In the thigh, muscle tears are uncommon amongst joggers, but muscle sheath tears with herniation are frequent, but insignificant. In the hip, trochanteric bursitis is very common. Avulsion fractures of the hamstring origin have been seen in young runners, as have avulsions of the sartorius origin. Osteoarthrosis of the hip joint is not infrequent among older joggers. Even after hip replacement, jogging may be resumed.

If jogging is worth its complications, two quotations may be remembered:

"It's a treat being a long-distance runner". (Alan Sillitoe)
"In the long run, we are all dead". (John Maynard Keynes).

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TENDOPERIOSTITIS IN THE LATERAL FEMORAL CONDYLE IN LONG-DISTANCE RUNNERS

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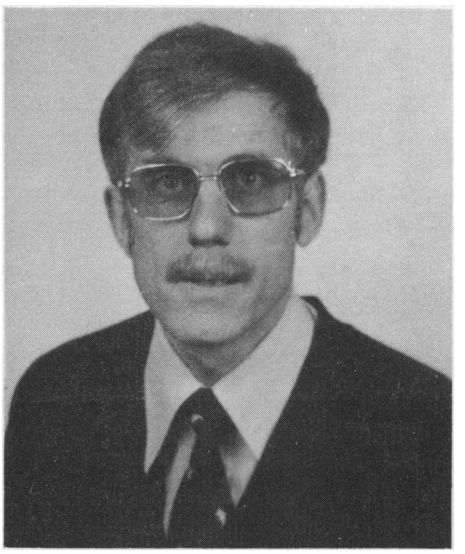

INTRODUCTION

Training for competitive sport is more intense today than ever before. It is therefore not surprising that sports medicine is faced with an increasing number of athletes with overuse injuries.

In Norway, long distance runners have consulted our sports clinic because they experienced pain located in the lateral aspect of the knee while training, especially in early spring and late autumn. Many doctors prescribe rest as the only therapy, but the athlete then discovers that the symptoms reappear as soon as he resumes training.

SYMPTOMS

The symptoms appear in runners training for endurance events. After 20-40 minutes of running they notice pain in the lateral side of one knee. The pain is of a dull aching type, vague at first but if running is continued it soon becomes so severe that further running is impossible.

When the symptoms are moderate, the pain is located in the lateral side of the knee, but it may spread to the upper part of the tibia and sometimes to the distal part of the thigh. As soon as running is stopped, the pain disappears. Some individuals, however, develop the symptoms quite rapidly, and experience difficulty even with walking.

Typically, running downhill often aggravates the symptoms, while running up-hill gives considerably less discomfort. Untreated, the symptoms can last for several months and thus more or less destroy a whole com-

petitive season. This complaint is most often found among long distance runners, skiers and orienteers, but we have also treated field sportsmen, tourists and others who experienced the complaints after walking for several hours in the mountains. It is also common among cadets of the Royal Academy of War when they join a para-troopers course, in which they are required to run for several hours in heavy army boots.

During a research programme in our department in which well-trained students were made to run for 3 hours on a treadmill 3 times a week, all of the participants had to stop running because of this complaint within 2-3 weeks. The condition of the ground surface seems to have a certain influence since most of the cases occur when the ground is frozen. Skiers who experience this complaint when training before the snow falls, no longer notice symptoms as soon as they can start training on skies.

Clinical examination reveals little or nothing. When a patient comes to us with a typical story, we send the patient out on a run until symptoms appear. Then, upon re-examination, we often find distinct tenderness on palpation of the lateral femur condyle. Sometimes we also find moderate tenderness when palpating the iliotibial tract just above and beneath the condyle. In most cases this tenderness disappears within a few hours. The causative mechanism of this complaint is the strain applied to the iliotibial tract.

MECHANISM

Running gait can be described as a cycle of motion which starts when one foot strikes the ground and continues until the foot again strikes the ground.

Each cycle is divided into two phases:

Support phase in which the foot carries the body weight.

Forward recovery phase in which the extremity does not carry weight but advances from the trailing to the leading position. As the foot leaves the trailing position and moves forward, the greatest extension of the hip, knee and ankle occurs. Flexion of the hip now brings the thigh forward, and at the same time the knee flexes. When the thigh is brought forward to a leading position, a rapid extension of the knee begins which is caused by the quadriceps muscle. The leg increases its forward speed and as it advances to the position of footstrike it has to be decelerated to zero velocity. This is done by the hamstring muscles.

At the moment of footstrike the extremity must carry weight, and the quadriceps contracts again. Both the biceps femoris and the quadriceps have fibres fastened to the lateral septum of the femur, which is fused intimately with the iliotibial tract, and at footstrike muscular contraction puts a considerable pull on this septum and thus on the iliotibial tract. This pull represents an eccentric muscle contraction which always creates larger forces than isometric or concentric contractions.

The iliotibial tract is regarded as a tense ligament reaching from the iliac crest to the lateral surface of the tibia. This tense ligament glides over the femoral condyle during each step, and in addition it has an insertion on the upper part of the condyle.

In some runners this strain on the iliotibial tract and the periostium on the femoral condyle becomes too severe so that they develop a tendoperiostitis in this region. Running downhill, or with heavy army boots requires greater force in decelerating the leg and thus puts greater strain on the ligament and its femoral insertion which aggravates the symptoms.

TREATMENT

The best treatment is to inject a local anaesthetic such as Lignocaine combined with betamethasone at the point of maximum tenderness. If no point can be located, the patient is required to run until his symptoms develop and then return for treatment. After the injection training for 3 days was forbidden, and for the 3 following days the training was gradually increased up to its normal intensity. Some patients require more than one injection and we usually give 2 or 3 with one week interval between treatments. The injection therapy works best in acute cases with a short history.

If the complaint has become subchronic or chronic (i.e. more than 3-4 weeks duration) the patients have to receive physiotherapy. The best treatment is then ultrasound combined with deep frictions of the ligament. It is important to instruct the patient carefully in increasing his training programme gradually. The activity should never be allowed to be harder than just to the limit of pain. The patients can almost always be regarded as cured if they are able to run for 40 minutes without creating pain. In some few resistant cases a plastic operation on the iliotibial tract has been necessary in order to diminish the strain.

We therefore conclude that pain in the lateral aspect of the knee in long distance runners may be tendoperiostitis in the lateral femoral condyle caused by severe strain on the insertion of the iliotibial tract in that region. The treatment of choice seems to be injection of cortisone, and in those who do not respond to that treatment, ultrasound therapy combined with deep frictions may be beneficial.

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STRESS FRACTURES

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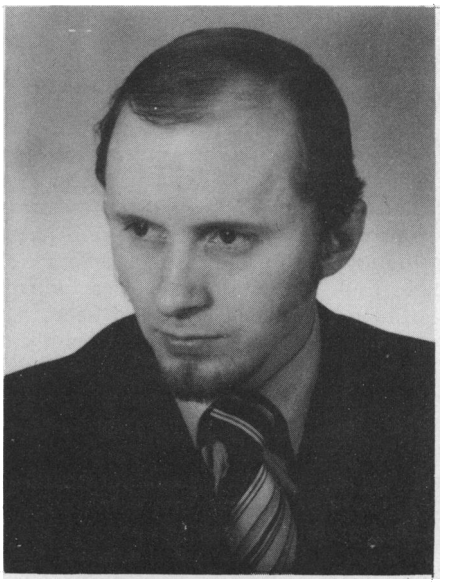

Although the German military surgeon Breithaupt, as early as 1855 described stress fractures in soldiers, such injuries were not mentioned in athletes until several decades later. With growing interest in competitive sport, the higher intensity of training and the growth of sports medicine, stress fractures are found in increasing numbers. The first radiographs of stress fractures of the metatarsal bones were published in 1897 by Stechow on 36 soldiers suffering from "march fracture".

Stress fractures develop in a bone without acute trauma, due to rhythmic bending repeated many times, muscle force and mechanical strain. Repeated and usually submaximal strain results in fatigue of the bone structure. Usually the fracture is limited to one side of the cortex only, but if untreated it may become complete. The musculo-skeletal system of competitive athletes is generally more adapted to hard exercise than that of recruits and keep-fit participants, nevertheless, stress fractures can develop in fit athletes as well.

During the ten years between 1969 and 1978, 200 cases of stress fracture caused by sport and physical exercise were recorded in 185 patients. All were athletes training regularly, or non-competitive keep-fit participants, 159 males and 41 females. Ages ranged from 10–51 years, av. 22.7. In the athletes' group the median age was 20.8, and in the joggers' group 33.2 years. Servicemen were not included in this survey. 80% of the patients were below 29 years. 15% were joggers, and of the athletes 116 (58%) were from track and field events, middle and long distance runners, jumpers and throwers exclusively. Cross-country skiiers, orienteers, ball games players and power event athletes formed the next groups according to injury frequency. Amongst the ball players there were five footballers, four Finnish baseball players, two from ice hockey, and one who played both basketball and volleyball.

The anatomical distribution of stress fractures is shown in figs 1 (tibia and fibula), 2 (metatarsals) and 3