REFLEX SYMPATHETIC DYSTROPHY OF THE KNEE

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Reflex sympathetic dystrophy of the knee has been studied in a series of 19 patients. Those diagnosed and treated early (at less than six months) did much better than those diagnosed and treated late. Nevertheless, when these patients were followed up at an average of 3.4 years from onset, not one was completely normal to objective tests with the Cybex II dynameter, an indication of the adverse prognosis with current methods of treatment.

Reflex sympathetic dystrophy has been studied extensively in the hand and foot, but much less so at the knee. We report 19 patients who had the typical features of this disorder as it affects the knee.

PATIENTS AND METHODS

Nineteen patients presented with the classic features of the reflex sympathetic dystrophy syndrome as judged by the criteria laid down by Kozin et al. (1981). They were divided into three groups: early – less than six months from the time of onset (seven patients); late – more than six months from the time of onset (nine patients); and postoperative – developing as the sequel to an operative procedure (three patients).

A history, physical examination, radiographs and a technetium-99m diphosphonate bone scan were carried out on each patient. Every patient also had a diagnostic arthroscopy, a synovial biopsy and subsequently underwent intensive physiotherapy. In those who did not improve a sympathetic block was performed. The patients in the late group who had significant joint fibrosis had a manipulation under anaesthesia and then were treated with a continuous passive motion machine.

At follow-up, knee function was assessed using the Hospital for Special Surgery scale (Insall et al. 1976), in which a score of 85 to 100 points represents an excellent result; 70 to 84 a good result; 60 to 69 a fair result; and less than 60 a poor result. All patients were then tested with the Cybex II isokinetic dynameter, for strength, power and endurance as compared to the opposite side.

Clinical features

Thirteen of the 19 patients were female. Their ages ranged from 15 to 59 years (average 40 years). The final assessment was at 18 months to 6 years (average 3.4 years) from onset.

In the early group, patients characteristically presented with a history of pain after a minor twist or other injury. They had marked hypersensitivity to touch, loss of quadriceps bulk and flexion contractures that, typically, were less than those in the other two groups (Table I). Only one of the seven patients in this early group had dystrophic changes.

In the later group, patients presented with a history of persistent knee pain and dysfunction often after previous unsuccessful attempts at rehabilitation. They had extensive wasting of the quadriceps and considerable loss of flexion (Table I). Eight of the nine patients in this group had dystrophic changes, often associated with thickening and fibrosis.

The three patients in the postoperative group had a stormy course after operation, with persistent pain, stiffness and difficulty in rehabilitation. Two had had a meniscectomy and one a Maquet procedure. They had wasting of the quadriceps and loss of movement, particularly terminal flexion; two had dystrophic skin changes.

Investigations

Radiography. The classic radiographic features of patchy demineralisation and generalised osteoporosis are best seen on the skyline view, but can also be seen on anteroposterior films. Of the early group, five of the seven patients had these typical changes (Table II); all those in the late group, but only two of the three in the postoperative group, also had these features.

Scans. The characteristic bone scan findings consist of increased blood flow to the involved knee with an increase in the blood pool phase and an increase in the two-hour delayed static image. In our patients the whole limb was often involved, with increased uptake around
the foot and hip as well as the knee. The early group and the postoperative group all had positive bone scans, whereas in the late group only six of the eight were positive (Table II). This suggests that the increased blood flow in the early stages diminishes with time.

**Arthroscopy.** Arthroscopy was performed as we felt that it was important to eliminate major intra-articular pathology as a cause of loss of movement (Table II). In the early group, six of the seven patients were found to have a mild synovitis; one had minor chondral damage. The late group consisted of three patients who had a normal arthroscopy and six who had minor abnormalities. In the postoperative group, all three patients had minor abnormalities, but nothing that would account for the loss of movement and the functional disability (two had an absent meniscus and one had chondromalacia patellae).

**Synovial biopsy.** In four of the seven early cases synovial biopsy showed non-specific subsynovial fibrosis with synovial proliferation, but without inflammatory changes (Table II). Similar changes were found in all nine patients who presented late, and the degree of fibrosis appeared to be greater. Similar changes were found in the three postoperative cases. From this data, it would appear that the synovial changes take some months to develop and therefore were not present in three of the seven early cases.

**Treatment**

All the patients were given non-steroidal anti-inflammatory drugs and analgesics. In the early group, five of the seven patients had intensive physiotherapy including transcutaneous nerve stimulation; the other two did not respond to these measures and had sympathetic blocks. In the late group, only two of the nine patients responded reasonably to physiotherapy. Three patients had a sympathetic block; the other four, who had restricted movement, were manipulated under general anaesthesia at the time of the arthroscopy and then treated on a continuous passive motion machine for 7 to 10 days. In the postoperative group, two patients had sympathetic blocks after failing to respond to physiotherapy and one was treated on a continuous passive motion machine to try to maintain the range of movement achieved under general anaesthesia. Patients on the machine often experienced pain which was controlled by epidural morphine.

**RESULTS**

The only excellent results, as assessed by the Hospital for Special Surgery grading, were in the early group, in which five of the seven were excellent (Table III); but even with early diagnosis and treatment, one knee was rated good and one was only fair. In the other two groups the results were most unsatisfactory.

**Table III. Results graded on the Hospital for Special Surgery scale**

<table>
<thead>
<tr>
<th>Group</th>
<th>Excellent &gt;85</th>
<th>Good 70-84</th>
<th>Fair 60-69</th>
<th>Poor &lt;60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early (7)</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Late (9)</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Postoperative (3)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

The results of the Cybex testing (Table IV) show that there were significant functional deficits in all three groups. Of all 19 patients tested, not one was normal. The functional deficits were least in the early group in whom the restoration of function was between 70% and 90%. Functional deficits were most apparent in the endurance testing.
Table IV. Average results of Cybex II isokinetic dynameter testing, expressed as a percentage of the normal side

<table>
<thead>
<tr>
<th>Group</th>
<th>Strength</th>
<th></th>
<th>Power</th>
<th></th>
<th>Endurance</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quadriceps</td>
<td>Hamstrings</td>
<td>Quadriceps</td>
<td>Hamstrings</td>
<td>Quadriceps</td>
<td>Hamstrings</td>
</tr>
<tr>
<td>Early (7)</td>
<td>90</td>
<td>70</td>
<td>80</td>
<td>70</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Late (9)</td>
<td>30</td>
<td>50</td>
<td>35</td>
<td>60</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>Postoperative (3)</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>50</td>
<td>30</td>
<td>45</td>
</tr>
</tbody>
</table>

DISCUSSION

The most significant factor affecting our results was the time of diagnosis. Those who were diagnosed early and started on intensive and prolonged physiotherapy did best. In those patients who were diagnosed late, the condition was much more refractory to treatment.

The radiographic features of reflex sympathetic dystrophy were not present in all our early cases, but were in the late cases. It would appear therefore that, in the knee, these changes are related to the duration of symptoms. This feature has also been noted in the foot (Poplawski, Wiley and Murray 1983) but is in contrast to the upper limb where only a small percentage of patients have such findings (Kozin et al. 1981).

Bone scans are particularly helpful and in all our early cases they were positive; but in some of the late group the scans were within normal limits. This suggests that there is hypervascularity in the early stages, but as the condition progresses it becomes less and in the late stage the vascularity may return to normal. This change from a positive to a normal scan with time has been reported in the upper limb where it has been attributed to effective therapy (Kozin et al. 1981). Although this may be the case in the upper limb, in the knee it seems to occur earlier and to relate to the duration of the condition (Tietjen 1986).

Diagnostic arthroscopy proved to be a valuable tool in ruling out serious intra-articular pathology, as many of these patients present with what seems like a locked knee. The synovial findings in our series have also been reported by others (Kim et al. 1979; Tietjen 1986). It was interesting to note that in the early stages only four of the seven synovial biopsies were positive; this again suggests that the synovial changes are related to the duration of the syndrome.

With regard to treatment we used non-steroidal anti-inflammatory drugs and intensive physiotherapy in the initial stages; failure to respond was an indication for a sympathetic block. In patients with fibrosis and loss of movement, we used the continuous passive motion machine. Despite this regimen of treatment, our overall results were less than satisfactory. Many other regimens have been proposed, but there is a paucity of scientific evidence to establish which is most effective (Schutzer and Gossling 1984); clearly there is scope for future investigation.

REFERENCES


