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CASE REPORT

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Posterior interosseous nerve palsy secondary to rheumatoid cyst of the elbow joint: case report

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Abstract A 73-year-old woman with rheumatoid arthritis had lost the ability to extend the digits on her right hand. A rheumatoid cyst in the elbow caused the posterior interosseous nerve palsy. Decompression was performed, and she recovered extension of the thumb and fingers completely within 3 weeks after the operation.

Key words Palsy · Posterior interosseous nerve (PIN) · Rheumatoid arthritis

Introduction

Rheumatoid arthritis often involves the elbow, which has three nerves around it. Ulnar nerve palsy is common, whereas radial nerve palsy is not. In this article, we report a case of posterior interosseous nerve palsy due to a rheumatoid cyst of the elbow joint.

Case report

A-73-year-old woman with a 12-year history of rheumatoid arthritis complained of an inability to extend the right thumb and fingers. She had been treated with nonsteroidal antiinflammatory drugs. In 1999 rheumatoid arthritis involved her right elbow, and in 2001 total knee arthroplasty was performed in her left knee. Thirty-five years ago, the right index finger had been amputated by a fishing mixing machine. In March 2003, mild pain began to radiate from her elbow to her hand. At the end of March, she was unable to extend the right thumb and the middle, ring, and little fingers.

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The problem was diagnosed in our department as either posterior interosseous nerve (PIN) palsy or rupture of the finger extensors and the extensor pollicis longus (EPL). On physical examination, the right elbow was slightly swollen and had −10° extension and 120° flexion without pain. The right wrist was slightly swollen, and its range of motion was 105° (50° dorsiflexion, 55° palmar flexion) without pain. There was no tender point at the ulnar head, and the forearm rotation was full and pain-free. The right wrist deviated radially on dorsiflexion (Fig. 1). The right thumb and middle, ring, and little fingers did not extend (Fig. 2), and abduction of the right thumb was weak. Sensation was normal in the radial nerve area. Roentgenograms of the right elbow and wrist showed the joint spaces to be narrow without articular cartilage destruction (Figs. 3, 4). The probable diagnosis was a PIN palsy.

Arthrography, magnetic resonance imaging (MRI), and needle electromyography (EMG) were performed to confirm the diagnosis. The anteroposterior view of the elbow in arthrograms showed distal extension of the synovium along the proximal radius into a synovial cyst (Fig. 5A). The lateral view of the arthrogram showed cystic synovitis around the radial head (Fig. 5B). On the MRI scans, a low-intensity signal was present on the T1-weighted images around the radial head area, with a shape similar to that seen on the arthrogram. It was associated with synovitis of the elbow joint (Fig. 6). On the T2-weighted images, a high-intensity signal was present in the anterior area of the radial neck (Fig. 7). Needle EMG showed fibrillation potentials or giant spikes in the extensor carpi ulnaris, extensor digitorum communis, and extensor pollicis longus. We concluded the patient had a PIN palsy caused by the rheumatoid cyst of the elbow.

Surgery was performed 1 month after the onset. Using an anterolateral approach, we identified the radial nerve between the brachioradialis and the biceps brachii muscles. The nerve was traced distally to where the PIN was compressed by the synovial mass just distal to the arcade of Frohse (Figs. 8, 9). The PIN was freed from the arcade of Frohse and decompressed by removing the synovial mass. There was macroscopic compression of the PIN (Fig. 8).

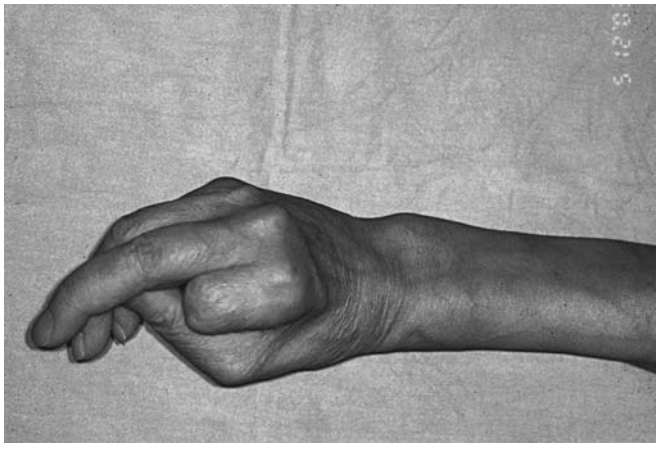

Fig. 1. Wrist extension with radial deviation

Fig. 2. Loss of the right thumb and finger extension

Fig. 3. Roentgenograms of the right wrist

The right arm was immobilized by a long arm splint for 10 days postoperatively. The patient was able to extend the right thumb and the index, middle, and ring fingers slightly 10 days after surgery with grade 3 muscle testing. The patient noted full recovery of the wrist extension without radial deviation and the fingers 3 weeks after surgery (Figs. 10, 11).

Discussion

Posterior interosseous nerve palsy secondary to rheumatoid arthritis of the elbow is uncommon. In 1999 Westkaemper et al. reviewed 13 cases of PIN palsy associated with rheumatoid arthritis.[1] The characteristic presentations were in patients more than 50 years old and with a history of rheumatoid arthritis for more than 8 years. The time from the onset of symptoms to the time of surgery ranged from 1 week to 5 months. PIN palsy due to rheumatoid arthritis must be differentiated from extensor tendon rupture, subluxation of the extensor tendons, and dislocation of the metacarpophalangeal joint. EMG, arthrography, and MRI help confirm the diagnosis. EMG is the most reliable and effective of these procedures.[2–4]

Roth et al. reported a case in which they confirmed the diagnosis of PIN palsy by elbow arthrography.[5] We used three methods to diagnose our case of PIN palsy associated with a rheumatoid cyst of the elbow. Arthrography and MRI provided similar findings of a synovial cyst in the

Fig. 4. Roentgenograms of the right elbow

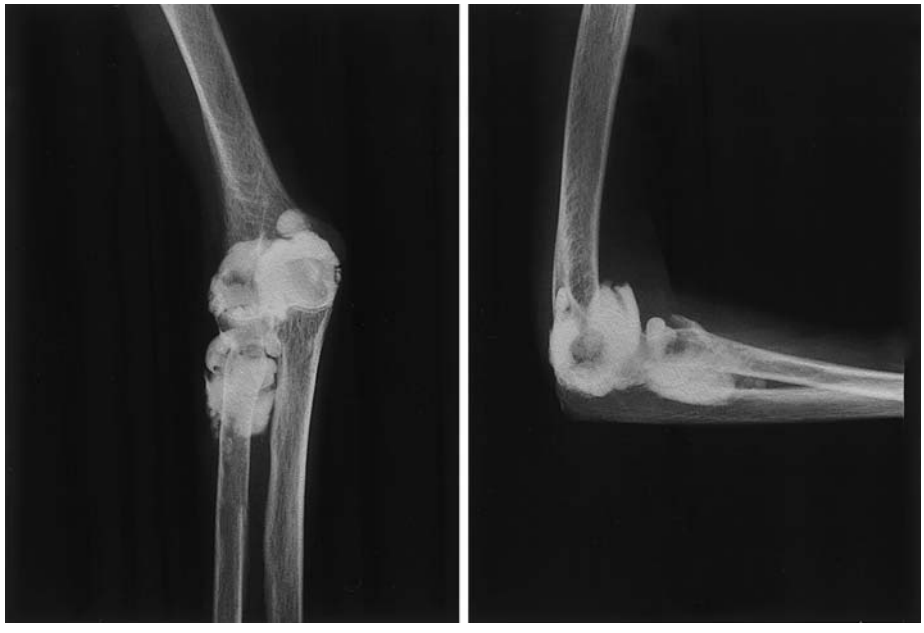

Fig. 5A,B. Arthrograms of the right elbow

antecubital area under the course of the radial nerve. In our case, all three diagnostic methods were helpful and effective for confirming the diagnosis.

Treatment includes conservative treatment and surgical decompression. Conservative treatment includes intraarticular injection of corticosteroids, oral medications, splinting, and physical therapy. Methotrexate has been reported to be helpful.[2,4,6–8] Three of seven patients (43%) noted full recovery after being treated conservatively.[1] A full recovery occurred in three cases, with the longest duration of PIN palsy being 3 months. Millender et al. reported a case treated by tendon transfer after 2 years of PIN palsy because of prolonged and irreversible palsy.[8] Westkaemper et al.[1] believed the nerve should be decompressed even if the duration of symptoms was more than 6 months. Surgical decompression was successful in all of their nine reported cases (100%).[1] On this basis surgical nerve decompression should be the treatment of choice for PIN palsy due to rheumatoid synovitis in the elbow.

According to Westkaemper et al.,[1] the time to full recovery from the palsy after surgery ranged from 9 days to 6 months (average 10 weeks). There was no relation

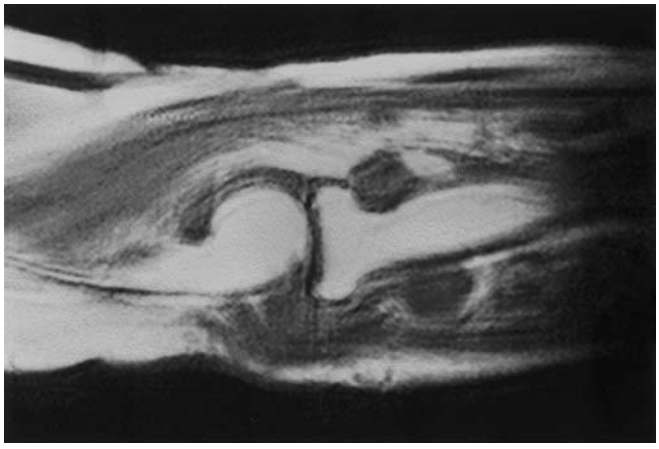

Fig. 6. T1-weighted magnetic resonance imaging (MRI) scan

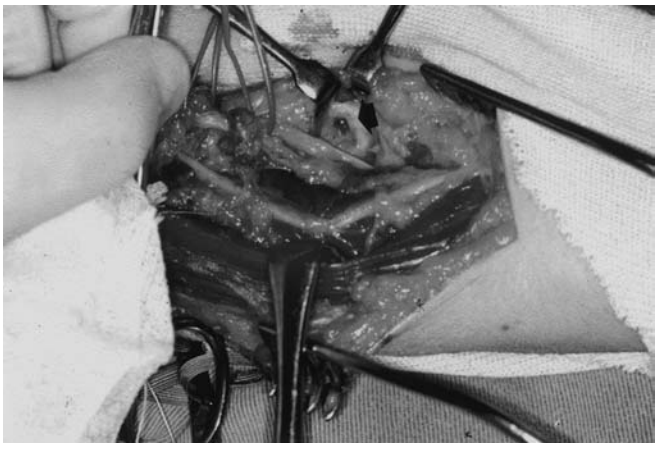

Fig. 9. Synovial fluid in the cyst (*arrow*)

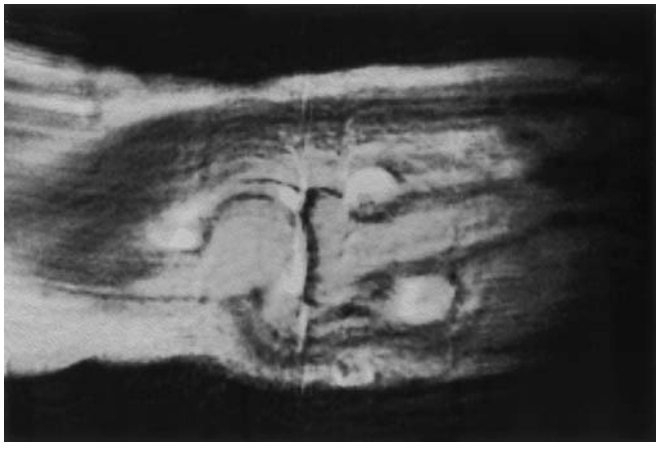

Fig. 7. T2-weighted MRI scan

Fig. 10. Extension of the right wrist 3 months after nerve decompression

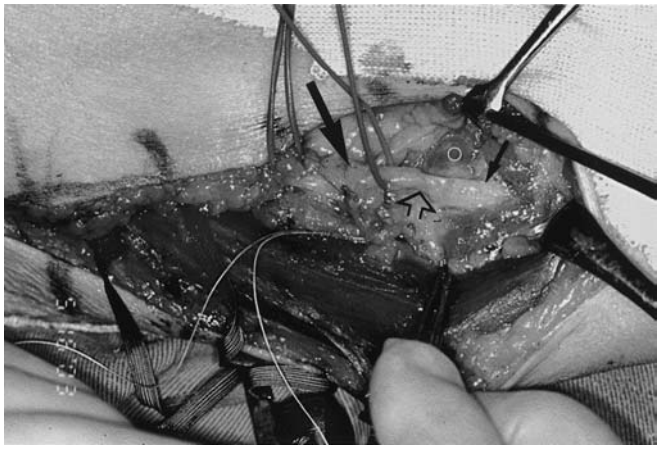

Fig. 8. Synovial cyst (*circle*), interossseous nerve (*thin black arrow*), the arcade of Frohse (*thick black arrow*), and constriction of the PIN (*open arrow*)

Fig. 11. Extension of the thumb and fingers 3 months after nerve decompression

between the duration of the PIN palsy and the time until full recovery. Surgical decompression yields consistently good results when the patients are diagnosed within 5 months. Our patient noted full recovery 3 weeks after nerve decompression.

Both the anterolateral and posterolateral approaches have been recommended for decompressing the posterior interosseous nerve. With PIN palsy associated with a rheumatoid synovial cyst, however, the PIN is trapped between the synovial cyst and the arcade of Frohse.[4,9] Hence, the anterolateral approach has the advantage of reaching the arcade of Frohse more easily than the posterolateral approach.[1,4,9]

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References

1. Westkaemper JG, Varitimidis SE, Sotereanos DG. Posterior interosseous nerve palsy in a patient with rheumatoid synovitis of the elbow: a case report and review of the literature. J Hand Surg [Am] 1999;24:727–31.
2. Chang LW, Gowans JDC, Granger CV, Millender LH. Entrapment neuropathy of the posterior interosseous nerve: a complication of rheumatoid arthritis. Arthritis Rheum 1972;15:350–2.
3. Rosen I, Werner CO. Neurophysiological investigation of posterior interosseous nerve entrapment causing lateral elbow pain. Electroencephalogr Clin Neurophysiol 1980;50:125–33.
4. White SH, Goodfellow JW, Mowat A. Posterior interosseous nerve palsy in rheumatoid arthritis. J Bone Joint Surg Br 1988;70:468–71.
5. Roth AI, Stulberg BN, Fleegler EJ, Belhobek GH. Elbow arthrography in the evaluation of posterior interosseous nerve compression in rheumatoid arthritis. J Hand Surg [Br] 1986;11:120–2.
6. Ishikawa H, Hirohata K. Posterior interosseous nerve syndrome associated with rheumatoid synovial cysts of the elbow joint. Clin Orthop 1990;254:134–9.
7. Marmor L, Lawrence JF, Dubois E. Posterior interosseous nerve palsy due to rheumatoid arthritis. J Bone Joint Surg Am 1967;49:381–3.
8. Millender LH, Nalebuff EA, Holdsworth DE. Posterior interosseous-nerve syndrome secondary to rheumatoid synovitis. J Bone Joint Surg Am 1973;55:753–7.
9. Leffert RD, Dorfman HD. Antecubital cyst in rheumatoid arthritis: surgical findings. J Bone Joint Surg Am 1972;54:1555–7.