PLANT THORN SYNOVITIS

MICHAEL SUGARMAN, DENNIS G. STOBIE, FRANCISCO P. QUISMORIO, ROGER TERRY, and VIRGIL HANSON

Five children with an inflammatory monarthritis due to penetration of the joint by plant thorns are presented. The clinical presentation was that of a transient acute synovitis followed by a relatively asymptomatic period, and later by chronic arthritis often after the thorn injury was forgotten. Histopathology demonstrated a granulomatous synovitis. Polarized light microscopy facilitated identification of the plant tissue within the synovium. Conservative medical therapy was ineffective, but surgical excision of the affected synovium resulted in normal joint function. The differential diagnosis of monarthritis in children is extensive, and awareness of this condition is necessary to elicit a comprehensive history and to avoid delay in treatment.

Foreign body synovitis due to penetration of the joint by plant thorns may be a significant cause of monarthritis, yet it has been infrequently reported. Awareness of this entity is necessary if a comprehensive history is to be elicited. The problem is compounded in that the differential diagnosis of monarthritis is extensive.

Five patients are presented with synovitis of the knee due to penetration by a plant thorn in which definitive therapy was often instituted late because of delay in establishing the correct diagnosis. We report our experience and propose the general term “plant thorn synovitis” for this category of joint inflammation in hopes of heightening physician awareness and thus of improving prospects for earlier definitive management. The rheumatologist and not the orthopedic surgeon is increasingly consulted, yet treatment is surgical.

MATERIALS AND METHODS

An index case was evaluated and treated prospectively in January 1975. Four additional cases were found after a retrospective review of the charts and pathologic specimens at the Children’s Hospital of Los Angeles over the preceding 5 years.

CASE REPORTS

Case 1

A 7-year-old boy was seen in the emergency room shortly after he fell and complained of a painful swelling of his
left knee. Aspiration of the joint yielded a yellow cloudy fluid with a xanthochromic supernate. The synovial leukocyte count was 18,900/mm³ with 96% polymorphonuclear cells. The glucose content of the joint fluid was 77 mg% with a concomitant blood glucose of 82 mg%. Mucin clot was good. Repeated cultures of the joint fluid were negative. X ray of the knee showed only evidence of effusion. The sedimentation rate was 30 mm/hour. Antinuclear antibody, rheumatoid factor, and antibody to DNA were negative.

The emergency room physician treated the patient as a case of traumatic arthritis. A cylindrical leg cast was applied. When the cast was removed 6 weeks later, the joint effusion was noted to be persistent, and a provisional diagnosis of juvenile rheumatoid arthritis was made. Over the next 3 months there was no response to aspirin therapy and only transient improvement with intraarticular triamcinolone. Radiographs at this time showed a lucent lesion in the femoral condyle surrounded by sclerotic reaction and epiphyseal overgrowth that had developed (Figure 1). Arthrotomy was performed 5 months after the initial injury and three pieces of palm thorn, 2 × 1 mm, were found in the synovium surrounded by marked synovial reaction.

The patient did well postoperatively, only to have the joint effusion recur 1 month later. The joint was reexplored and a complete synovectomy was performed. The surgeon found massive synovial membrane hypertrophy that had eroded the femoral condyle, causing a bony cavity measuring 1.5 cm in diameter. No retained palm thorn was grossly identified; however the histopathology disclosed a reactive granulomatous inflammation with foreign body giant cells. Within the central portion of some of the granulomas, microscopic evidence of vegetable tissue was found. This tissue was most readily identified by its anisotropic characteristic when viewed by polarized light (Figure 2) (1). The patient did well postoperatively.

Retrospectively, no history of thorn injury was elic-

ited. A year after surgery the patient was asymptomatic with normal joint function.

Case 2

A 5-year-old girl came to the emergency room complaining of a swollen, warm left knee. Two weeks earlier she had fallen on a palm frond. Her mother claimed that a thorn was removed intact from the subpatellar area.

Physical examination was normal except for effusion of the left knee. There was no warmth or tenderness of the joint. No puncture wound was found. X rays showed evidence only of a joint effusion. The leukocyte count was 11,800 cells/mm³ with 91% polymorphonuclear cells. Cultures of the joint fluid showed no growth. The leg was placed in a cylindrical cast. When the cast was removed a month later, the effusion persisted and the patient was admitted for further diagnostic evaluation.

She had a rectal temperature of 101.8°F, and her pulse was 130/minute. The left knee was warm, boggy, and swollen. Repeat synovianalysis revealed a joint fluid with a leukocyte count of 117,000 cells/mm³ with 90% polymorphonuclear cells. Mucin clot was poor. Cultures of the joint fluid grew staphylococcus albus that was coagulase negative. Synovial fluid glucose was 25 mg% with a blood glucose of 80 mg%. Skin tests for coccidiomycosis and tuberculosis were negative.

Methicillin was administered in a dosage of 8 g/day. Repeat joint fluid cultures became negative; however there was no significant clinical improvement. Arthrotomy and synovectomy were then performed, 11 weeks after the initial injury. At surgery the synovium was red, edematous, and thickened with pannus formation, but no foreign body was grossly identified. The operative impression was synovitis consistent with juvenile rheumatoid arthritis. The synovial biopsy, however, disclosed plant material surrounded by foreign body granulomas with many giant cells similar to that seen in Case 1 (Figure 3). Six months after surgery the patient was asymptomatic with normal joint function.
operative course was uneventful, and completely normal joint function returned.

Case 3

A 4-year-old girl had fallen on a palm frond 1 month before coming to the emergency room. She had an acute, painful swelling of her left knee which resolved within 3 days. A week later the pain and swelling of the knee recurred and continued until she presented 3 weeks later.

On physical examination she was afebrile, and the only positive findings were a hot, swollen, tender left knee with a 15° flexion contracture, and small puncture wounds over the medial aspect of the knee. Ten cubic centimeters of bloody joint fluid were aspirated; the mucin clot was poor and the white cell count was 33,000 cells/mm³ with 90% polymorphonuclear leukocytes. Gram stain of the joint fluid was negative but cultures grew paracolon (slow lactose-fermenting, gram-negative rod).

After a poor clinical response to intramuscular kanamycin, an exploratory arthrotomy was performed. Marked synovial membrane thickening was noted and articular cartilage was normal. No foreign body was found. However microscopic examination of the resected synovium showed a palm thorn 2 mm long surrounded by granulomas with foreign-body-type giant cells. Follow-up examination a year later showed full range of motion of the knee with no residual deformity.

Case 4

A 4.5-year-old girl knelt on a palm frond. A few hours later her left knee became swollen and painful. The swelling persisted and the patient was seen 2 months after the injury.

On examination she was afebrile with a swollen, tender knee. The range of motion in the knee was 20–100°. The quadriceps muscles were atrophic. There was a suspicious puncture wound over the lateral border of the knee. Arthrotomy disclosed inflamed hypertrophied synovium within which was found the tip of a palm thorn. The inflamed tissue was resected. Cultures of joint fluid were negative. The post-

Case 5

A 5-year-old boy fell into a palm tree and three thorns punctured the skin over his right knee. One week later the patient came to the hospital unable to bear weight, complaining of a painful, swollen knee held flexed at 90°. Aspiration of the joint yielded 7 cm³ of straw-colored fluid with a white cell count of 1,470/mm³ with 30% polymorphonuclear cells and 70% mononuclear cells. Cultures of the joint fluid grew alpha-hemolytic streptococcus.

At surgery a thorn measuring 3.8 × 0.4 cm was found embedded in the synovium and was removed. Postoperatively the patient was treated with penicillin and he has recovered fully.

DISCUSSION

The geographic distribution of plants influences the type and frequency of thorn injury. In England the black thorn (Prunus spinosa), a perennial shrub, is the most common cause of thorn injury (2). It is associated with an upper extremity arthritis occurring at pruning time. The date palm (Phoenix dactylifera and Phoenix canariensis) and sentinel palm (Washingtonia filifera) are the major offenders in our experience in southern California. One of our patients was injured by Yucca aloifolia, commonly called the “Spanish bayonet,” and others have even reported injuries from the common rose thorn (3). Palm fronds fall to the ground and their sharp tips become dry and brittle. If one kneels or falls on the frond, the brittle tip may penetrate and break off within the joint. Hence there is a clustering of injuries in late winter and spring, when the trees shed.

The clinical presentation of our patients was that...
of a transient episode of acute synovitis followed by a relatively asymptomatic period, and later by a chronic arthritis, often after the thorn injury has been forgotten. The etiology of the arthritis remained obscure until the family was directly questioned about a plant thorn injury, or until the histopathology of the synovium disclosed plant tissue. All of our patients were afebrile at initial presentation; however, 1 subsequently developed a fever. There were few systemic symptoms.

The synovial fluid was inflammatory in 3 patients, with a high leukocyte count and a predominance of polymorphonuclear cells. The fourth patient had a Group I fluid. Bacteria were cultured from the joint fluid in 3 patients. Organisms were probably introduced at the time of injury. The sedimentation rate was elevated in all, and did not correlate with the presence of infection. The initial radiographs showed evidence only of synovial effusions. However, Patient 1 developed a lucency in his femoral condyle with a sclerotic margin. The bone was invaded by inflamed and thickened synovial tissue. This case represents the “thorn-induced pseudo-tumor of bone” that has been described elsewhere (4–6).

Careful microscopic examination of the synovium was important because no foreign body was found at surgery in 2 patients. Vegetable tissue was identified microscopically by the presence of characteristically thick cell walls. Identification of plant tissue was facilitated by periodic acid Schiff stain as well as by viewing with polarized light. The synovium was diffusely inflamed with hyperplasia of the lining cells, and it was infiltrated with many chronic inflammatory cells, especially lymphocytes and plasma cells. Many granulomas with multinucleated foreign-body-type giant cells were identified. Other than the identifiable vegetable fibers, the histologic appearance resembled that seen in a variety of granulomatous synovitides, such as sarcoidosis, tuberculosis, and fungal diseases. However, all fluid and tissue specimens submitted for fungal and mycobacterial culture were negative.

The history of a preceding fall may mislead to an erroneous diagnosis of traumatic arthritis and thus delay proper therapy. The high synovial leukocyte count, a predominance of polymorphonuclear cells, as well as the chronic course should place this diagnosis in doubt. Alternately, the diagnosis of juvenile rheumatoid arthritis (JRA) may be entertained. One-third of the children referred to an arthritis clinic with a diagnosis of JRA had, in fact, other illnesses (7). It is difficult to differentiate the two entities without a history of a penetrating wound. About 30% of cases of JRA start as monarthritides, with the knee being the most common joint (8). Synovial analysis is helpful only in patients with positive bacterial cultures. In common with monarticular JRA are the elevated sedimentation rates, age distribution, and lack of systemic symptoms.

The treatment of palm thorn synovitis is surgical. Treatment with antiinflammatory agents such as salicylates and intraarticular steroids or with antibiotics alone in patients with superimposed bacterial infection is ineffective. If a history of thorn injury is described by a patient with undiagnosed monarthritides, we suggest that arthrotomy be performed to visualize the joint. Because plant fragments may be too small to be seen grossly, all inflamed synovium as well as the entry tract should be excised and examined carefully. Examination of sections with polarized light facilitates identification of plant tissue fragments. We advocate this aggressive approach because this is one type of arthritis that can be definitively treated with the expectation of complete return of joint function.

REFERENCES