months in the last group). In the first 2 groups (39 and 41 patients) conventional methods of repair (modified Kessler and a simple epitendinal suture) were used in conjunction with early mobilization based on passive flexion (dynamic traction) of one digit in the first group, and of all 4 digits in the second group. In the last group (36 patients) a new epitendinal suture method, the cross-stitch, developed and tested biomechanically in vitro on sheep tendons, was used in conjunction with the modified Kessler repair and an early mobilization program combining passive and active flexion of all 4 digits.

There was a roughly linear relationship between early controlled IP joint range of motion and the resulting excursions of the FDP tendon. There was a positive correlation between the size of the FDP tendon excursions recorded during early controlled motion and subsequent clinical results in terms of active IP joint range of motion. The relationship was roughly linear but in the region of 6 to 9 mm there appeared to be a threshold, beyond which the effect of a further increase in excursions became insignificant. There was no clinically significant relationship between gap formation and tendon excursions or between gap formation and subsequent active IP joint range of motion. Gaps up to 10 mm were compatible with good results.

Early controlled motion with passive flexion of all 4 digits produced significantly larger excursions and better clinical results than the traditional Kleinert program based on passive flexion of only one finger. A combination of passive and active flexion of all 4 digits improved tendon excursions and clinical results still further.

The in vitro breaking strength of the cross-stitch (63 N) was significantly greater than the strength of the modified Kessler repair combined with a circumferential conventional epitendinal suture (48 N). When the cross-stitch was used in conjunction with a modified Kessler repair and an early mobilization program combining passive and active flexion of all 4 digits, the mean return of function (157 degrees composite IP joint range of motion) corresponded to 90% of normal function, results that are significantly better than those previously achieved with passive flexion alone.