

# Surgical Treatment of the Upper Extremity in Rheumatoid Arthritis\*

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All surgical procedures designed to preserve or improve function in the extremities, whether in rheumatoid arthritis or not, must consider the functional emphasis of the upper extremity as compared to the lower extremity. The upper extremity has, as its primary goal, mobility and prehension, whereas in the lower extremity, stability is the most important goal, mobility the next in order of importance, and prehension the least important. For example, the feet fulfill a need for stability with very little requirement for prehension, but the hand is more an instrument for prehension and there is less need to consider stability.

I have divided surgery in the upper extremity of the rheumatoid patient into the surgery of prevention and the surgery of repair—that is, those procedures designed to *prevent* the loss of function and those designed to *restore* some measure of function.

**Surgery of Prevention.** *Synovectomy.* One might include synovectomy under the surgery of prevention. The question of whether synovectomy is worthwhile as a possible means of controlling the progression of rheumatoid disease in any particular joint is not appropriate to this discussion. My personal view is that synovectomy alone has not adequately been shown to favorably alter the course of rheumatoid arthritis in the involved joint, although there is definitely a place for synovectomy

whenever synovial tissue itself interferes with function or when it is causing intractable pain. Further, synovectomy done in association with certain anatomic adjustments is an essential element in the operative procedure. An example of such a situation is illustrated by the patient who has monarticular synovitis of a metacarpal phalangeal joint with severe pain and limitation of motion and who has not responded to the usual conservative methods applied over a reasonable period of time. In such an instance there is a reasonable chance of attaining at least some pain relief if not some improvement in the range of motion of that joint.

*Anatomic Adjustments.* These are procedures which are often done in association with synovectomy to prevent further progression of destructive processes that we know will cause a functional loss to the patient if some surgical adjustment is not made. Radial-head excision, along with synovectomy of the elbow joint, may preserve pronation and supination at the elbow and perhaps even flexion and extension at the elbow longer than it would have been preserved using conservative treatment alone. The procedure is also helpful in relieving pain. Radial-head excision is ordinarily not considered as a possibility until there is x-ray evidence of advanced destructive changes and clinical evidence of persistent pain and reduction in the range of motion.

When the patient has tenosynovitis on the extensor surface of his wrist and hand, there is a threat of possible destruction of extensor tendons with consequent severe loss of function. A synovec-

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tomy is in order because the synovial tissue seems to cause destruction of the tendons by ingrowth into the substance of the tendon; indirectly, there is damage by competition with the blood supply and also by compression underneath the extensor retinaculum which also interferes with the blood supply. At the same time that the synovectomy is done, the extensor retinaculum is removed, so that if synovitis recurs the tendons will not be exposed to compression and consequent loss of blood supply. Usually the retinaculum itself is preserved but re-routed beneath the extensor tendons and sutured down to the capsule of the wrist joint. This collagen graft helps to stabilize the wrist joint itself, so that a tissue which was in a potentially destructive position before surgery is converted to an assistant which may help to stabilize the wrist joint.

When synovitis in the flexor canal, which contains the long flexor tendons and the median nerve, increases the pressure within the volar canal, the patient experiences decreased function of the median nerve distal to the wrist. There are signs and symptoms of carpal tunnel syndrome. If this condition is allowed to progress the patient may ultimately develop a complete nonfunction of the median nerve and the flexor tendons may rupture; the mechanism would be the same as that described for extensor tendons under the extensor retinaculum. Therefore, a release of the volar carpal ligament combined with synovectomy will preserve irreplaceable function of the median nerve and probably prevent rupture of the flexor tendons.

Frequently, synovitis occurs in the flexor tendon sheaths in the finger. When it progresses to the point where the flexor tendons are unable to glide through the pulleys, a situation described as "trigger finger" exists. This painful locking of the flexor tendons cannot be treated by a simple division of the pulleys because severe functional loss is a consequence of division of the pulleys. In this instance a complete synovectomy of the flexor tendons in the fingers will allow them to become flexible again.

**The Surgery of Repair.** *Repair or Grafting of Ruptured Tendons.* As pointed out earlier, the surgery of repair is indicated when anatomic equipment has already been destroyed by the rheumatoid process and some kind of reconstruction or substitution should be considered. Some examples include the repair or grafting of ruptured tendons. Rupture of tendons can occur on the extensor surface of the

wrist or in the flexor canal or in the digits as a result of synovitis as described earlier. Another frequent cause of tendon rupture is dorsal dislocation of the head of the ulna with sharp bone edges which physically abrade the extensor tendons. The repair is accomplished by placing a tendon graft between the muscle and the distal stump of the tendon and by removal of the distal ulna. Other substitution procedures include such things as tendon transfers to replace ruptured tendons or to replace a specific function when there is an imbalance problem caused by contractures or tendon rupture.

*Release of "Stuck" Tendons.* Another example of surgery of repair is seen in patients who have ignored the destructive process or were unaware of the destructive process to the point where the tendons have stuck together or to surrounding tissues. Consequently, tendon gliding is prevented and there is no function in the digit. A reconstruction here requires removal of adhesions to allow the tendons to glide once again.

*Arthrodesis of Small Joints.* The small joints in the hand are exposed to the ravages of rheumatoid arthritis and osteoarthritis follows directly in its footsteps resulting in severe pain and instability. Fortunately, some joints do not require motion to be useful; therefore, an arthrodesis of some small joints which relieves pain and provides stability can be a definitive and helpful operation. Arthrodesis of the thumb metacarpal phalangeal joint and arthrodesis of the wrist are the most commonly performed fusions in patients with rheumatoid arthritis.

*Selective Excision of Rheumatoid Nodules.* We are all aware of the fact that rheumatoid nodules have a high recurrence rate after excision; however, nodules may appear in areas where they can cause much pain and interfere with function of a hand out of proportion to their usually benign nature and surgical excision is indicated.

*Resection Arthroplasty of Small Joints.* In the last thirty years or more, surgeons have been attempting to provide motion and a reduction in pain in the small joints of the hand by performing an arthroplasty where arthrodesis was not a reasonable alternative. We attempted to produce a type of pseudojoint by removing a portion of the old destroyed joint and substituting some type of soft tissue, such as fascia or tendon, for articular cartilage. Such soft tissue arthroplasties have helped to reduce pain in the involved joints and have helped

to increase the range of motion in the involved joints; however, the soft tissue arthroplasties have fallen far short of normal function. The soft tissue arthroplasties do not hold up over a long period of time because the interposed soft tissue tends to disappear with time allowing the bone ends to come back together and pain is a result.

*Replacement Arthroplasty of Small Joints.*

Presently, soft tissue arthroplasties are being augmented by the use of a spacer between the two bone ends to prevent the two bone ends from migrating back together. The spacers which are inserted also have a certain amount of inherent rigidity which improves the stabilizing characteristics of the arthroplasty. We are using Silastic® spacers or prostheses of which there are now three popular types: Swanson, Niebauer, and Calnan-Nickel (the Swanson type is illustrated). Experience has shown that the implant type of arthroplasty can greatly improve the average range of motion following surgery and can also maintain pain reduction for many years. Stability is improved over the pure soft tissue arthroplasty but is not as good as normal. Recurrence of ulnar drift is still a significant problem in this type of arthroplasty.

Another type of arthroplasty which is moving us closer to the theoretical optimum of total joint replacement is the Steffey; it is a metal prosthesis with two sections. Each section has a stem, which is inserted into the respective medullary canal, and a high density polyethylene articulating surface. The two pieces are snap-fitted together and the stems are held in place with methylmethacrylate bone cement. This prosthesis is a direct outgrowth of the earlier metal prosthesis designed by Brannon and

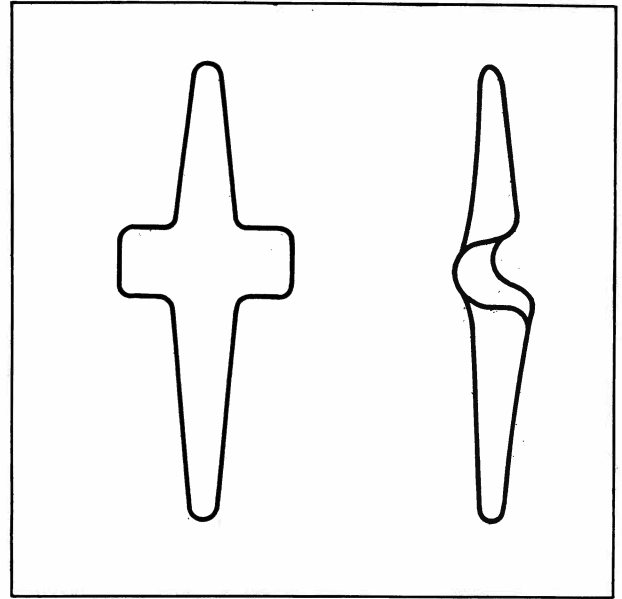


Fig. 1—Silastic® finger joint prosthesis of the Swanson design.

another designed later by Flatt. One of the most important hopes that we have for this prosthesis is that it will provide a higher degree of stability. At the present time, this particular prosthesis is not widely available.

In closing, I should like to emphasize a point that Dr. Bryan has made. It is wise for all of us to appreciate the fact that the surgeon always loses his battle to rheumatoid arthritis. The best the surgeon can possibly hope to do is to ameliorate the symptoms or preserve or sometimes even to reconstruct lost functional parts.