

**ILIOTIBIAL TRACT FRICTION SYNDROME IN ATHLETES —
AN UNCOMMON EXERTION SYNDROME ON THE LATERAL SIDE
OF THE KNEE**

S. ORAVA, M.D.

*Associate Surgeon-in-Chief, Dept. of Surgery,
Keski-Pohjanmaa Central Hospital, Kokkola, Finland*

Surgeon, Sports Clinic of the Deaconess Institute of Oulu, Finland

ABSTRACT

An uncommon exertion pain on the lateral side of the knee is described in 88 patients, in four of whom it was bilateral. The disorder is a result of the friction of the iliotibial tract over the lateral femoral epicondyle. The syndrome is the iliotibial tract friction syndrome of ITFS. All the patients in the material were active athletes or middle-aged joggers in regular training. The cases were seen over four years and four months. The mean age of them was approximately 25 years, and there were only nine women in the series. The pain appeared usually after running and was localised on the outer femoral condyle, and often radiated downwards along the iliotibial tract. Conservative treatment and changes in training habits cured most cases. The disorder has not often been described in the literature, and seems to appear only in physically very active people, such as athletes or military recruits.

INTRODUCTION

An exertion pain, associated with hard running, and felt on the lateral femoral condyle, has been named the "iliotibial tract friction syndrome" (Renne, 1975). The name describes well both the aetiology and the anatomy of the disorder. This syndrome has not been reviewed in the literature very often (Colson and Armour, 1961; Renne, 1975), and in northern Europe, is better known as an overuse injury in athletes and "keep-fit" enthusiasts (Bjorholt, Nilsson *et al*, 1974; Järvinen, 1974; Staff and Nilsson, 1971; Orava, 1974, 1978). In inactive patients the syndrome is, however, so uncommon that it is not described in definitive textbooks of knee pathology and surgery (Helet, 1974; Smillie, 1970). So far the largest survey of patients with this syndrome has been presented by Renne, describing 16 cases. In this study a series of patients with iliotibial tract friction syndrome, ITFS, is reported and discussed.

METHODS AND PATIENTS

Ninety-two cases of iliotibial tract friction syndrome were seen in 88 patients. There were 79 men and 9 women in the series. Eighty-four patients were seen in the Sports Clinic of Deaconess Institute of Oulu, Finland, and other patients were treated elsewhere by the author between 1973 and 1977. The Sports Clinic patients were followed-up for from three years to three months; mean, one year.

The mean age of the patients was 25.1 years in men and 23.8 years in women (Table I). Approximately 78 per cent of the cases were from 16 to 30 years old (range 15-53 y).

TABLE I

Age and sex distribution of the material

Age (years)	Males	Females	Total
≤ 15	2	1	3
16-20	21	2	23
21-25	23	3	26
26-30	18	2	20
31-40	11	—	11
≥ 41	4	1	5
Total	79	9	88

Sixty-nine patients were active athletes including several of international level, and 19 "keep-fit" middle-aged athletes in training (Table II). In 82 cases the syndrome followed running, and in six cases other exercises, such as weight lifting, downhill skiing, circuit training and jumping exercises. In ten cases the syndrome developed during or immediately after a running race. In other cases the symptoms appeared gradually, during training that was more intensive than normal. Four patients suffered from acute respiratory infections before the appearance of the syndrome.

Fifty-three per cent of the patients trained regularly for six times a week or more, 32 patients 3-5 times a week, and three twice a week, before the onset of the symptoms. The distance runners ran about 100 kms a week, and the joggers about 40 kms, the heaviest training in the series being 180 kms in a 24-year old runner. The longest distance covered in the day symptoms appeared was 47 kms. The author himself got the syn-

drome during a 32-kms running race on a cold winter day.

TABLE II
Sports events of the athletes with iliotibial tract friction syndrome

Sports event	Males	Females	Total
Distance/middle distance running	26	1	27
Sprinting/hurdling	6	2	8
Skiing	9	4	13
Orienteering	7	—	7
Ball events (football 7)	8	1	9
Judo	3	—	3
Javelin throwing	1	—	1
Weight lifting	1	—	1
Jogging	18	1	19
Total	79	9	88

In about half of the cases symptoms lasted for less than one month before the first attendance at the clinic (Table III). The syndrome had lasted for several months in about a third of the cases.

TABLE III
Duration time of the symptoms before treatment

Duration time	N	per cent
< 1 week	6	6.8
1-2 weeks	14	15.9
2-4 weeks	24	27.3
1-2 months	18	20.5
2-6 months	14	15.9
6-12 months	8	9.1
> 1 year	4	4.5
Total	88	100%

SYMPTOMS AND FINDINGS

Generally the syndrome only affected running, but six patients had pain also in walking. Two patients were limping when first seen. The pain was stinging in character, and localised at the outer femoral condyle, 1-2 fingerbreadths above the joint line. The pain typically was aggravated by even-pace, smooth running for a few kms, but not by jumping, squatting or sprinting. The pain was most intense when the leg came into contact with the ground in the deceleration phase of running. It radiated obliquely downwards along the iliotibial tract, even to its tibial attachment, and in a few

cases radiated also along the lateral side of the thigh. One patient had simultaneous trochanteric bursitis.

The maximal tenderness was over the most prominent part of the lateral femoral condyle. This point and a small area distal to it were sensitive to palpation and percussion in 22 cases. Crepitation or snapping over this region during knee movements was felt in seven patients, but swelling was noticed only three times. Varus stress provocation test with simultaneous fast extension of knee from a flexion of 45 degrees caused pain in about ten per cent of the patients examined.

Four patients had bilateral ITFS. One had undergone lateral meniscectomy of the same knee a year before. The symptoms resembled those preoperatively, and the operation records of the meniscus tear, as well as the history of trauma were inadequate. The patient's symptoms disappeared after local steroid injections. In re-examination after several months he was symptomless and trained normally.

Knee radiograms were taken in every case. Tunnel and patellar projections were taken in half of the cases. In three cases arthrography of the knee was performed with normal results. All investigations of the actual knee joints were interpreted as being normal.

TREATMENT

Conservative methods were used in all cases (Table IV), operative treatment not being considered necessary. Several athletes waited for a long time for the disappearance of symptoms without any specific treatment. In some cases athletes had learned to manage with this exertion pain by themselves, using proper warming-up and local vasodilating agents before training. Because the syndrome usually hampered only running, several athletes could carry out specific training for their sports without disability if running was not required. Fourteen cases recurred or became chronic during the follow-up period, but most remained bearable with local steroid injections and physiotherapy.

TABLE IV
Treatment of the patients with iliotibial tract friction syndrome. In most cases the treatment was combined

Treatment	N
Anti-inflammatory agents by mouth	47
Vasodilating agents topically	50
Physiotherapy (short wave diathermy)	35
Local steroid injections	28
	160

ANATOMY AND PATHOLOGY OF ILIOTIBIAL TRACT

The iliotibial tract in man is a fascial thickening of the tensor fasciae latae muscle, extending from the iliac spine to the knee, forming in its lower part a ligament-like structure with an insertion into the antero-lateral tibial tubercle. At the knee joint the tract acts as a stabilising band between the lateral femoral condyle and the tibial attachment. On the outer femoral condyle the band is attached to the lateral intermuscular septum and quadriceps muscle fascia. This fixation permits a limited amount of antero-posterior motion during extension-flexion movements (Fig. 1). Kaplan (1958) gives a detailed description of the iliotibial tract anatomy.

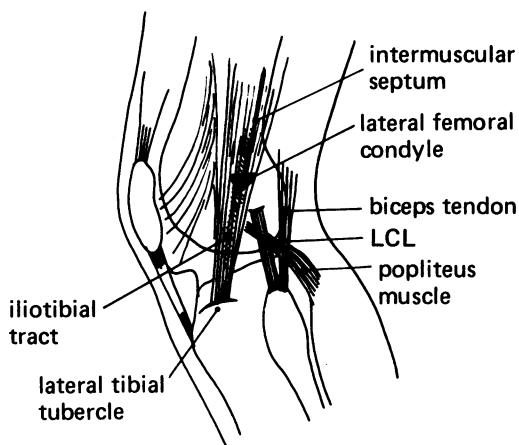


Figure 1. Schematic drawings of the anatomy of the lateral aspect of the knee.

Only a few pathological conditions of this structure are known. Iliotibial tract contractures may follow certain paralytic disorders (Kaplan, 1958; Tohen, Carmona *et al*, 1968). In the upper part of the tract trochanteric bursitis and tendinitis with possible snapping are known (Gordon, 1961; Romer, 1973).

Dissection findings

The iliotibial tract in the knee region was examined in seven cadavers and during three knee operations (8 male knees, 5 female knees). The mean age was 24 years (2-58 y). In women the iliotibial tract was a less distinct and more hazy structure than in men. The lateral femoral condyle was more prominent in men. Just distal to the epicondylar prominence, reddish-brown bursal thickening was noticed under the iliotibial tract in most men. In the oldest man the distal part of the lateral

intermuscular septum as well as the overlying proximal part of the band were thick and cartilaginous. In extension of the knee with varus stress, snapping could be palpated over the lateral femoral condyle in most men in 20-30 degrees' angle (Fig. 2). In women this phenomenon was not demonstrable. Conclusions were: 1. mechanical friction may really occur over the lateral femoral condyle by the iliotibial tract, 2. bursal tissue develops between these structures, probably with secondary inflammation.

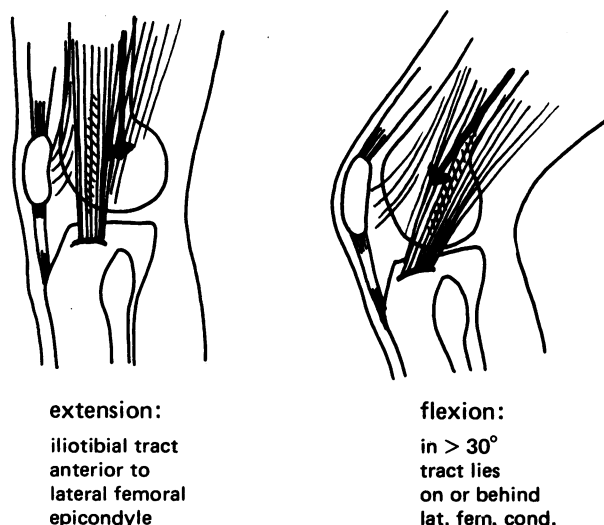


Figure 2. Location of the iliotibial tract during knee movements.

DISCUSSION

Eighty-four cases of ITFS were found amongst exertion syndromes in 1311 athletes, 6.4 per cent of overuse injuries treated in the Sports Clinic of Deaconess Institute of Oulu, Finland, during three years. It comprised 1.6 per cent of all injuries to athletes and keep-fit athletes (c. 5400) treated during this time. In a group of 104 middle-aged "Classical Marathon Race" runners, 19 men had suffered from exertion pains of knees. Four of these patients (3.8 per cent) had ITFS (Orava and Karvonen, 1976). Renne (1975) found 16 cases of ITFS in a group of c. 1000 military trainees over a six-month period.

The reason for women's comparative rarity in the series may be the more pronounced valgity of their knees, weaker iliotibial tracts, and greater laxity of their ligaments.

All patients were active in sports; running caused 93 per cent of the cases, symptoms usually occurring even with running paced at relatively low speed. For treat-

ment, changes in training habits often were enough to reduce or alleviate symptoms; patients were advised to vary the tempo of running, from walking to sprinting and to avoid even-pace jogging. The best treatment was rest from all training for a few days, anti-inflammatory agents by mouth, vasodilating agents topically, and gradually increasing the amount of training with the above mentioned method. Local steroid injections were necessary only in recurring and severe cases, and were combined with short wave diathermy.

The ITFS was generally only a slightly disabling disorder. Several athletes managed for a long time without any specific treatment. The syndrome interfered only with athletic activities.

One reason for the relative frequency of the iliotibial tract friction syndrome in Northern Europe may be the cool climate, and slippery running surfaces. In fact, most of the ITFS in the series appeared in the winter months. Athletes have to train outdoors throughout the year, in spite of the weather.

In differential diagnosis of the ITFS, several disorders have to be considered. In addition to arthrotic changes,

lateral meniscus tears, avulsions, degenerations, cysts, and discoid meniscus, hypermobile patella syndrome, patellar chondromalacia, popliteus muscle tendon inflammation, and anomalies of the iliotibial tract have to be excluded (Ankerhold 1971; Dobler, 1977; Helfet, 1974; Mach, 1965; Mikić and Lakić, 1974; Raine and Gonet, 1972; Smillie, 1970).

The prognosis of this exertion injury obviously is good, even in the recurrent or chronic cases symptoms were usually mild. Operative treatment seems unnecessary, although it would be interesting. In the trochanteric region, fasciotomies have been performed because of disabling symptoms from the proximal part of the iliotibial tract (Romer, 1973). In paralytic contractures partial iliotibial tract excisions have been performed (Tohen and Carmona, 1968).

Iliotibial tract friction syndrome is an exertional non-traumatic disorder connected with increased physical activity. It needs more clinical investigation directed to the aetiological, clinical and histological basis, as well as the incidence of the syndrome in the general population. It forms a clinical entity and needs to be added to the masses of the various knee disorders.

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