



Case Report

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Bilateral Isolated Third Metacarpophalangeal Arthritis at Long-Term Follow Up After Bilateral Wrist Fusion

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Abstract

Total wrist fusion is an established surgical option for the management of severe wrist arthritis. Long-term sequelae of wrist fusion are numerous and incompletely understood. The following case documents a patient who developed third metacarpophalangeal (MCP) joint arthritis following radiocarpal wrist fusion with a plate and screw construct from the radius to the third metacarpal. An MCP arthroplasty was subsequently performed and outcomes reported. This case report outlines the need for further study of the force transmission through and motion of the MCP joint following a radiocarpal wrist arthrodesis.

Introduction

Total wrist fusion or radiocarpal arthrodesis is a mainstay treatment for arthritic wrist pain. Arthrodesis has been utilized for the surgical management of advanced arthritis in the radiocarpal joint and midcarpal joints since the early 1900s [1]. When successfully performed, this procedure provides pain relief and increased strength via wrist stability at the expense of motion [2]. Wrist arthrodesis is the definitive surgical management for symptomatic wrist arthritis where limited motion may already be present. Despite the emergence of total wrist arthroplasty (TWA) in the 1970s, wrist arthrodesis remains a common procedure. TWA and radiocarpal arthrodesis have similar indications and outcomes, including pain relief and return to function [3]. The complications of a radiocarpal arthrodesis are frequently preventable and often temporary. These include surgical site infections, symptomatic hardware, impaction, impingement, intra-operative nerve injuries, post-operative neuritis, as well as the development of adjacent joint arthritis, specifically the distal radioulnar joint (DRUJ) and trapeziometacarpal joints [4]. At long term follow-up, progressive arthritic changes were identified in nearly one third of patients [5]. However, arthritic changes of the MCP joint following total

wrist arthrodesis have not been reported in the literature. This case report presents a patient with symptomatic bilateral third MCP osteoarthritis following total wrist arthrodeses performed in the 1990s. The goal of this report is to inform hand surgeons of a potential long-term complication after radiocarpal arthrodesis and to direct future biomechanical studies on MCP force transmission and motion.

Case Report

A 77-year-old right-hand-dominant male presents with bilateral hand cramping and long finger pain. Patient is a non-smoker, retired, and denies a medical history of gout or inflammatory arthropathy. The patient previously sustained bilateral distal radius fractures 20 and 25 years prior to presentation. His fractures were managed surgically and complicated by persistent pain, degenerative changes of the wrist, and instability. Ultimately the patient elected to proceed with bilateral radiocarpal fusions utilizing a plate and screw construct extending from the distal radius to the third metacarpal, both of which went on to successful union. The patient reported resolution of his arthritic wrist symptoms and recalled no peri-operative or post-operative complications and satisfactory bilateral

upper extremity function for nearly 20 years following his wrist fusions. Prior to his presentation, he experienced cramping and pain isolated to the left third MCP joint exacerbated by prolonged activity and pain that interferes with sleep. He attempted bracing, activity modification, and topical and oral anti-inflammatory medications without significant relief. Intra-articular MCP joint injections provided short term pain relief. However, his symptoms impacted his ability to perform certain activities of daily living and prevented him from engaging in pursuits such as woodworking and gardening.

Examination of the left upper extremity revealed a well-healed, midline dorsal wrist incision. The extremity was neurovascularly intact with full range of motion of his digits, including all MCP joints. Strength testing showed 4/5 grip strength, 4/5 APB, and 5/5

interossei muscle strength. Tenderness to palpation at the third MCP joint with associated swelling was noted. The provocative tests for carpal tunnel syndrome were negative. No masses, skin wounds, or other evidence of injury to the hand or wrist was identified. Examination of the right upper extremity revealed similar findings with less severe tenderness to palpation at third MCP joint.

Bilateral PA, lateral, and oblique radiographs (Figure 1) were obtained demonstrating diffuse degenerative changes of bilateral hands with severe osteoarthritic changes at the third MCP joints bilaterally. Long finger MCP joints featured large osteophytes, joint space narrowing, subchondral sclerosis, and cyst formation. Images demonstrated appropriate alignment of the plate and screw fixation from the radius to the third metacarpal and a solid fusion mass without hardware complications, lucency, or fracture.



Figure 1: Pre-operative PA radiograph of bilateral hands demonstrating previous bilateral wrist fusion constructs and advanced degenerative changes of the third MCP joints bilaterally.

The patient was diagnosed with bilateral long finger MCP joint osteoarthritis. Following discussion with the patient, the patient elected to proceed with a left middle finger MCP joint arthroplasty using a flexible silicone prosthetic.

Via dorsal midline approach, collateral ligaments were found and preserved. A constrained silicone elastomer joint replacement was inserted. Stability and adequate range of motion were confirmed, incision closed, and the procedure was completed

without complication. Patient was splinted post-operatively with instructions to initiate hand therapy at 2 weeks.

At final follow up, examination of the left hand revealed well-healed incision without instability or loss of motion at this MCP joint. The long finger had recovered full preoperative range of motion. He reported resuming activities including yard work and gardening without pain. Post-operative radiographs were obtained at 2 weeks (Figure 2).



Figure 2: Post-operative left hand radiographs following left third MCP joint arthroplasty with silicone prosthetic.

Discussion

MCP arthritis is a potential long-term complication following total wrist arthrodesis. There are many known complications of wrist arthrodesis, the majority of which occur in the immediate post-operative period and are largely avoidable by improving patient selection, surgical technique, or postoperative care [5]. Most common complications include surgical site infections, carpal tunnel syndrome, and pain related to prominent hardware, skin irritation, or extensor tendonitis and even attritional rupture [4]. Considerable data exists cataloguing and describing the long-term outcomes of wrist arthrodesis. Multiple studies have reviewed wrist arthrodesis cases, following patients up to thirty years after operation. Extended follow-up studies report positive patient-reported outcomes with over 90% patient satisfaction. Complications are not uncommon but are largely limited in their effect and duration. However, baseline functionality did not return in many patients, even in the absence of complications. The most common functional limitations included opening doorknobs or opening sealed jars [6, 7]. These difficulties and other complications rarely require surgical correction. Nearly 70% of patients who undergo a wrist arthrodesis do not require a secondary surgery within 20 years of the index operation [7].

Adjacent joint arthritis is not mentioned as a common complication in these studies; however, its occurrence is well-documented. Two additional studies monitoring the long-term consequences of total wrist arthrodesis estimate the prevalence of adjacent joint arthritis between 19-23% [8, 9]. These reports do not mention MCP joint arthritis. Adjacent joint arthritis most commonly involves the distal radioulnar joint. In limited wrist fusions, the trapeziometacarpal and midcarpal joints are the most effected. MCP joint arthritis remains poorly described in the literature. Overall, arthritic complications appear to be more prevalent in midcarpal wrist fusions versus total wrist fusion [4].

Specific limitations require discussion in regard to the case presented. Due to the isolated nature of this case, determination of causality is presumptive. The bilateral nature of the MCP arthritis following surgery indicates shared pathophysiological process. However, osteoarthritis is a common condition among elderly patients and selective joint involvement could be related to other patient-specific and lifestyle factors. MCP arthritis following wrist arthrodesis could be unreported in the literature. Very few patients have documented long term follow-up, making the prevalence

of this complication very difficult to estimate. Additionally, it is possible that physicians managing patients with adjacent MCP arthritis did not connect their findings to a past procedure. The arthritic pattern has not been reported in literature in association with total wrist fusion, so correlation could be overlooked.

Conclusion

Adjacent metacarpophalangeal joint arthritis serves as a potential complication of total wrist arthrodesis using a plate and screw construct. Hand surgeons and physicians following patients who have undergone this procedure should consider the possibility of MCP joint arthritis development. These findings suggest an alteration in the biomechanics, stress, and load across the affected MCP joint that should further be explored with biomechanical testing.

Conflicts of interest

None.

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