Surgical treatment of an intrinsic plus contracture of the hand secondary to Parkinson’s disease

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ABSTRACT

While uncommon, contractures can be associated with Parkinson’s disease. The ongoing muscle spasticity associated with this condition could make the results of surgical intervention less predictable. We present a novel case demonstrating the utility of the intrinsic release procedure in a patient with intrinsic plus contractures related to Parkinson’s disease.

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Introduction

An intrinsic plus contracture is a result of an imbalance between the intrinsic and extrinsic muscles of the hand, with the contracted intrinsics overpowering the weaker extrinsics. This results in the characteristic finding of MCP flexion and PIP and DIP extension, commonly referred to as intrinsic plus hand.

Patients with intrinsic plus contractures often present with difficulty gripping large objects. Inspection of the joint reveals intrinsic plus hand characterised by MCP joint flexion and PIP and DIP joint extension. The intrinsic tightness test developed by Bunnell can be used to differentiate intrinsic plus contractures from other related conditions [1].

Intrinsic plus contractures are known to arise secondary to Parkinson’s disease (PD) [2], though the incidence of these contractures is probably low [3]. The exact aetiology of the contractures is not known, but it is thought that they stem from the characteristic spastic over-activity of the small muscles of the hand [4]. There has been very little study regarding the responsiveness of these patients to surgical interventions.

Case report

A 60 year-old man with history of PD presented with a left hand contracture for 4 years. Over this time, his left hand slowly began to assume a contracted position. It progressed to the point that he could no longer actively extend his left long, ring, and small fingers. He denied any numbness or tingling. The patient took Amantadine and Sinemet for his Parkinson’s disease.

Examination of the hand revealed tremor and rigidity consistent with PD. The hand was held in intrinsic plus position with the MCP joints of the long, ring, and small fingers at 90° of flexion and hyperextension of the PIP and DIP joints (Figure 1). Some ulnar deviation at the level of the MCP joints was also noted. The patient was unable to actively flex or extend the affected fingers at the MCP joints. The hand could be passively opened to about twenty degrees shy of full extension. The patient was able to fully flex and extend both the PIP and DIP joints. Bunnel test was mildly positive, though slightly obscured due to dystonia caused by Parkinson’s disease. Sensations were intact to light touch throughout the median, ulnar, and radial nerve distributions. Radial pulses were 2+ with brisk capillary refill.

Therapy for an intrinsic plus contracture was initiated conservatively in the forms of occupational therapy, extension bracing, and botox injections. Laboratory testing including CBC, ESR, CRP, RF, ANA, and anti-CCP was done to rule out rheumatological conditions. After initial interventions failed to improve the patient’s condition, the patient was consented for surgery.
At surgery, the first finger addressed was the long finger of the left hand. A longitudinal incision was made over the proximal phalanx curving around the MCP joint. A distal and proximal intrinsic release was performed on the radial side of the finger (Figure 2). The volar capsule was also gently released by sliding a Freer elevator around the finger in a proximal direction from the same dorsal incision. In a similar fashion, a distal intrinsic release, proximal intrinsic release, and volar capsulotomy were also performed on the ulnar side of the finger. Next, an extensor tendon centralisation was performed to correct the patient’s ulnar deviation. At the level of the MCP joint, the extensor tendon was found to be in an ulnarly subluxed position. As a result, the radial sagittal bands were very stretched out. Extensor tendon stabilisation was performed with non-absorbable PDS suture. In a similar manner, the fourth and fifth fingers were then addressed. A distal intrinsic release, proximal intrinsic release, and volar capsular release were performed on both sides of each finger, followed by extensor tendon centralisation of each finger.

After surgery, the fingers were immobilised using a volar splint with the MCP joints in neutral position and the PIP and DIP joints in full extension. At 1 week post-op, the patient was placed in a volar splint holding the wrist, MCPs, PIPs, and DIPs all in full extension. At 4 weeks post-op, the patient still exhibited about ten degrees of hyperextension of the IP joints. At this point, he was placed in a brace that freed the PIPs to allow him to work on range of motion. He also attended occupational therapy sessions that focussed on improving the range of motion of the IP joints. The motion protocol consisted of tendon gliding exercises, active digit extension, passive digit flexion, wrist range of motion, and finger isometric strengthening. At the 2-months mark, the patient was fitted for an Orthoplast splint holding his MCPs in extension and an oval-8 splint to prevent hyperextension of the PIP joints. This protocol was designed to strike a delicate balance between preventing stiffness while at the same time using splints to ensure that the patient’s previous deformities did not recur.

The patient eventually demonstrated significant improvement in motion and function. At the 3-months mark, the patient exhibited active flexion from zero to 55 degrees (Figure 3). The hand and MCP joints could be opened to full extension passively. Hand grip strength was 44 lbs. as measured by a Jamar test.

**Discussion**

Though contractures of the hand in Parkinson’s disease have been documented in the literature, the surgical outcomes of these patients are largely unknown. A concern in this case was that the patient’s ongoing muscle spasticity would result in postoperative recurrence of the contractures and failure of the intervention.
Reinholdt and Fridén evaluated the functional effect of the distal ulnar intrinsic release procedure in intrinsic tightness associated with tetraplegia. This is relevant to our case because, like with Parkinson’s disease, the probable mechanism for contractures in tetraplegia is muscle spasticity. In a sample of seventeen patients, it was found that the distal intrinsic release reduced intrinsic tightness completely in all patients. Range of motion was improved at a statistically significant level. The effects of treatment remained intact 6 months after surgery [5]. The overall positive outcome of this case supports the findings of this study.

In conclusion, surgical management can provide great benefit for patients with intrinsic plus contractures related to Parkinson’s disease. Management of intrinsic plus contractures results in better gripping ability and an increased quality of life for the patient. This is especially important because many patients with PD already deal with significant functional impairments.

Disclosure statement
No potential conflict of interest was reported by the authors.

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