Local corticosteroid injection in iliotibial band friction syndrome in runners: a randomised controlled trial

P Gunter, M P Schwellnus

Objective: To establish whether a local injection of methylprednisolone acetate (40 mg) is effective in decreasing pain during running in runners with recent onset (less than two weeks) iliotibial band friction syndrome (ITBFS).

Methods: Eighteen runners with at least grade 2 ITBFS underwent baseline investigations including a treadmill running test during which pain was recorded on a visual analogue scale every minute. The runners were then randomly assigned to either the experimental (EXP; nine) or a placebo control (CON; nine) group. The EXP group was infiltrated in the area where the iliotibial band crosses the lateral femoral condyle with 40 mg methylprednisolone acetate mixed with a short acting local anaesthetic, and the CON group with short acting local anaesthetic only. The same laboratory based running test was repeated after seven and 14 days. The main measure of outcome was total pain during running (calculated as the area under the pain versus time graph for each running test).

Results: There was a tendency (p = 0.07) for a greater decrease in total pain (mean (SEM)) during the treadmill running test in the EXP group compared with the CON group tests from day 0 (EXP = 214 (160), CON = 203 (160)) to day 7 (EXP = 140 (87), CON = 178 (76)), but there was a significant decrease in total pain during running (p = 0.01) from day 7 (EXP = 140 (87), CON = 178 (76)) to day 14 (EXP = 103 (89), CON = 157 (109)) in the EXP group compared with the CON group.

Conclusion: Local corticosteroid infiltration effectively decreases pain during running in the first two weeks of treatment in patients with recent onset ITBFS.
anti-inflammatory/analgesics together with physiotherapy been shown to increase total running time and decrease pain in the first two weeks of treatment.\(^1\)

In addition to the treatments already mentioned, it is also popular clinical practice to inject the area between the lateral femoral condyle and the iliotibial band with corticosteroids to reduce the local inflammation.\(^1 12 19 31 32\) However, despite the popularity of this practice, the effect of local corticosteroid injection at the site of tenderness has never been evaluated in a randomised placebo controlled clinical trial.

The aim of this study was to determine whether a single local infiltration of corticosteroid into the area between the iliotibial band and the lateral femoral condyle decreases pain during running in the first two weeks of treatment.

METHODS
Subjects
All male and female runners aged 20–50 attending the sports medicine clinic of a Staff Health Maintenance Organisation (Vaalmed) in South Africa, who were diagnosed clinically with ITBFS, were potential subjects. They were all athletes from local running clubs, and were either self referred or referred by their general practitioners.

Approval for the study was obtained from the ethics and research committee of the Faculty of Health Sciences of the University of Cape Town.

Diagnosis of ITBFS was based on history, clinical examination, and special clinical tests. Patients were considered if they presented with pain of recent onset (in the preceding 14 days) on the lateral aspect of the knee during repetitive flexion and extension movements of the knee.

Subjects underwent a full clinical assessment. The following information was obtained: age, weekly running distance, best 10 km running time, pain localisation, degree of pain, medical and surgical history, history of allergies (lignocaine or corticosteroids), and family history.

Criteria for inclusion were that the pain had to be: (1) well localised to the lateral femoral condyle; (2) sharp; (3) characterised by a sudden onset, usually after a specific time (or distance of running); (4) more intense at the stage when the foot comes into contact with the ground during deceleration (when contraction of tensor fascia occurs at 30° knee flexion); (5) worse during downhill running—because there is a reduced angle of knee flexion at foot strike when running downhill and therefore the posterior border of the iliotibial band is in the “impingement zone” over the lateral femoral condyle for a longer period of time; (6) relieved by walking with the knee in full extension.

The history was followed by a full clinical examination to confirm the diagnosis of ITBFS and to exclude any contraindications to methylprednisolone administration. MPS performed all the medical assessments. Specific features in the clinical examination considered to be diagnostic were: (1) tenderness of the lateral femoral condyle located 2 cm above the lateral joint line of the tibiofemoral joint; (2) elicitation of pain at 30–40° of flexion when a finger was held on the lateral condyle during flexing and extending of the knee; (3) pain on weight bearing on the affected limb at knee flexion of 30–40°. The diagnosis was made on the basis of a classic history and the presence of criterion 1 and at least one of the other two criteria on clinical examination.

Subjects with a confirmed clinical diagnosis of ITBFS were excluded from the study if: (1) the pain was not severe enough to impair running performance; (2) there was an unwillingness to adhere to the period of rest, icing, and abstinence from running during the first 14 days of treatment; (3) the subject had a history of allergy to methylprednisolone acetate or lignocaine.

Forty five runners were screened, but only 18 fulfilled the inclusion criteria. The most common reasons for not including potential subjects were that they were not willing to comply with the protocol and that the pain was not severe enough.

Day 0: screening, familiarisation, and randomisation
Subjects dressed in appropriate running gear including their normal running shoes (which were used for each subsequent test) were familiarised with the treadmill running test. A previously validated\(^1\) treadmill running test was used to measure the amount of pain that subjects experienced during normal running. There was a warm up period of five minutes. During this phase, all the subjects ran on the motorised treadmill at a slow speed equivalent to 7 min/km. A 10 point visual analogue scale (VAS) was used during the test to measure pain experienced during running (fig 1). Subjects were instructed to report the severity of the typical pain on the lateral side of the knee at the site of ITBFS pain at the end of every minute of the test. A chart with the VAS was displayed on the wall in front of the treadmill so that the subject could easily see it while running.

After the warm up period (first five minutes of running), the speed of the treadmill was increased to the subjects' best recent 10 km running speed. This speed was then maintained for 30 minutes or until the pain reached 8 (severe pain) on the VAS. The test was then terminated.

After the treadmill running test had been completed, the subjects were randomly assigned to either the experimental (EXP) or control (CON) group in a single blind (subject blinded but not investigator) fashion. The EXP group (n = 9) received an injection of 40 mg (1 ml) methylprednisolone acetate (Depot-Medrol; Pharmacia and Upjohn, Craighall, Johannesburg, South Africa) mixed with 10 mg (1 ml) 1% lignocaine hydrochloride (Fresenius Kabi, Halfway House, South Africa). The CON group (n = 9) received an injection of 20 mg (2 ml) 1% lignocaine hydrochloride into the space between the lateral femoral condyle and the iliotibial band.

PG used the following technique while injecting the subjects:

- After receiving an explanation of the injection technique, the subject was positioned lying on his/her side with the affected leg on top.
- The knee was flexed to 30° and the point of maximal tenderness (the area to be injected on the lateral femoral condyle) was identified and sterilised using 90% ethanol.
- 2 ml either 1% lignocaine hydrochloride (CON group) or 1 ml methylprednisolone acetate together with 1 ml 1% lignocaine hydrochloride (EXP group) was drawn into a 2.5 ml disposable syringe.
- While identifying the iliotibial band with the thumb of the left hand and sliding it over the posterior border of the

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<table>
<thead>
<tr>
<th>No pain</th>
<th>Severe pain</th>
<th>Unbearable pain</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>8</td>
<td>10</td>
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<tr>
<td>1</td>
<td>7</td>
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<td>1</td>
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<tr>
<td>8</td>
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</table>

Figure 1 Visual analogue scale of pain perception.
Corticosteroid injection for iliotibial band friction syndrome

The pathology of ITBFS is an inflammation resulting from repetitive mechanical trauma. The inflammation results in pain, mainly during running. This pain can be graded on a scale of 1 to 10, with 10 being the most severe. The pain is often described as a sharp, burning sensation that radiates along the lateral aspect of the knee. The pain can be exacerbated by activities such as running, jumping, or climbing stairs.

Physical characteristics, running, and training history

Table 1 shows the physical characteristics of the subjects in the CON and EXP groups. There were no significant differences in any of the physical characteristics, running history, or training history between the two groups.

Side effects/adverse reactions

None of the subjects reported any side effects or adverse reactions as a result of either the placebo or the active injection.

DISCUSSION

In this study, the efficacy and safety of injection of methylprednisolone into the area between the lateral femoral condyle and the iliotibial band was evaluated. The only other form of treatment during the study period was ice on the area for 20 minutes twice daily. The results show that local infiltration with corticosteroid decreases pain during running more than placebo after 14 days in patients with ITBFS of recent onset. Both groups showed improvement in pain during running, which may be attributed to a period of rest and the application of ice. However, the group receiving a local corticosteroid injection had a significantly greater decrease in pain during running than the control group.

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This study has a number of limitations. Firstly, the sample size is small. This was because, despite recruiting 45 runners, the study only included 18 subjects (9 in each group) due to the small sample size. Additionally, the study was conducted in a single center, which may limit the generalizability of the results to other populations.

Table 1: Physical characteristics and training history of the experimental (EXP) and control (CON) groups

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>CON Group</th>
<th>EXP Group</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total weekly distance (km)</td>
<td>82.5 (9.3)</td>
<td>83.3 (9.7)</td>
<td>0.87</td>
</tr>
<tr>
<td>Best 10 km time (minutes)</td>
<td>46.6 (6.7)</td>
<td>46.8 (6.9)</td>
<td>0.96</td>
</tr>
<tr>
<td>Age (years)</td>
<td>28.9 (5.0)</td>
<td>29.0 (6.5)</td>
<td>0.87</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>177.9 (11.1)</td>
<td>176.4 (8.3)</td>
<td>0.86</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>70.5 (8.0)</td>
<td>73.3 (7.3)</td>
<td>0.72</td>
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Values are mean (SD).
most who were eligible did not want to refrain from running for the 14 day study period. Recruitment of subjects for this study took in excess of 24 months, highlighting the difficulty in performing these types of controlled trials in the running population.

A second limitation is the short duration of the study. A period of 14 days was selected for the follow up period because the drug used should have shown an effect if the pain were due to an acute inflammatory process. Furthermore, as mentioned, runners were only willing to comply with the request to refrain from running for that period but not any longer. Although an attempt was made to follow up the runners in each group for much longer, there was too large a variability in their return to running, their volume of running, the type of rehabilitation programme, alternations in footwear, and the use of orthodoxes, all of which form part of the second phase treatment of this condition. Therefore no conclusions on the longer term benefits of the corticosteroid treatment compared with placebo could be made in this group.

In conclusion, the results of this study show that the infiltration of the lateral femoral condyle area deep to the iliotibial tract with corticosteroid decreased pain during running after 14 days. Therefore the practical recommendation for treating runners is that local corticosteroid infiltration is effective and safe in the early (first 14 days) treatment of this condition. However, ITBFS is notorious for not responding to treatment evidence) in many previous articles on this condition. The main value of this study is in providing good scientific evidence that a corticosteroid injection improves the symptoms of ITBFS two weeks later. This confirms a clinical impression among sport physicians and a treatment recommendation that has been suggested (without good evidence) in many previous articles on this condition. However, ITBFS is notorious for not responding to treatment and often becomes chronic or recurrent. The question of whether corticosteroid injections help with the ultimate resolution of the symptoms is not answered (and not claimed to be answered) by the investigators in this study. From a cautionary point of view it could even be argued that, although corticosteroid injections reduce symptoms in the acute phase of the condition, they may actually delay the eventual return to full pain free running because of the longer term effects of cortisone—that is, inhibition of collagen synthesis. Despite these comments, I believe this is a useful study for the reasons given above.

Authors’ affiliations

P Gunter, M P Schwellnus, UCT/MRC Research Unit for Exercise Science and Sports Medicine, Department of Human Biology, Faculty of Health Sciences, University of Cape Town, Cape Town, South Africa.

REFERENCES


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P J Fuller
Lifecare Ashwood Sports Medicine, 330 High Street, Ashwood, Victoria 3147, Australia; peterfuller@sub.net.au

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