FATIGUE FRACTURES OF THE LOWER TIBIA AND FIBULA IN THE SAME LEG

Report of a Case

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Since attention was focused on the subject by Burrows (1940) many fatigue fractures of the lower fibula have been reported. Fatigue fractures of the lower tibia, however, are uncommon. Singer and Maudsley (1954), describing five cases, could find only three previous examples in the literature. I can find no record of fatigue fractures affecting the lower thirds of the tibia and the fibula of the same limb at the same time.

CASE REPORT

A boy of sixteen years complained of pain over the outer side of the right ankle when he attempted to run. He had no discomfort when walking. When he was first seen the symptoms had already been present for five months. The pain was noticed first during a six-mile road run. Running was one of his main recreations and he usually went for a long run once a week. On this particular occasion he developed a pain in the region of the right ankle after running about three miles. He was unable to finish the course and walked home. The ankle became stiff and painful but after a day in bed and the application of strapping to the leg he was able to get about in relative comfort. A week later he resumed his usual activities but the pain recurred whenever he tried to run or even stand on tip-toe. There was no history of injury.

On examination the patient was tall and thin. There were thickening and tenderness in the region of the lowest third of the right fibula. The skin temperature was normal and there was no oedema. Ankle and tarsal movements were free and painless, but when asked to stand on tip-toe he complained of pain over the lower third of the fibula. Radiographs showed an old fracture of the lowest third of the right fibula two inches from the tip of the lateral malleolus (Fig. 1). There was expansion at the fracture site with a gap between the bone ends. The distal fracture line was concave and showed some sclerosis. There was rarefaction proximal to the fracture, with scattered calcification between the fragments.

Progress—The nature of the fracture was not clear at the time, and it was decided to put the leg in a below-knee walking plaster for a month and observe the progress of the lesion. It was thought that this was probably a fatigue fracture showing unusual indolence in uniting, but the possibility of its being a fracture through a chondroma or some such lesion was borne in mind. The plaster was removed after four weeks. The tenderness had disappeared from the lower fibula but now there were thickening and tenderness over the subcutaneous surface of the lowest third of the tibia. Radiographs revealed the presence of a transverse fracture of the lower tibia three and a half inches above the medial malleolus (Fig. 2). The fracture line was faint but there was unmistakable infraction of the lateral cortex. A faint band of sclerosis ran across the bone, and subperiosteal calcification extended up and down the medial cortex for about two inches. Re-examination of the previous films with a lens failed to show any abnormality in the tibia. On direct questioning the boy admitted that, after wearing the short plaster for two weeks, he had noticed discomfort in the lower part of the leg, especially when he turned sharply to either side.
Figure 1—Initial radiograph. Fatigue fracture of lower fibula. Tibia apparently normal. Figure 2—One month later. Fatigue fracture of the lower tibia.

Figure 3—Six months later. Note how the infraction on the lateral aspect of the tibia resembles the original fibular lesion. On the medial aspect the tibial fracture is consolidating. The fibula is slowly uniting. Figure 4—A year after first examination. Solid union of the tibia but with slight valgus angulation. The fibular fracture is united but not yet completely consolidated.
DISCUSSION

Further progress—Six months after his first attendance he reported discomfort over the lower tibia which gradually increased till he was unable to climb stairs without pain in the whole of the right leg. Tenderness had increased also and the skin over the fracture was warmer than normal. Radiographs showed that although there was satisfactory buttressing on the medial side of the tibial fracture the infraction on the lateral side had increased till it closely resembled the original fibular fracture, which was by now slowly uniting (Fig. 3). Because of his discomfort a second long-leg plaster was applied. This was kept on for a further two months. When it was removed the local signs of swelling over the tibia were found to have subsided. There was no tenderness over either fracture. Six weeks later he was symptomless. A year after his first being seen there was radiological evidence of union of both fractures. Although complete consolidation of the original fibular fracture had not yet taken place (Fig. 4). Clinically there was some residual bone thickening of the lower tibia which increased the girth of the leg at this point by a quarter of an inch. The fibular thickening had disappeared. Joint movements were unrestricted and the patient had resumed full normal activities. He was playing football and cycling but had not yet tried long distance running. It was notable that his height had increased in the year by about three inches.

Radiographs of the rest of the skeleton showed no abnormality of ossification of the epiphyses. Control radiographs of the hand showed no porosis. Blood examination was normal.

Treatment—A toe-to-groin walking plaster was applied and worn for two months. After its removal radiographs showed satisfactory progress in both the tibial and fibular fractures. Strapping was applied and a week later he stated that his leg was comfortable. He was kept under close observation and his activities were restricted. The thickening over the tibial fracture was now quite marked and tenderness was still present.

Fatigue fractures of the lower tibia and of the lower fibula follow a well defined pattern and this case is no exception. According to Burrows (1948) the young runner’s fracture in the lower fibula is found two inches or more from the tip of the lateral malleolus and in the middle-aged woman the fracture is through mainly cancellous bone about an inch lower down. Similarly in the lower tibia, where only eight fatigue fractures have been published, the elderly or middle-aged person sustains the fracture through the expanded lower end of the bone about two inches above the medial malleolus (Singer and Maudsley 1954) whereas when the fracture has occurred in young men it has been higher up the shaft (Blumenfeld 1943, Krause and Thompson 1943). The fractures in my case follow the now familiar pattern in both the tibia and fibula, being at the higher or young person’s level.

There can be little doubt that the tibial lesion was a true fatigue fracture. The radiological appearance conforms to Hartley’s (1942) description, with the band of sclerosis across the medullary space penetrated by the thin radiolucent line. Another characteristic of a fatigue fracture, according to Hartley (loc. cit.), is that the processes of destruction and repair are going on simultaneously. Here this is well shown by the early subperiosteal calcification on the medial side which proceeded to bone buttressing, and the infraction of the lateral cortex which extended to become a large area of bone absorption before finally uniting (Fig. 1). The diagnosis of the fibular lesion was not so easily made as in the case of the tibia. The first radiographs showed the appearance of a fracture with delayed union, but this could have been a pathological fracture through a chondroma or through an area of fibrous dysplasia. It was not until the fatigue fracture of the tibia on its lateral aspect began to show a similar appearance after five months that the diagnosis of the fibular lesion was established. Previous accounts have not stressed the delay that may occur in the union of these fractures, except in the case reported by Evans (1955) of a fatigue fracture of the ulna which showed established non-union by the time the patient was seen. An onlay tibial graft promoted
rapid union. In the present case bony union of the tibial fracture was achieved after a year and at the end of this period the fibular fracture was not completely consolidated.

In seeking for an explanation of the unusual indolence of the fibular fracture and the progress of absorption on the lateral side of the tibial fracture attention was directed to a possible underlying endocrine fault. A possible clue was the fact that the patient had grown about three inches in the year. It is known that an adolescent in a period of rapid growth may become liable to slipping of the upper femoral epiphysis. and Harris (1950) produced experimental evidence that an excess of growth hormone decreases the shearing strength of the epiphysial plate in rats. Radiographs of the femoral heads in my patient showed no epiphysial coxa vara and films of the rest of the skeleton were normal. Biochemical tests also failed to reveal any evidence of endocrine dysfunction. It is nevertheless possible that because he was in a stage of rapid growth the tibia was unusually prone to stress. Wolfe and Robertson (1945) stated that "rhythmically repeated mechanical stresses at the point of greatest bone bending can produce fractures of individual trabeculae. This reduces the functional capacity of the bone and overloading then results in a fracture." The overloading in this case may well have been the excessive torsional strain imposed upon the fast growing tibia by the application of a below-knee walking plaster which fixed the foot but allowed the knee to rotate. The patient was aware of discomfort whenever he turned round while in this plaster. This was not a complication that could be foreseen but it is worth recording. It is open to question whether such a plaster was good treatment for a painful lower fibula, but there can be little doubt that the protection of a long-leg plaster should always be advised in the young patients with fatigue fractures relatively high in the tibial shaft, at least until partial consolidation or buttressing is advanced. Unprotected activity may transform a fatigue fracture of the tibia into a displaced fracture (Hartley 1942. Roberts and Vogt 1939, Krause and Thompson 1943, Burrows 1956).

SUMMARY

1. A case is described of fatigue fractures occurring in the lowest thirds of the right tibia and fibula simultaneously.
2. The fibular fracture was a runner’s fracture.
3. The tibial fracture was ascribed to the application of a below-knee walking plaster to treat the fibular lesion.
4. Both fractures were slow in uniting.
5. The fractures occurred in a rapidly growing youth but no clinical evidence of an endocrine dysfunction was found.

REFERENCES


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