Treatment of Bowler's Neuroma with Digital Nerve Translocation

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Abstract Bowler's thumb presents as paresthesias or a neuroma involving the ulnar digital nerve of the thumb. Over 95 million people enjoy bowling worldwide with nearly 3 million certified league bowlers in the United States. While the incidence of Bowler's thumb is unknown, it is an unrelenting nuisance for bowlers, and symptoms can be severe enough to prevent further sport participation. The condition can be managed nonoperatively with rest and splinting, but successful nonoperative treatment frequently requires discontinuation of bowling. The pressure on athletes to resume sports participation sooner and the possibility of nonoperative treatment failure mandate the need for development of a dependable surgical procedure for this condition. We present a case report of a successful surgical treatment by transposing the ulnar digital nerve dorsal to the adductor pollicis. The patient returned to manual labor and resumed bowling and is symptom free 3 years postsurgery.

Keywords Bowler's thumb · Bowler's neuroma · Translocation · Digital nerve

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Introduction

Bowler's neuroma affects tenpin bowlers who put spin on the bowling ball by keeping their thumb in the thumb-hole until the last moment of release. The clinical presentation involves paresthesias, hyperesthesias, possible changes in two-point discrimination, and a thickened digital nerve on palpation [2, 5–7, 10]. Previous case series have noted histological changes of extensively proliferated scar tissue that engulfs the nerve fascicles [4]. Histological analysis of bowler's neuroma also shows significant atrophy of the nerve fascicles and separation of the fascicles by fibrosis. In addition, electrophysiologic findings have been noted in patients with digital neuropathy of the thumb [9, 10].

Within the bowling community, experts have purposed widening the holes on the ball, using protective padding, changing techniques, or wearing splints as effective treatment measures. Most cases of bowler's neuroma can be treated conservatively with rest and adaptive devices or techniques, but the increased need for competitive bowlers to minimize the time away from the sport dictates a need for a definitive, quick, and successful treatment [8, 11].

The literature regarding bowler's neuroma consists of case reports and small series of patients mostly treated with conservative measures [8]. For those patients who fail conservative treatment, surgical options included various procedures involving the ulnar digital nerve of the thumb to include neurectomy, neurolysis, and translocation. Of particular note, Belsky et al. and De Smet et al. describe cases of a bowler's Neuroma treated with translocation of the ulnar digital nerve dorsal to the adductor pollicis [1, 2]. We present a similar case successfully treated with dorsal translocation of the ulnar digital nerve of the thumb which requires the transection of the adductor pollicis insertion site and the subsequent reattachment. Our procedure differed

Figure 1 Location of neuroma delineated by ovoid mark on volar side of drawn out incision site.

slightly from previously described techniques in the use of a mini-Mitek™ bone anchor to reattach the adductor pollicis.

Case Report

A 20-year-old male, professional league bowler, presented with a 2-year history of a painful lump on the volar aspect of his thumb which had increased in size to 1 cm. The patient was not able to continue to bowl secondary to digital swelling. He denied any numbness or tingling but noted a “zing” into the tip of his thumb whenever he bumped the mass. An outside workup consisted of an magnetic resonance imaging and X-ray, and the patient was referred with a diagnosis of a giant cell tumor versus a ganglion cyst. On physical examination, a small, mobile, palpable mass on the volar aspect of the right thumb just proximal the

Figure 3 Placement of bone anchor suture after transaction of adductor pollicis and retraction of ulnar digital nerve volarly.

interphalangeal joint was noted. There were no motor or sensory deficits. The diagnosis of bowler's neuroma was made. The patient had a strong interest to continue bowling, and translocation of the ulnar digital nerve was proposed.

At operation, a mid-lateral incision was made just volar to the palpable mass (Figs. 1 and 6). The extensive adherent connective tissue was freed up under loupe magnification to mobilize the nerve (Fig. 2). The adductor pollicis was then taken down at its insertion (Figs. 3 and 7). The ulnar digital nerve was transposed dorsally, and the adductor pollicis is reattached volar to the nerve using a mini-Mitek™ bone anchor (Figs. 4 and 8). The final appearance of the operative field with the bone anchor sutures tied down is illustrated in Fig. 5. The patient's uncomplicated postoperative course allowed for the patient to resume his job as a television delivery person 5 weeks postsurgery and bowling

Figure 2 Penrose drain around adductor pollicis and neuroma of ulnar digital nerve marked with purple marking pen in middle of operative field.

Figure 4 Dorsal translocation of ulnar digital nerve (red vessel loop around it) and reattachment of adductor pollicis using bone anchored sutures.

Figure 5 Final appearance of operative field with bone anchored sutures tied down and ulnar digital nerve (*red vessel loop around it*) translocated dorsally.

in 5 months. He reported no recurrent symptoms and continues to bowl 3 years postoperatively.

Discussion

The largest series of patients with bowler's neuroma (Fig. 6) is from the Mayo Clinic which includes 17 patients. In this review, eight patients were treated with conservative management. These patients were followed from 3 months to 4 years after diagnosis. Patients who stopped bowling

Figure 6 Illustration of the location of the bowler's neuroma.

Figure 7 Illustration of the transection of the adductor pollicis.

completely demonstrated marked improvement compared to those who attempted to resume bowling. Also, those who did return to bowling required alteration in the grip or thumb-hole placement to effectively participate. Seven underwent a surgical procedure. Of these seven patients, two were re-operations after failed neurectomy performed elsewhere, two digits were explored to establish a diagnosis and three were operated on secondary to persistent or recurrent symptoms after failed conservative management. The two re-operative patients were treated with neuroma re-excision. Of the two patients who underwent digital exploration, one underwent neurolysis, while the other patient had proliferative synovitis and was treated by synovectomy and neurolysis. Of the three operative patients who had conservative treatment, one was treated with neurectomy and primary repair, another with neurolysis, and the last with neurolysis and simple translocation of ulnar digital nerve. Of the seven who underwent

Figure 8 Illustration of the reattachment of the adductor pollicis with the ulnar digital nerve transposed dorsally.

surgical treatment, six returned to bowling within 2 years, and one was lost to follow-up [4].

Additional case reports range from one to three patients per publication. The second largest series of patients is from Duke in 1972, which includes two patients, two treated by neurolysis, and one was treated nonoperatively. Of the two patients who underwent neurolysis, one had to discontinue bowling secondary to recurrent symptoms, and the other required 22 months to return to bowling [7]. There is another report of a patient treated with neurolysis in 1970 at the Lahey Clinic who returned to bowling 4 months later [6]. A more recent report from the Cleveland Clinic in 2004 describes two patients which were treated nonoperatively, both of which returned to bowling within 4 months [10].

Dunham et al. describe two additional cases of simple transposition. Both patients underwent neurolysis and transposition of the ulnar digital nerve of the thumb. They describe placing a suture which tacked subcutaneous tissue to adjacent fascia, medial to nerve to create a more medial channel for the nerve in one patient and with several 7-0 silk sutures attaching the epineurial sheath to the subcutaneous tissue in the other [5].

Some have proposed that protecting the nerve with muscle would lead to more predictable outcomes. In 1980, Belsky and Millender describe a case of Bowler's thumb in a professional baseball treated by covering the nerve with muscle by translocation of the ulnar digital nerve dorsal to the adductor pollicis (Figs. 7 and 8). The patient returned to baseball without recurrent symptoms [1]. De Smet et al. of Belgium performed the same successful procedure in a bowler with a neuroma nearly two decades later. They, like Belsky and Millender, transected the adductor pollicis insertion and re-approximated the severed tendon with sutures. This patient was able to return to work in 5 weeks, to bowling in 2 months, and was symptom free at 1 year [2]. Our procedure differed slightly from Belsky's and De

Smet's technique in the use of a mini-Mitek bone anchor to reattach the adductor pollicis but had similar results.

The nature of sports and need to return to practice as soon as possible leaves competitive bowlers yearning for a fast and reliable option. Unfortunately, the surgical literature fails to provide a comprehensive comparison of successful surgical procedures for bowler's neuroma. Clearly, neurectomy leads to significant sensory loss and is no longer a viable treatment option. Neurolysis alone or in combination with simple translocation has proved successful in patients who wish to resume bowling. Similarly, our case of a more complex dorsal translocation demonstrated a quick return to work activity and bowling and may be utilized in patients who fail conservative treatment or those wanting a quick return to bowling.

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