Tibiofibular Synostosis in a Military Soldier

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Tibiofibular synostosis or heterotopic ossification within the interosseous membrane of ankle is an uncommon cause of ankle disability. Here we present a case of a 21-year-old young soldier who sustained a left ankle sprain about 5 years ago and was initially treated successfully by the conservative methods. Two years later, however, he suffered intermittently from an unexplained vague ankle pain, each time the symptoms occurred right after an active exercise, especially when he had exercised aggressively. After being a military recruit in 2000, his symptoms became progressively worse and exacerbated into severe pain, even at rest. We treated the patient with bed rest and put on analgesics for temporary relief of severe pain. In addition, we treated him with supportive tap and a progressive rehabilitating physical therapy. However, it was ineffective in spite of all efforts. The radiographs revealed that there was a mature distal tibiofibular synostosis. The patient received surgical excision of synostosis. Post-operation condition was satisfied to all concern and the result was found to be excellent during one-year follow-up.

Key words: ankle sprain, tibiofibular synostosis

INTRODUCTION

Ankle sprain is a common athletic injury and may result in chronic pain and a long term disability if not treated properly. It is a fact that the incidence of a new injury superimposed upon the old injured site is high. Although a tibiofibular synostosis followed by soft tissue injury to the ankle as a late complication is relatively uncommon. Nevertheless we present a case of distal tibiofibular synostosis. This patient is a young military soldier who had a long history of chronic ankle pain seeking for medical treatment. The patient was treated surgically by excision of synostosis and the result was excellent to all concern.

CASE REPORT

This is a 21-year-old male soldier who experienced an inversion-internal rotation injury to his left ankle while he was a student in a senior high school about 4 years ago. Initially he was treated conservatively by traditional herb application and somehow got a complete symptomatic relief. Two years later, he suffered intermittently from an unexplained vague ankle discomfort on his left lower extremity. Each time the symptoms occurred right after strenuous activity. Although his symptoms improved frequently after rest. After being a recruit in the navy, while at his first office visit to our hospital clinic, the patient brought himself with the chief complaint of left lower leg discomfort especially when there was a pain around his left ankle during the push-off phase of running. Physical examinations revealed that this is a well-built young male soldier in good health. The range of motion of left ankle is normal. While plantarflexing his ankle without gravity he felt tenderness in anteriorly to the distal third portion at the junction of tibia and fibula. During weightbearing and push-off phase of running, tenderness over his distal fibula was noted. Ankle inverts, everts, dorsiflexors and plantar flexors tested normal strength. External rotation test and squeeze test showed no significant finding. Anterior drawer test and talar tilt test of left ankle are negative. His neurovascular condition is also normal. No significant abnormality is found in the serological examinations. Roentgenograms of left leg and follow-up magnetic resonance imaging (MRI) demonstrated that there is a complete synostosis, about $\frac{3 \times 1.5 \times 1.5}{cm^3}$ in diameter, of distal tibia and fibula with compression to extensor hallucis longus and extensor digitorum longus tendons (Figs. 1, 2). After being a military recruit in 2000, his symptoms became progressively worse and exacerbated into severe pain,
Tibiofibular synostosis

Fig. 1 The radiograph reveals a synostosis between the tibia and fibula at the junction of the middle and distal third of the leg.

Fig. 2 The MRI shows a bony bridge between the tibia and fibula with compression to extensor hallucis and digitorum longus tendons.

We treated the patient with bed rest and put on analgesics for temporary relief of severe pain. In addition, we treated him with supportive tap and a progressive rehabilititating physical therapy. However it was proved to be ineffective, in spite of all efforts. Surgical excision of synostosis was performed 4 months after his first visit. Intra-operatively, there was a complete synostosis with ridge between tibia and fibula. It was exposed and excised under tourniquet control. Bone wax and thrombin-soaked gelfoam were applied to the raw cortical margin to control hemorrhage in order to prevent formation of the recurrence of new bone. Meticulous hemostasis was obtained prior to closure. Post-operatively, a dramatic improvement of leg pain during plantar flexion of ankle was noted and the patient became asymptomatics within 48 hours. No further medication was prescribed 2 days after surgical excision. He began active range of motion of ankle and resumed normal activity 2 weeks later. No recurrence of the symptoms and new bone formation was found during one-year follow-up.

DISCUSSION

Tibiofibular synostosis is a rare cause of disability. The causes of a tibiofibular synostosis are varied. The proximal variety is usually derived from congenital; the distal variety is mostly acquired, and almost uniquely reported to be a post-traumatic injury. Congenital tibiofibular synostosis may arise from intrauterine trauma, infection, focal inflammation or due to developmental arrest shortly after joint cavitation. Angular deformity, leg length discrepancy, and multiple hereditary exostoses have also been reported in conjunction with proximal tibiofibular synostosis. Posttraumatic tibiofibular synostosis has been described to occur mostly in the athletics, usually after a single or repeated ligamentous inversion sprains of the ankle and after direct blow to the lower leg.

In one series, the incidence of distal tibiofibular synostosis was 2% after Weber B fractures and 12% after Weber C fractures. The author found that there is no correlation with the use of a syndesmotic screw, and the synostosis developed relatively rather quickly, usually within 3 months of fracture. Another study had found that the absorbable polyester implants used to treat malleolar fractures seemed to be gradually establishing synostosis among other methods of internal fixation.

Tibiofibular synostosis may be a cause of lower leg pain in association with athletic activity or a cause of uncertain origin. Some clinical statistics indicated that initially the synostosis patient did not seek for medical evaluation by the physician probably owing to the paucity of symptoms. Shin splint-like pain as a result of synostosis secondary to stress fracture has also been reported. Compromised by the mass in the space of anterior compartment that caused anterior compartment-type symptoms of pain in the lower leg is possible. Wong and Weiner et al. have reported 2 asymptomatic cases in young children of proximal synostosis. Gamble et al. described a 3-year-old girl with...
proximal synostosis causing pain during athletic activity not until later in life. McMaster and Scranton et al.\textsuperscript{1,12} have reported on ten distal tibiofibular synostosis with minimal symptoms initially became disabling over the next 3 to 11 months.

The fibula is more than a static lateral strut for the ankle mortise or origin for muscles of the ankle and foot\textsuperscript{2,12}. In the studies of McMaster and Scranton et al. and Ogden et al., fibula bears one sixth of the force transmitted from the femur to the ground and that dissipates torsional stress generated by ankle motion\textsuperscript{1,12,13}. Severe inversion-internal rotation sprain of ankle with damage to the syndesmotic ligaments and interosseous membrane is a possible pathogenesis of distal tibiofibular synostosis\textsuperscript{2,6,12}. Ossification of the hematoma resulted in bony fusion of tibia and fibula and thus prevents normal ankle function. During midstance and preswing phase of gait cycle the fibula is normally pulled distally by plantarflexors of the foot as they absorb the force of impact and then initiate push-off\textsuperscript{2,14}. This downward movement serves to deepen the ankle mortise and tighten the interosseous membrane, stabilizing the ankle during maximum weightbearing and stress\textsuperscript{2,12,14}. Tibiofibular synostosis prevent the fibular descent on weightbearing and restrict the normal increase in width of the ankle mortise which occurs on dorsiflexion of the talus. Thus ankle pain developed because anterior talus can not fit into the ankle mortise\textsuperscript{2,12,17}.

A 14-year follow-up study\textsuperscript{9} suggested distal tibiofibular synostosis after ankle fracture usually give rise to few symptoms. It also demonstrated no radiological change in the ankle after one year and no progression of degenerative change. Their synostosis patients had normal or near normal function and range of motion of ankle and need no specific treatment. Whiteside et al.\textsuperscript{6} have reported 6 cases of distal tibiofibular synostosis in high performance athletes. Result is varied whether surgical excision was performed or not. McMaster and Scranton et al.\textsuperscript{2,12} have reported 10 cases of distal tibiofibular synostosis, the reliable results were obtained with surgical treatment except recurrence in 2 cases in their earlier study. They emphasized meticulous attention to hemostasis and the use of bone wax as essential technical points in preventing further recurrence.

According to previous studies, a trial of observation and conservative treatment initially seems appropriate to determine if pain will be chronic and allow maturity of the ossification\textsuperscript{1}. Surgical excision should be performed only in athletically active individual with progressive symptoms and disabling, and synostosis is mature on radiographs. As in myositis ossification, operative intervention during proliferating phase is contraindicated\textsuperscript{2,3}, which may recur early despite attention to surgical detail. To lessen the possibility of recurrence, meticulous hemostasis and use of bone wax and gelfoam can not be overemphasized.

REFERENCES
