Arthroscopic Synovectomy of the Metacarpophalangeal Joint in Refractory Rheumatoid Arthritis: A Technique

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Summary: Arthroscopic synovectomy was performed on 29 metacarpophalangeal joints belonging to 21 patients with refractory rheumatoid arthritis. This article describes the method of anesthesia, landmarks, and operative technique. Short-term (12-month) results and patient satisfaction have been excellent. No complications were noted. We conclude that arthroscopic synovectomy of the metacarpophalangeal joints in patients with refractory rheumatoid arthritis can be performed safely and effectively. Possibilities for improvement of the technique as well as possible uses of the technique in research are discussed. **Key Words:** Synovectomy—Metacarpophalangeal joint—Rheumatoid arthritis.

Despite recent advances in antirheumatic therapy,[1] some patients will continue to have active synovitis involving the small joints of the hand. Arthroscopic intervention in these joints has rarely been mentioned in the published literature.[2-4] We have performed arthroscopic synovectomy of persistently swollen metacarpophalangeal joints in 21 patients with rheumatoid arthritis with good short-term (12-month) results. Patient acceptance and tolerability have been excellent. The purpose of this report is to describe our technique.

TECHNIQUE

Anesthesia

With our first 14 cases, we used a ring block in conjunction with local anesthesia. Since then we have found the following anesthetic technique to be sufficient. For local anesthesia, 1 mL of a 50:50 mixture of 1% lidocaine without epinephrine and 0.25% bupivicaine at the metacarpophalangeal joint line on either side of the extensor mechanism using a 26-gauge short needle. For intra-articular anesthesia, 2 mL of a 50:50 mixture of 1% lidocaine with epinephrine and 0.25% bupivicaine are injected into the joint using a 22-gauge needle. Five to 10 mg of diazepam is administered orally.

Positioning and Preparation

Patients are placed in a supine position with the head of the table elevated 30°. A pillow is placed under the shoulder and upper arm. The patient rests the forearm on an arm rest that keeps the limb at a 75° angle (Fig 1). A blood pressure cuff is applied above the elbow and a gauze band is applied around the blood pressure cuff and tied to the bottom of the table to anchor the arm to the table.

Each patient's arm is prepped initially with an iodine-based soap scrub. A sterile stockinette and elastic bandage wrap are applied extending from the fingertips to the elbow. The hand and arm are then inserted through the elasticized opening of a drape sheet. Another sterile bandage wrap is applied to seal the arm and drape sheet.

The stockinette is rolled back to the wrist. The hand is reprepped with an iodine-based solution and alco-

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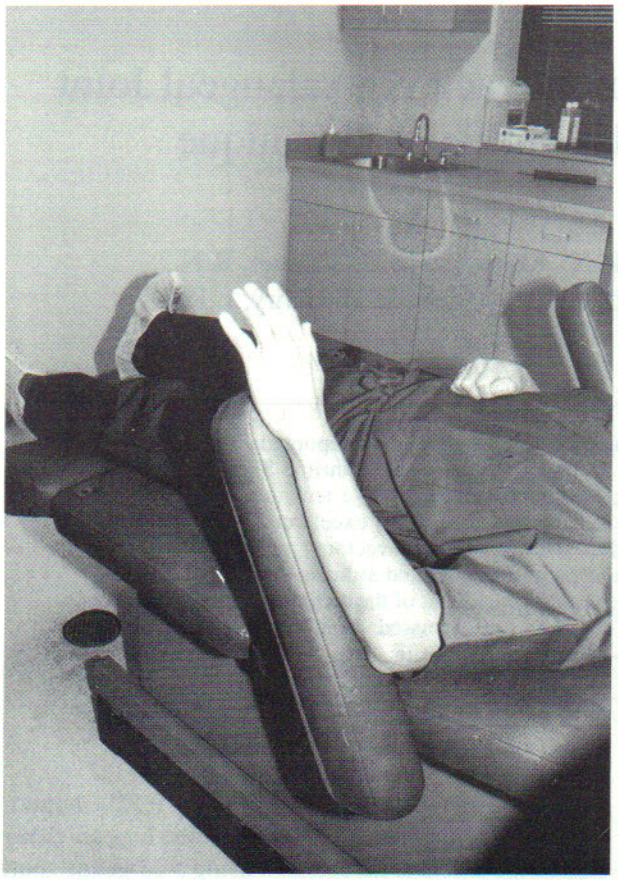

FIGURE 1. Arm rest for hand placement.

hol. A 2- × 3-inch section of sterile gauze is wrapped around the digit and a fingertrap is applied. In the initial 12 cases, the fingertrap was attached to an IV pole and manual traction was applied. Since then, we have used a pulley system with 8 lb of traction applied per digit (Figs 2 and 3).

Approach

A longitudinal incision, 2 mm in length, is made with a No. 11 scalpel blade at the dorsoradial portal. This is located at the joint line on the radial side of the extensor tendon (Fig 4). The skin and subcutaneous tissue are spread down to the joint capsule using a small mosquito clamp.

A short 2.2 mm semiblunt trochar and cannula system are inserted into the joint using steady gentle pressure. The trochar is advanced with the tip in a slightly distal direction so that when the capsule is pierced, the cannula follows the convex contour of the metacarpal head. The cannula tip will move freely when placement is correct.

Gravity inflow is attached to the arthroscope sheath. A 1.9-mm arthroscope is then inserted and visualization commences. Once visualization is achieved, an 18-gauge spinal needle is inserted at the dorsoulnar portal. The needle functions as outflow for bubbles and fluid. It also functions as a probe.

The spinal needle is removed. A 2-mm longitudinal skin incision is made at the joint line on the ulnar side of the extensor tendon. The skin and subcutaneous tissue are dissected with the mosquito clamp. A blunt trochar and cannula are inserted. Proper placement is noted with the arthroscope. The trochar and cannula

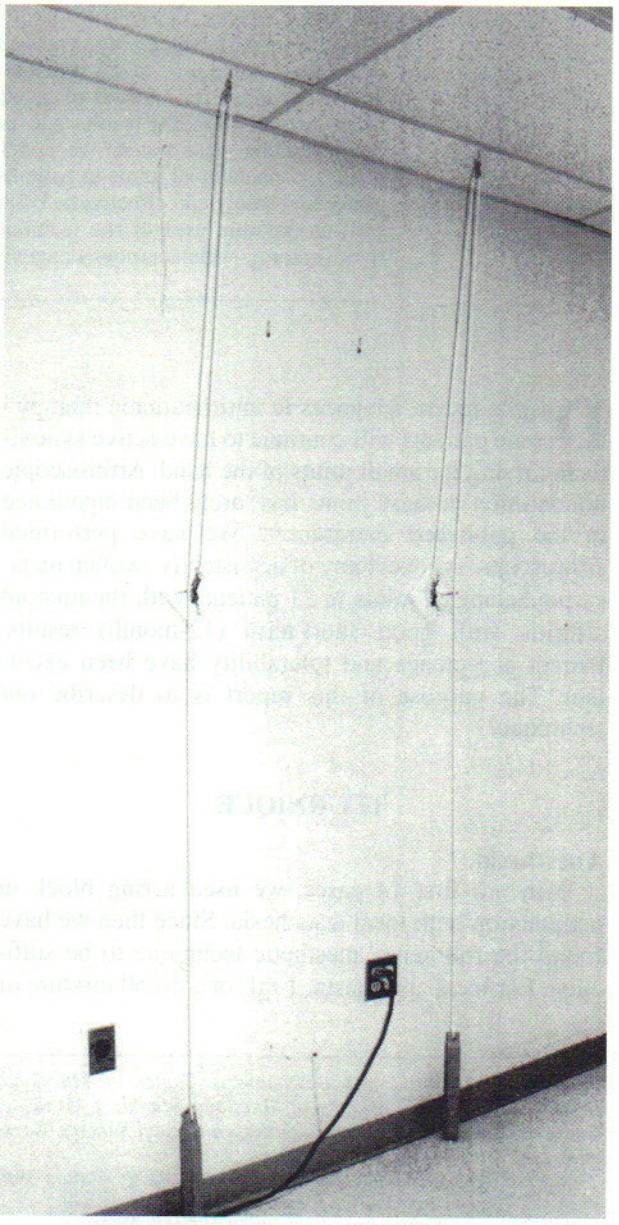

FIGURE 2. Traction system with 8-lb sash weight and pulley.

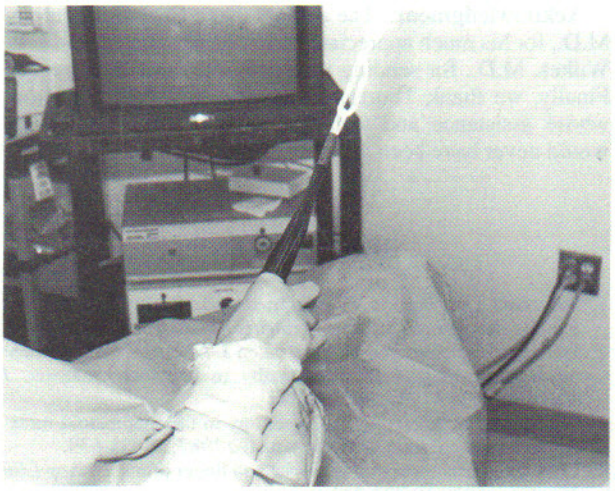

FIGURE 3. Traction set up for arthroscopy.

are removed. A 2.9-mm full-radius motorized shaver blade is inserted (Fig 5).

Removal of synovium starts in the midportion of the joint. The dorsal capsule and radial recesses to the collateral ligaments are then cleaned. Exposure by ulnar deviation and flexion of the joint facilitates this part of the procedure. The arthroscope and shaver are then switched to the opposite portals. The ulnar recesses to the collateral ligaments and volar portion of the joint to the volar plate are then trimmed with the assistance of radial deviation and hyperextension of the joint. The instruments are removed. No sutures are required.

Postprocedural Instructions

Patients have their hand dressed with a sterile pressure bandage. The following day they may remove the bandage and use small adhesive bandages. Patients are seen for follow-up in 1 week.

FIGURE 4. Location of dorsoradial and dorsoulnar portals—at the joint line on either side of the extensor tendon.

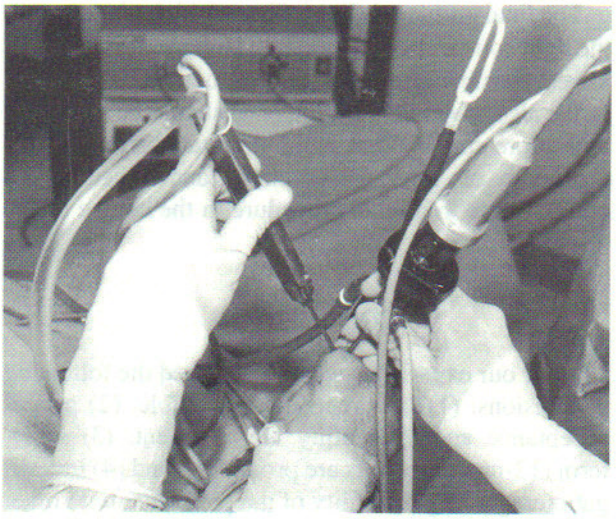

FIGURE 5. Arthroscope and shaver inside the joint.

DISCUSSION

Arthroscopic synovectomy of the metacarpophalangeal joint has been described by others.[2-5] To our knowledge, a detailed description of this technique has not been published. We have found the short-term (12-month) results and patient acceptance of this procedure to be exceptional. Our procedure time was initially about 30 to 45 minutes making this a longer procedure than we had anticipated. Our procedure time is currently 15 to 20 minutes per joint. The amount of tissue obtained has been adequate for evaluation of T-cell subsets and cytokine analysis.

We have encountered the following three problems as part of the learning curve. The first is "falling out of the joint." It may be difficult to keep the arthroscope and cutting instrument inside the joint. This is particularly true in the following instances: (1) Vacuuming the recesses where the shaver blade is held at an acute angle to the perpendicular. (2) Cleaning the dorsal capsule when the shaver is held at an obtuse angle to the perpendicular. We have found a pencil grip position helpful to use for both the arthroscope and shaver. Using the tip of the of the arthroscopist's third finger as a guide/fulcrum to both balance the instruments as well as keep the instruments inside the joint capsule is important.

The second problem is maintaining distention of the joint. During the shaving process, maintenance of adequate distention is both critical and difficult. As with any small joint, but particularly the finger joints, a tiny bit of suction can collapse the joint quickly. The scrub nurse has to be vigilant. A fluid pump may solve this problem.

The final problem is light. Since the joint is so small, the light source strength needs to be turned down to the lowest possible setting for good visualization.

We also have two questions that should be answered with more study: What is the long-term effect of this procedure on joint preservation? and When is the optimal time to do this procedure in the course of the disease?

CONCLUSION

After our experience we have reached the following conclusions: (1)The procedure is feasible, (2) patient acceptance and tolerability are excellent, (3) short-term (12-month) results are promising, and (4) investigation regarding the utility of the procedure with other forms of arthritis and other orthopaedic conditions is warranted.

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REFERENCES

1. Moreland LW, Heck LW, Koopman WJ. Biologic agents for treating rheumatoid arthritis. *Arthritis Rheum* 1997;40:397-412.
2. Declercq G, Schmitgen G, Verstreken J. Arthroscopic treatment of metacarpophalangeal arthropathy in haemochromatosis. *J Hand Surg [Br]* 1994;10:212-214.
3. Wilkes LL. Arthroscopic synovectomy in the rheumatoid metacarpophalangeal joint. *J Med Assoc Ga* 1987;76:638-639.
4. Chen YC. Arthroscopy of the wrist and finger joints. *Orthop Clin North Am* 1979;10:723-733.
5. Ryu J, Fagan R. Arthroscopic treatment of acute complete thumb metacarpophalangeal ulnar collateral ligament tears. *J Hand Surg [Am]* 1995;20:1037-1042.