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Synovectomy of the proximal interphalangeal joint of the finger in rheumatoid arthritis

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RHEUMATOID arthritis, a disease that can affect every organ system in the body, is particularly likely to affect the musculoskeletal system. In the hand, progressive rheumatoid arthritis leads to rupture of either the flexor or the extensor tendons, or both, and to instability or to dislocation of the finger joints. When these complications occur, hand function declines and the patient experiences difficulty in performing many acts of daily living.

This paper concerns the proximal interphalangeal joint of the finger, a joint that is important in the actions of pinching and grasping. Preservation of function of the joint is vital, especially when the metacarpophalangeal joint is diseased and its function restricted. When both the metacarpophalangeal and proximal interphalangeal joints are destroyed, hand function is poor. At the present time, the disability caused by a destroyed or dislocated metacarpophalangeal joint can be greatly reduced by arthroplasty (the fashioning of a new joint). However, in regard to the proximal interphalangeal joint, arthroplasty is still in the developmental stage of technic.

In the proximal interphalangeal joint, the disabilities resulting from chronic, progressive rheumatoid arthritis are the boutonniere deformity (*Fig. 1*), and the destruction of the joint, producing instability, pain, and angulation (*Fig. 2*). In the patient with rheumatoid arthritis the boutonniere deformity is due to stretching or actual rupture of the central slip of the extensor tendon at its attachment on the dorsum of the middle phalanx. The lateral bands of the extensor tendon are also stretched due to persistent synovitis in the proximal interphalangeal joint, and fall below the axis of movement of that joint to act as flexors rather than as extensors. This results in a flexion deformity of the proximal interphalangeal joint and hyperextension of the distal phalanx.

The direct surgical repair of the boutonniere deformity resulting from trauma is difficult. When the deformity is a result of rheumatoid arthritis, it is impossible to correct surgically.[1, 2] Arthrodesis of the proximal interphalangeal joint or a tenotomy of the extensor tendon at the distal interphalangeal joint is usually advised in an attempt to reduce the deformity.[1-4] There are disadvantages to these procedures. A fused proximal interphalangeal joint, while painless and strong, imposes a handicap on the patient. Arthrodesis of the proximal inter-

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Fig. 1. Boutonniere deformities in the hand of a 56-year-old woman with rheumatoid arthritis for 23 years. The deformity consists of flexion of the proximal interphalangeal joints and hyperextension of the distal joints of the fingers. Deformity in the distal joints is so severe that dislocation has occurred and the condyles of the middle phalanges have eroded the skin and drained purulent material.

phalangeal joints should be performed only when the metacarpophalangeal joints are mobile, for when there is progressing disease in the metacarpophalangeal joints hand function may be diminished by fusing the proximal interphalangeal joints. The difficulty with tenotomy is that while it reduces the deformity somewhat it does not correct it completely, and both patient and surgeon are dissatisfied with the unsightly appearance of the boutonniere deformity that remains.

Damage to the articular cartilage of the proximal interphalangeal joint from the synovitis of rheumatoid arthritis is commoner than is generally believed. Careful examination of roentgenograms, in anteroposterior and true lateral projections, will often reveal erosions in the form of indistinct defects in the subchondral plate (*Fig. 3*). Experience with surgery in the proximal interphalangeal joint has made possible a close correlation between minute roentgen findings and erosions in the articular cartilage seen at operation. A magnifying lens is used to examine the preoperative roentgenogram for evidence of minute erosions.

Synovectomy of many joints affected by rheumatoid arthritis is now being performed in an effort to relieve pain, maintain motion and, hopefully, to prevent further destruction of the joint. Damage to the articular cartilage is usually found in the joints at the time of synovectomy. This operation is therefore being offered as a therapeutic measure rather than a prophylactic one, as articular damage has already occurred at the time the operation is performed.

Fig. 2. Severe angular deformities at the proximal interphalangeal joints in a 57-year-old woman with rheumatoid arthritis for 13 years. The angulation is due to severe loss of cartilage and bone as a result of rheumatoid arthritis.

Synovectomy of the proximal interphalangeal joint has been performed for a number of years as a measure to prevent the development of the boutonniere deformity, and to prevent gross destruction and angulation of the proximal interphalangeal joint.

Wilkinson and Lowry[5] reported the results of synovectomy of the proximal interphalangeal joint. Relief of pain occurred in five of nine patients who underwent operation; no mention was made of the extent of motion or of whether or not synovitis recurred. It has been said that surgery on the proximal interphalangeal joint will result in joint stiffness. Certainly this may be so in cases of surgically treated intraarticular fractures, or in tumors or nonarthritic conditions adjacent to the joint. Postoperative joint stiffness in those instances is commonplace. However, after synovectomy of the proximal interphalangeal joint affected by rheumatoid arthritis, in most cases there has not been much sacrifice of joint motion postoperatively. Since July 1966 we have performed 69 synovectomies of the proximal interphalangeal joint in 23 patients who have rheumatoid arthritis.

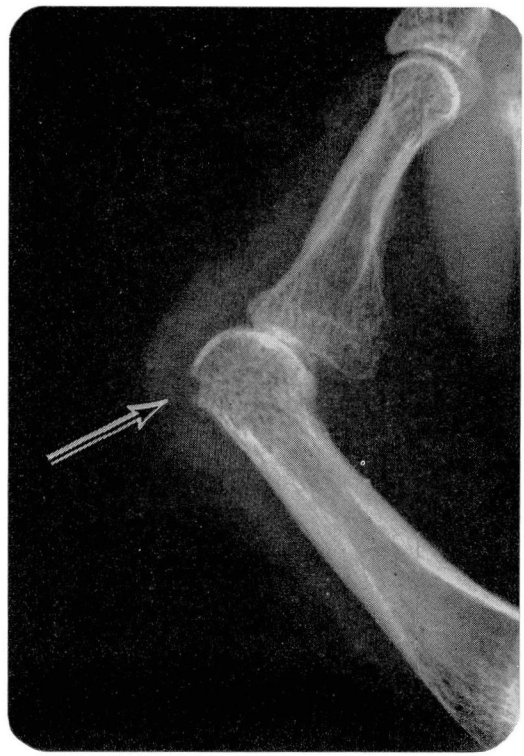

Fig. 3. A true lateral roentgenogram demonstrates an erosion in the proximal interphalangeal joint of a 57-year-old woman with rheumatoid arthritis for 13 years.

Indications for operation

Patients who have chronic and progressive rheumatoid arthritis are selected for surgical treatment. The arthritis must be unremitting and the synovitis that is produced must be proliferative rather than fibrotic. Proliferative synovitis can be recognized by the presence of a mass of synovium which, when compressed, has a spongy feeling. Fibrotic synovium develops in the adhesive capsulitis form of rheumatoid arthritis; it has an indurated feeling when it is rolled beneath the examiner's finger. It is highly important to distinguish between the two types of synovitis, as synovectomy performed on the fibrotic type or adhesive capsulitis form of rheumatoid arthritis often yields poor results with loss of motion.

On roentgenograms the joints should show only minimal erosions or there should be none. The motion of the proximal interphalangeal joint should be good, and there should be minimal or no ligamentous instability and, preferably, no deformity. Clinical indicators of progressive and destructive rheumatoid arthritis are: the presence of subcutaneous rheumatoid nodules, vasculitis, peptic ulcer, persistent leukocytosis, high latex titer, and hypergammaglobulinemia (serum γ-globulin content more than 1.7 g per 100 ml). Synovectomy

of the proximal interphalangeal joint is indicated when proliferative synovitis persists after a trial of medical treatment, especially when minute erosions are already demonstrated on the roentgenogram.

Contraindications for synovectomy

The adhesive capsulitis form of rheumatoid arthritis has already been mentioned, and is recognized by the lack of a synovial mass and by an indurated feeling of the synovium when it is rolled beneath the examiner's finger. Synovectomy performed in this form of rheumatoid arthritis may result in stiffness of the joint.

Ankylosing spondylitis affects the peripheral joints, including the proximal interphalangeal joint, in 20 percent of patients.[6] The synovitis in ankylosing spondylitis in the early stages of disease is proliferative and, when there is minimal involvement of the spine, differentiation from rheumatoid arthritis may be difficult. The correct diagnosis of ankylosing spondylitis is important because of the natural tendency for joints to undergo fibrous ankylosis and finally bony ankylosis. Performing synovectomy of a peripheral joint in ankylosing spondylitis may well lead to ankylosis.

It is mandatory that the cooperation of the patient be obtained, otherwise joint stiffness will occur. The postoperative rehabilitation program requires early motion, which takes effort and perseverance on the part of the patient. If the patient is too young or too feeble to participate in the necessary postoperative exercise program, the result will likely be poor with regard to motion. Depression, psychosis, and conversion reaction are all conditions in which the patient may not be willing or able to participate in the aftercare program necessary to regain joint motion, and the detection of these concomitant disorders should give one pause before recommending operation.

Operative technic and aftercare

The operation is basically a modification of a procedure described by Flatt.[1] It has been performed extensively by Savill[7] at the Combined Medical and Surgical Arthritis Unit in Edinburgh, Scotland. Motion of the fingers is begun in the dressing on the afternoon after surgery, and is continued until the dressing and sutures are removed on the tenth postoperative day. Active movements and use of the hand are encouraged. Light activities should be engaged in at that stage. Exercising with bouncing putty, and also mobilizing the proximal interphalangeal joint by holding the metacarpophalangeal joint still with the opposite hand is performed. If there is a problem in obtaining motion at the proximal interphalangeal joint, the plaster exercise splint described by Savill[7] may be used. This consists of a dorsal slab of plaster extending to the metacarpophalangeal joints on the dorsum of the hand with an encircling band of plaster which holds the metacarpophalangeal joints in extension and allows unrestricted movement ot the proximal interphalangeal joints. It is most helpful in obtaining flexion. If there should be difficulty in obtaining extension, a dynamic brace

can be used. This consists of a lumbrical bar to block extension at the metacarpophalangeal joints, a standard long opponens and proximal interphalangeal extensor assists. The brace and the plaster exercise splint have not been necessary in most cases.

Clinical data

Twenty-three patients comprise our series, four of whom had juvenile rheumatoid arthritis or had juvenile rheumatoid arthritis persisting into adulthood. There were 22 females and 1 male in an age range of 12 to 60 years; 69 synovectomies of the proximal interphalangeal joint have been performed since July 1966. Fifty of the synovectomies were performed in patients with adult rheumatoid arthritis, and 19 were performed in patients with juvenile rheumatoid arthritis. The progress of patients was followed as long as 30 months after the operations, and that of 20 was followed for six months or less.

Results

Motion. Preoperative and postoperative measurements were made of 50 joints. In three joints of one patient there was a loss of motion of 30°, 45°, and 50°. That patient had an intrinsic contracture that worsened in the postoperative period and caused loss of motion. In the other patients, motion was unchanged, increased, or was lost as much as 15°, although there were four patients who gained 20°, and one each who gained 25° and 40° postoperatively.

Pain relief. As for relief of pain postoperatively, there are records in regard to 42 joints: seven patients reported no pain; 26 believed that the pain had regressed somewhat; and nine had no relief of pain. No patient had more pain postoperatively than that experienced before operation.

Recurrent synovitis. Proliferative synovitis has recurred in 10 of 62 joints, at this time of writing. This represents 16 percent of the total number of synovectomies performed.

When the two groups were examined individually, notable differences were readily seen. Patients with adult rheumatoid arthritis and those with juvenile rheumatoid arthritis should be treated separately, as they represent different diseases in their course and response to therapy, both medical and surgical. Of the 19 synovectomies performed in juvenile rheumatoid arthritis or juvenile rheumatoid arthritis persisting into adulthood, six joints in two patients had recurrent synovitis postoperatively. Longer follow-up study and more experience is needed to obtain an accurate picture of the rate of recurrence of proliferative synovitis in patients with juvenile rheumatoid arthritis.

In the 19 patients with adult rheumatoid arthritis, 50 synovectomies were performed. There were four recurrences of proliferative synovitis in three patients after operation. Some of the recurrences did not appear for one year or longer after operation, and obviously a longer follow-up study of this group is needed in order to obtain a more accurate impression of the recurrence rate after synovectomy of the proximal interphalangeal joint in adult rheumatoid arthritis.

Complications of the operation

The complications of synovectomy have been minor. There were no instances of skin loss, boutonniere deformity, or infection as the result of the operation. There were two hematomas, two suture granulomas, and one neuroma. The neuroma did not affect the main digital nerve, but was the result of sectioning one of the dorsal branches of the digital nerve. No boutonniere deformities developed, either as a complication of 69 operations or later.

Summary

Sixty-nine synovectomies of the proximal interphalangeal joints of the fingers have been performed in 23 patients with rheumatoid arthritis. Fifty of the operations were in 19 patients with adult rheumatoid arthritis and 19 were in four patients with juvenile rheumatoid arthritis or juvenile rheumatoid arthritis persisting into adulthood. Follow-up periods range up to two and one-half years. No new boutonniere deformity has developed postoperatively; some patients had the deformity before operation. Proliferative synovitis has recurred after 4 of 50 synovectomies performed in 19 patients with adult rheumatoid arthritis, and after 6 of 19 synovectomies performed in four patients with juvenile rheumatoid arthritis or juvenile rheumatoid arthritis persisting into adulthood. Further follow-up study is needed to obtain a more accurate evaluation of recurrence of synovitis after synovectomy.

No patient has had more severe pain after the operation than before, and most of the patients were improved with regard to pain. Most of the patients did not lose a significant amount of motion postoperatively.

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