

## TENOSYNOVITIS IN WOMEN IN INDUSTRY

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**S**URGEONS interested in surgery of the hand and who practice in large industrial communities are aware that today's industrially employed women often become afflicted with tenosynovitis of one or more tendons about the hand and wrist. The age of the woman and the rate at which she works seem to be the major factors that affect the problem. With the expansion of types of industrial skills, and the increasing speed of operation of mechanical apparatus, the incidence of tenosynovitis also has increased.<sup>1,2</sup> This report is based on a study of 50 women, 38 of whom were employed.

It has been the practice of the authors to treat posttraumatic tenosynovitis nonoperatively at first. One or two injections of hydrocortisone acetate into the area of tenosynovitis frequently will be curative.<sup>3</sup> Splinting of the hand, warm hand baths two or three times daily, and mild analgesics often will produce permanent improvement. Ultrasonic therapy or roentgentherapy has not proved successful in our experience. The 50 patients who comprise the series, for this report, failed to respond to the initially administered conservative treatment.<sup>4</sup>

### Material

All case reports of nonsuppurative or traumatic or posttraumatic tenosynovitis or fasciitis occurring in women who were admitted to The Grace Hospital (Central Unit) of Detroit, Michigan, during the years 1956 through 1960 were reviewed; the total was 50 cases. It was found that the only instances of tenosynovitis were those involving the hands. There was one case of "tennis elbow." Thirty-eight women were employed in various industries; 12 patients were not employed—they were either housewives or retired from employment; there was no predisposing occupation that could be definitely determined as contributing to the development of tenosynovitis.

This group of 50 women, admitted to the hospital for surgical treatment represents only a small proportion (less than 5 percent) of women treated for these problems during the years 1956 through 1960. Initial treatment consisted of one or more attempts at nonoperative measures, including rest (in a sling, a splint or a cast), exercise (electric stimulation, massage, whirlpool bath), injections of drugs, and radiation (ultrasound, diathermy, or x-ray).

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*\*This study was conducted while Doctor Hartwell was associated with the Department of Surgery, The Wayne State University College of Medicine, and the Department of Surgery, The Grace Hospital, Detroit, Michigan, with Doctor Larsen and Doctor Posch.*

## Correlations

*Sex ratio.* The incidence of tenosynovitis of the stenosing variety is probably close to ten times greater in women than in men.<sup>5</sup> Perhaps the types of traumata endured by women make them anatomically selectively susceptible to tenosynovitis: in the female there is greater angulation of tendinous paths through the carpal spaces and compartments than in the male.

*Types of traumata.* The types of trauma found in the women may be classified according to speed of work: "fast jobs" account for 66 percent of cases (33/50); "slow jobs" for 10 percent (5/50); and 24 percent (12/50) of cases represent women who are not in industry. Two thirds of the cases in this study occurred in women whose jobs required fast, repetitive manipulations, or where the posture of the hand was such that strong, unremitting, or repetitive pinching, grasping, pulling, or pushing was necessary. Such jobs included the operation of several kinds of keyboard business machines, sewing machines, lathes, drills, presses, grinders, and switchboards. Also included were jobs as assemblers, inspectors, spot-welders, and, in one case, the job of order-clerk, in which handwriting was indicated as a cause of tenosynovitis. Nearly all of these cases were rated compensable as occupational illness and were carried by compensation underwriters in a variety of industries.

Ten percent of the cases in this report occurred in women whose job classifications could not be considered to be in the same category as those mentioned above. These women were employed as a domestic servant, a fitter in a dress shop, a manager of a dry-cleaning establishment, a waitress, and a saleslady.

*Age.* The average age of the industrially employed women with tenosynovitis in this series was 47.4 years, and the average age of the nonworking women was 54.9 years. This is not a common disease among girls in their late teens, or in women in their twenties, and early thirties, although there are many women in this younger age group who are industrially employed. The preponderance of women who were subject to an industrially related tenosynovitis in their hands and wrists is in the fifth and early sixth decades.

*Sites.* The occurrence of tenosynovitis is more common in the thumb than any other part of the hand, wrist, or forearm. The great mobility of the thumb makes it especially vulnerable. Through its range of motion is seen the wide angulation at the wrist through which the tendons of the extrinsic muscles of the thumb must pass. Next most frequently involved are the ring and middle fingers.<sup>6,7</sup>

Stenosing tenosynovitis of the flexor pollicis longus (trigger thumb) and Quervain's disease, or tenosynovitis at the radial styloid of the extensor pollicis brevis and the abductor pollicis longus, were found in 76 percent (38/50) of the cases in this series. Tenosynovitis in both ring and middle fingers together constituted 30 percent (15/50), and involvement of other areas was found in only 10 percent (5/50) of the cases. Some patients suffered from more than one focus of disease, as the summation of the percentages indicates.

The other areas affected with tenosynovitis were the little finger, the flexor carpi ulnaris, the extensor digitorum communis, and the index finger. As mentioned before, there was one case of tennis elbow, or radiohumeral fascioperiostitis, in this group.

### Operative Treatment

*Procedures.* Operative procedures were done on every patient but one in this series of hospitalized patients; the exception was one unemployed woman who was treated while in the hospital for another illness and who received a steroid injection as treatment for coincidental tenosynovitis. The operations were designed to mobilize and to free the tendons involved in posttraumatic adhesive tendonitis or in a stenosing tenosynovitis. One fasciotomy was performed—in the woman who had tennis elbow. The types of operations were: tendolysis, excision of sesamoid bones, fasciotomy, excision of tendon sheaths, incision of tendon sheaths.

*Results.* The long-term results of operation are not entirely successful. The patients were operated upon through the years 1956 to 1960, and some of them are still suffering pain and loss of motion in their hands. The hands of these women postoperatively have continued to be subjected to the trauma of some industrial occupation.

It has been shown that anatomic variation at the wrist is not uncommon in Quervain's disease;<sup>8</sup> duplicated tendons, intertendinous slips, separate carpal spaces, and unusual insertions have been found. These variations may be evenly spread throughout the population; but it is certain that exposure to industrial life, particularly by women, enhances the probability that they will become symptomatic. Posttraumatic tenosynovitis in working women may be prevented by recognition of the patterns of work which too often may injure and disable the hands. After treatment, a lighter or different type of work will ordinarily prevent the development of a painful hand associated with considerable disability. A great problem is that patients return to the same type of factory work that incited the tenosynovitis. Though it may not be wise to do so, the patient is rehabilitated to her usual skills (a) because of her need of a gainful occupation, and (b) because her employer's liability underwriters have financed her care. The employer who insists that an employee return to the same occupation that incited the tenosynovitis is inviting chronic problems.

### Comment

Movements of the hands and wrists in the course of one operation on a machine or on an assembly line done at a high rate of speed can be readily seen and analyzed. These motions result in wear and tear of human tissue scarcely able to keep up with replaceable machinery. Rais,<sup>9</sup> in his own experiments, has shown what repetitive trauma to muscles and tendons at high speeds for various lengths of time can do.

There is no doubt that there are certain industrial occupations that are conducive to traumatic tenosynovitis.

### Conclusion

Tenosynovitis about the hands and wrists in industrially employed women is most commonly associated with an occupation that requires rapid repetition of a motion several thousand times daily. There is a higher incidence of posttraumatic tenosynovitis in women in industry than there is in the population at large. This condition is most common in the fifth and sixth decades of life and is rare under the age of 30 years. Tendons of the thumb are much more commonly involved in posttraumatic tenosynovitis than are other tendons of the upper extremity. Most women with this problem will respond favorably to conservative treatment. The early results of operation are almost uniformly gratifying; failures after operation may be due either to improper motivation on the part of the patient who desires continued income from the insurance carrier, or to return to the type of work that produced the original difficulty. Symptomatic women should not return to the same traumatizing work, and knowledge by the clinician of the industrial job is necessary in making recommendations about returning them to their work.

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