

FATIGUE FRACTURES OF THE LOWER EXTREMITIES

One case of bilateral fatigue fracture of the collum femoris

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By

ERIK RENGMAN

Fatigue fracture or march fracture has earlier been described in this country by Friis Baastad in an article on foot tumour which appeared in the Norwegian Army Medical Journal in 1930. In his article Friis Baastad reports the comprehensive statistical work by Aleman showing the frequency of march tumour in the Swedish army in the period 1914–1928. The total number of march fractures of the metatarsal bones for this period is given as 11,540.

The definition of march fracture is “a dissolution of bone brought on by prolonged walking”.

The accumulation of march fractures is particularly noticeable in times of war.

In the various medical publications fatigue fractures of other bones; the fibula, the ulna, the os pubis etc. have been described too. A Norwegian military surgeon affirm to have seen a case of fatigue fracture of the collar bone caused by the carrying of too heavy a rucksack.

The material which will be presented here is not very comprehensive as it only represents case from military units that are given treatment at the Oslo Military Hospital.

The following table shows the various fatigue fractures which have been treated at that hospital:

Metatarsalbones	16
Tibia	4
Collum femoris	2

In 1955 a patient from a military unit was admitted to the hospital.



Fig. 1.

Fatigue fracture of fibiae which can be confused with a bone tumour, "Bergstrandtumour".

The diagnosis was a bilateral fracture of the collum femoris. As fatigue fractures in this site seem to be extremely rare, the author has in fact not come across a single certain case in the literature available to him, the case will be reported below.

The patient is a 21 year old soldier, powerfully built, and rather heavy of weight. He has previously always been healthy, and on admission to hospital he showed no other predisposition to disease. The case history shows that three months earlier he had taken part in a very strenuous march, carrying a heavy load. During the latter part of the exercise he felt pains in the rightside hip and thigh region. They were however, not too bad for him to be able to finish the march. He did not seek the army surgeon as the pains were slight and disappeared after a few days. A week later he again took part in an exhausting march. The same pains returned, only this time they were so intense that



Fig. 2.

X-ray 3 months after the first symptoms. Fracture on right side—fissura on left side—collum femoris.



Fig. 3.

X-ray after 3 months in bed. The fracture is healing.

he was incapable of completing the march. He felt better after a couple of days, and for a while he was partly able to attend to his duties and partly on sick leave. At this time, three months after the first appearance of the symptoms, an X-ray examination of the pelvis region and the hips was performed. The pictures showed a fracture of the right collum femoris, and the patient was therefore sent to the hospital. Shortly after admittance new X-ray pictures were taken. A close study of the old pictures and the new ones revealed: On the right side, a definite fracture fissure with an angle of the axis of some degrees approximately in the middle of the collum. A distinct callus formation could be seen both in the upper and lower contours of the collum. On the left side a periosteal callus deposit was found approximately in the middle of the collum both in the upper and lower contours. A closer examination also revealed a distinct infraction of the bone structure. No osteoporosis was seen.

It should be expressly noted that the patient has never shown symptoms of a left-side fracture. Upon examination the patient informs us that he has never suffered from a fracture of the collum femoris.



Fig. 4.

After one year, healing is complete.

Neither has he been exposed to any trauma which might conceivably be the cause of his collum fractures.

The patient has never before the day he was admitted to the hospital been exposed to X-rays.

In this case the history and the clinical and roentgenological examination clearly indicates the diagnosis of typical fatigue fracture.

DISCUSSION

As the fatigue fractures are most frequently seen in healthy young persons in their early twenties, in a satisfactory state of nutrition during the execution of physically heavy tasks, various theories as to the reason for their pathogenesis have been put forwards.

The studies of recent years show that fatigue fractures can occur in practically all bones, even though they are rare outside the metatarsal bones.

Fatigue fractures must not be confused with the spontaneous fractures which develop as a result of osteoporosis of varying etiology, nor with the spontaneous fractures of bones that can be caused by lues latents. It is typical that the fatigue fractures develop in normal appearing bones.

In the case of one patient with clinical symptoms of fatigue fracture of the tibia, the radiologist stated that a bone tumour "Bergstrand-

tumour'' seemed a more likely explanation. As a result of this diagnosis a biopsy was performed. The histologic examination showed connective tissue, osseous tissue with reactive changes, *Callus*.

It seems highly probable that the callus formation as a regenerative component sets in more or less parallel to the development of the fracture. In our material this seems to have been the case where the symptomless left-sided fracture of the collum femoris is concerned. The X-ray pictures here show both infraction and callus formation.

The clinical and roentgenologic picture which the various fatigue fractures presents seems to be the same for the whole group.

If one regards the fatigue fractures in their widest sense, examples from mechanics and practical life show that solid substances like metals or wood will break if exposed to repeated, one-side stress, exceeding the breaking limit. The best known practical example is that a metal thread or nail will snap it constantly bent from one side to the other.

It seems to the author reasonable to compare this manner of breaking to the development of fatigue fractures in humans.

During one or several long marches the stress factor mentioned above will be present. The duration of the march, the bodyweight, the weight of the load carried constitute the components which will be decisive for a possible development of fatigue fractures. Should the aggregate of these components go beyond the breaking strenght limit of the bones, fatigue fractures may develop.

S U M M A R Y

Fatigue fractures of the lower extremities. 16 cases of fracture of the metatarsal bones, 4 cases of fracture of the tibia, and 1 case of bilateral fatigue fracture of the collum femoris which has been specially reported. In all these cases of fracture of otherwise normal bones, as well as in similar cases described in the various medical publications the causative factor seems to be the same, i.e. prolonged stress.

R E S U M E

Fracture de fatigue aux extrémités inférieures. 16 cas de fractures métatarsiennes, 4 cas de fracture du tibia, exposé d'un cas de fracture bilatérale du col du fémur. Dans tous ces cas de fracture d'os autrement normaux, ainsi que dans d'autres cas décrits dans diverses publications médicales, le facteur causal semble être le même: surmenage de longue durée des os.

ZUSAMMENFASSUNG

Ermüdungsbrüche in den unteren Extremitäten. 16 Fälle von Metatarsalbrüchen, 4 Fälle von Tibiabrüchen und 1 Fall von doppelseitigen Ermüdungsbruch im collum femoris, dieser Fall ist speziell referiert.

In allen diesen Fällen von Brüchen in sonst normalen Knochen, wie auch in ähnlichen Fällen, die in verschiedenen Publicationen beschrieben sind, scheint der auslösenden Faktor der gleiche zu sein, nämlich, langdauernde erhöhte Beanspruchung.

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