Bowler's Thumb: Diagnosis and Treatment
A REVIEW OF SEVENTEEN CASES

BY JAMES H. DOBYS, M.D., ROCHESTER, MINNESOTA, LIEUTENANT COLONEL
EUGENE T. O'BRIEN, MEDICAL CORPS, UNITED STATES AIR FORCE; RONALD L.
LINSCHEID, M.D., AND GEORGE M. FARROW, M.D., ROCHESTER, MINNESOTA

From the Mayo Clinic and Mayo Foundation, Rochester

Bowling is a popular sport in America, with at least 20,000,000 regular participants. The medical problems associated with this sport have not been analyzed, as far as we know, but bowlers, like most sports enthusiasts, tend to forget their difficulties between symptomatic episodes or alleviate symptoms by changing their technique. Although many bowlers cease participating if changes in technique do not relieve discomfort, a surprising number continue despite significant difficulty. Undoubtedly, bowling is associated with physical problems in many regions of the body, but a consistent and common problem is related to the hands. Generally, the long and ring fingers are slightly enlarged and their interphalangeal joints, particularly the proximal ones, are enlarged, ache mildly, and are slightly stiff. The thumb may undergo adaptive changes similar to those seen in the other digits which are inserted in the holes of the ball, but the thumb is more likely to have a broken nail, skin irritation about the nail, blistered, calloused, or cracked skin elsewhere on the thumb, and scarring or proliferative changes in its subcutaneous structures. These problems are so well known that special preparations to protect the skin and special devices to protect the inserted digits, particularly the thumb, are advertised in all the trade journals. Technical solutions to these difficulties are concerned primarily with the size, spacing, fit, and slope of the holes in the ball, and with the grip and delivery used. An even more serious problem in these bowler's thumb lesions is the development of a type of traumatic neuroma characterized by proliferation of the fibrous tissues around and within the digital nerve. This more serious problem of bowler's thumb probably can be avoided if the thumb is never completely inserted into the thumb hole of the ball (insertion of three-quarters of the thumb is recommended). Another common remedy is to backset the thumb hole to increase the extension-abduction stance of the thumb. The cause of the difficulty seems to be friction between the thumb and the ball associated with repeated insertion and withdrawal of the thumb during bowling.

Our Series
During the past eight years, more than twenty-five patients were seen with nerve-related complaints on the web side of the thumb. Seventeen of these patients were bowling enthusiasts and most of them bowled five times a week or more. Their symptoms initially were pain and sensitivity over the nerve and hyperesthesia in the region of the distribution of the nerve. Atrophy of the overlying skin or callous formation was common, and subcutaneous scarring was usual. Often the fibrosis and...
hypertrophy involved all tissues down to and including the flexor-tendon sheath. A lump developed in all cases. Tinel's sign usually was positive and, in some thumbs, the sensitivity became so exquisite that the patient could not tolerate any contact with the affected region. Frequent paresthesias and hypesthesias, as well as occasional changes in two-point discrimination on the web aspect of the thumb, were noted. The involved nerve was thickened and firm to palpation, and when it was visualized at operation it was greatly enlarged and, in one thumb, redundant (Fig. 1).

If the condition was mild, the symptoms cleared up with rest and cessation of the aggravating trauma. In the moderately advanced cases, use of a plastic thumb guard (Fig. 2) to prevent trauma to the region was effective, the symptoms resolving and normal sensation returning to the thumb after the guard had been used for six weeks to six months. However, this device and similar ones are inconvenient, and patients dislike them.

Of the seventeen patients in our series, two were lost to follow-up, eight were relieved by conservative measures, and seven were operated on, one or more times. Of the seven patients operated on, two underwent operation because of residual symptoms following excisional surgery done elsewhere; two, to establish a diagnosis; and three, because of persistent or recurring symptoms despite conservative treatment. The two patients lost to follow-up were seen once and were advised regarding the recommended protective measures. The other eight were seen more than once, with the time-span ranging from a few months to four years. Those who discontinued bowling had little further difficulty, but of those who did not, approximately half had mild difficulty which required somewhat diminished participation or further alterations of grip or thumb-hole placement.

In the patients operated on, results were also satisfactory despite the different preoperative problems. There were two patients who had a typical bowler's thumb problem originally, as ascertained from their history and review of the histopathology of their original lesion. They were first seen at our clinic because of a residual painful traumatic neuroma secondary to excisional surgery for the original perineural fibrosis. Their symptoms were relieved by the customary technique of dividing the injured nerve again at a more proximal level and in uninjured tissues. This procedure, of course, did not improve the condition of two patients.

Two patients underwent excisional surgery for the original perineural fibrosis. However, the other part of the neuroma, which also involved the digital nerve, was not excised. In one case, the neuroma was excised from the sheath on the radial side of the first dorsal interosseous muscle, and in the other case, the neuroma was excised from the sheath on the digital nerve. The symptoms were relieved by the customary technique of dividing the injured nerve again at a more proximal level and in uninjured tissues. This procedure, of course, did not improve the condition of two patients.

Of the three patients operated on, one was treated by excisional surgery, and the other two were treated by the customary technique of dividing the injured nerve again at a more proximal level and in uninjured tissues. The patient treated by excisional surgery had moderate symptoms, and the other two patients had mild symptoms which improved significantly after the procedure. The two patients treated by excisional surgery had moderate symptoms, and the other two patients had mild symptoms which improved significantly after the procedure.

Case 1. In 1964, a bowler's thumb developed on the palm. At that time, the patient wore a bowler's thumb guard. After several months, the symptoms subsided, and the patient stopped using the guard. However, the symptoms recurred after a few weeks. The patient was advised to wear the guard again, but he continued to experience symptoms. The patient was advised to stop bowling, but he continued to do so. The symptoms persisted, and the patient was advised to consult a specialist. The patient was referred to our clinic, where he was treated with conservative measures. The symptoms subsided, and the patient was advised to continue to wear the guard. The patient was followed up for six months, and the symptoms subsided.

Case 2. A typical bowler's thumb problem developed in the patient. The patient was treated with conservative measures, and the symptoms subsided. However, the patient continued to experience mild symptoms, and the patient was advised to continue to wear the guard. The patient was followed up for six months, and the symptoms subsided.

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of course, did not relieve the significant sensory defect on the thumb of these two patients.

Two patients underwent operation because of doubt regarding the correct diagnosis. Even though one patient gave a history of the sudden appearance of a mass and pain, a typical bowler's thumb with fibrosis was found. The surgical procedure in this patient involved careful neurolysis of the extraneural and epineural scar. However, the other patient who had a similar history not only had fibrosis around the digital nerve but also had chronic, proliferative synovitis which seemed to arise from the sheath of the flexor pollicis longus tendon. Excision of the synovial mass as well as careful neurolysis was accomplished with relief of symptoms.

Of the three patients treated because of persistent symptoms, two were seen before the thumb guard was devised and were not made comfortable simply by changes in their bowling patterns. One of these two patients underwent operation before it was known that there were extraneural and intraneural fibroses and that there were no detectable (except atrophy) in the neural fasciculi themselves. This patient, therefore, was treated by excision of the neuroma and primary repair. Although the result was acceptable, it was not as good as the ones after treatment by protection alone or after neurolysis followed by protection; in addition, return of sensory function was much slower. The second of these two patients was treated by neurolysis followed by protection and did well. The third patient in this group did not respond completely to conservative measures that included use of a thumb guard. Operation revealed that the nerve was so redundant that it was treated by neurolysis and by transfer to a new location; the result was good.

Of the seven surgical patients, six returned to bowling within two years. The seventh patient was lost to follow-up. Except for the seventh patient, all were examined postoperatively at intervals of one to six years, with a mean of four years. The two patients who had the nerve excised had no two-point discrimination: the patient treated by excision of the neuroma and repair of the nerve had two-point discrimination of eight millimeters; the other three patients had two-point discrimination of two to three millimeters, four to five millimeters, and five to six millimeters, respectively, on the ulnar side of the pulp of the thumb. Retrospective study of the seven patients suggested that adequate conservative therapy would have given satisfactory relief in all but two of these patients. One of them was the patient with associated proliferative synovitis. The other was the patient in Case 1 to be described.

Case Reports

CASE 1. In 1964, a twenty-seven-year-old man noted a painful lump at the base of his right thumb on the palmar aspect. His pain was aggravated by bowling, the activity which had precipitated his condition, and by his work, which involved the use of IBM cards. The patient wore a bowler's thumb guard for three months. During this time, his symptoms were relieved and the thickening and sensitivity in his thumb were considerably diminished. In addition, the two-point-discrimination distance on the web surface of the thumb went from more than ten millimeters to normal. However, symptoms returned whenever he discontinued using the thumb guard.

Surgical exploration was carried out in April 1967, and a thickened, redundant abnormal section of nerve (seven centimeters long) was found in scarred tissue which extended from the metacarpophalangeal to the interphalangeal joint level (Fig. 1). After removal of the scar and lysing of the nerve, the nerve was transposed to the opposite side of the thumb. After operation the thumb was protected for about three months; the patient then returned to his normal work.

When last examined in June 1968, he had normal two-point discrimination on the thumb and was again engaged in league bowling. However, Tinel's sign was elicited by percussion over the transferred nerve, which was still thicker and firmer than normal.

CASE 2. A twenty-eight-year-old right-handed machinist was seen in April 1969 because of a mass at the base of his right thumb. The mass had been present for one and a half years and had been gradually increasing in size. Tenderness and tingling in the thumb were noticed...
only during bowling. Confirmation of the diagnosis was desired by the surgeon; a preliminary trial of conservative therapy was not used. At surgery in May 1969, the diameter of the digital nerve on the web side of the thumb was two or three times normal along a segment approximately two to three centimeters in length and the nerve was rather firm. As much thickened epineurium as seemed safe to remove was excised during the neurolysis. The wound healed without incident, and a redrilling of the thumb hole in his bowling ball was recommended.

Examination in February 1971 revealed no complaints and full use of the thumb; the thumb hole of the bowling ball had been sloped and beveled at the point of contact. Palpation revealed that the nerve on the web side of his thumb was still thickened and firm. The patient also had mild hypesthesia, and the two-point-discrimination distance on the web side was five to six millimeters compared with three to four millimeters on the other side of the thumb.

Fig. 3-A: Digital nerve with a traumatic neuroma. Extensively proliferated fibrous tissue surrounds, separates, and engulfs nerve fascicles (hematoxylin and eosin, reduced from × 28).

Fig. 3-B: Thumb subcutaneous fat from a bowler's thumb. There is extensive fibrous reaction (hematoxylin and eosin, reduced from × 50).

Comment

The seventeen cases in our series, the two reported in the literature, and those described in an unpublished paper by Bassett, Minkow, and Goldner are the only ones documented as far as we can tell, although the lesion is probably common.

Usage has established the term neuroma for the similar lesion of Morton's toe and for this reason the term is a misnomer. The basic process does not involve hyperplasia of neural elements but rather a proliferation of perineural fibrous elements that surround and separate the nerve fascicles, which eventually are strangulated by the fibrous tissue and undergo atrophy (Fig. 3-A). This proliferation also extends into adjacent fascial and subcutaneous structures and may compromise the vascular supply (Fig. 3-B).

The digital nerve on the web side of the thumb is particularly vulnerable during bowling because it lies superficial to the sesamoid bone on this side within a thin layer of subcutaneous tissue. Although normally the nerve is mobile, it is easily trapped, since it is partly tethered by its branches to local skin areas. As scarring in the area increases, the nerve becomes more fixed and less likely to be displaced sufficiently to escape irritating pressures.
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This anatomical arrangement predisposes the area to similar changes as the result of any repetitive pressures, and patients with this condition due to other causes have been seen. By far the largest group to date are bowlers, however. It is not yet clear how many such patients will need surgery, but the percentage probably will be low if appropriate protection is used. In instances in which the surgeon suspects the diagnosis but elects to confirm it by exploration, best results are obtained by external neurolysis followed by protective measures. Most such patients do as well or better without surgery.

Summary

In the hands of bowlers, a traumatic neuroma of the digital nerve on the web side of the thumb may develop in association with fibrosis of the regional tissue. This condition may cause permanent disability if it is not diagnosed and treated early. Surgery can be of assistance when the symptoms are severe and intractable. However, if the condition is severe, surgery will probably never completely restore the thumb to normal. Therefore, early recognition and the prompt use of appropriate protective measures are important. The condition may be aggravated by changes in the local tissues, including tumors adjacent to the nerve. Presently, neither bowlers nor physicians are sufficiently aware of this serious problem, and its incidence is unknown.

References