BILATERAL SIMULTANEOUS SPONTANEOUS RUPTURE OF THE QUADRICEPS TENDONS

FIVE CASE REPORTS AND A REVIEW OF THE LITERATURE

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Five cases are presented of bilateral simultaneous rupture of the quadriceps tendon and the English literature of six isolated case reports is reviewed. All the patients were men, and most were over 50 years old. The injury often happens in elderly people and there is diagnostic confusion with other causes of inability to use the legs, notably with mild strokes. In three of our five cases there was a delay in diagnosis.

The cardinal features are diffuse swelling around the knee, a visible or palpable suprapatellar defect and the inability to lift the straight leg despite a functioning quadriceps and normal activity in all other muscle groups in the leg. In all our patients operative repair was undertaken, followed by six weeks immobilisation in plaster and subsequent physiotherapy. Even late repair was associated with successful rehabilitation of the patient and a return to useful function.

Rupture of the quadriceps tendon is an uncommon injury. Scuderi presented the largest series (20 cases) in 1958 (Scuderi 1958). Bilateral simultaneous rupture of the quadriceps tendon is very rare and only six isolated cases have been reported in the English literature. We report five additional cases. All underwent successful operative repair, although in no case was a protective wire pull-out suture employed, as has been suggested both by McLaughlin (McLaughlin and Francis 1956) and by Scuderi in 1958.

CASE REPORTS

A summary of the case reports is given in Table I.

Case 1. A 68-year-old man was seen on a domiciliary visit; he had been unable to walk for a month. He had stumbled whilst leaving church and was diagnosed as having had a mild stroke. Bilateral spontaneous quadriceps ruptures were diagnosed and he was admitted to hospital. Operation was carried out the following day through transverse incisions. Complete ruptures of the quadriceps tendons were found. The tendons were repaired with sutures passed through drill holes in the patella and the legs were immobilised in plaster cylinders.

He was discharged three weeks after operation and the plasters were removed at seven weeks. He then attended for physiotherapy and at nine months had a range of flexion from 0 to 70° in one knee and from 0 to 55° in the other. He had difficulty in standing up from a chair but was otherwise mobile. He was seen a year later with a rupture of the long head of the biceps. At that time his serum uric acid was estimated in order to exclude gout, which is known to be associated with tendon ruptures (Levy et al. 1971). He had by then returned to playing bowls, following the successful repair of his quadriceps tendons.

Case 2. An 84-year-old man fell forwards on to both knees and was unable to stand afterwards. He complained of painful knees and was seen in Casualty; effusions were noted and it was noticed that he could not lift his heels from the bed. Radiographs showed no bony injuries and he was discharged home, without a definite diagnosis. Six days later he was seen by an orthopaedic surgeon and bilateral simultaneous quadriceps ruptures were diagnosed. Operation was carried out the following day; both tendons were repaired with polyglycolic acid sutures. Plaster cylinders were applied and he was discharged home with crutches.

The plasters were retained for six weeks, after which he received inpatient hydrotherapy for a week. At final review 10 weeks after operation he had 115° of flexion in one knee, and 120° in the other; in each there was an extension lag of five degrees. He used a walking frame with which he was quite independent.

Case 3. A 54-year-old mentally subnormal man weighing 87.5 kg had fallen on to his knees on the day of admission. On examination suprapatellar defects could be felt and he was unable to lift his heels from the couch. At operation on the same day the ruptures were repaired.
with nylon sutures, placed circumferentially around the distal pole of the patella and in a figure-of-eight manner in the quadriceps tendons.

Plaster cylinders were retained for six weeks after which he had physiotherapy as an outpatient. At six months from operation one knee had 100° of flexion with an extension lag of 20°, and the other had 110° of flexion with a 35° lag of extension. He walked independently using a stick.

Both legs were immobilised in plaster cylinders for six weeks. Physiotherapy was instituted and two weeks later one knee had 70° of flexion, and the other 90°; there was a 10° lag of extension on each side and he walked with a frame. He was then discharged from the clinic. **Case 5.** A 74-year-old man tripped on the steps disembarking from an aircraft, rupturing both quadriceps tendons. The diagnosis was made by the Airport Authority Medical Officer and he was transferred to his home city for treatment. He was a known diabetic and also suffered from angina pectoris and a hiatus hernia. Operative repair was carried out on the following day. Figure-of-eight stainless steel sutures were passed through patellar drill holes and polyglycolic acid sutures were used to reinforce the repair.

### Table I. Summary of five cases

<table>
<thead>
<tr>
<th>Case</th>
<th>Age (years)</th>
<th>Time before repair was undertaken</th>
<th>Method of repair</th>
<th>Postoperative regime</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>68</td>
<td>4 weeks</td>
<td>Sutures passed through patellar drill holes</td>
<td>Plaster cylinders for 7 weeks</td>
<td>9 months after operation returned to playing bowls Flexion = 0-70°; 0-55°</td>
</tr>
<tr>
<td>2</td>
<td>84</td>
<td>7 days</td>
<td>Dexon mattress sutures</td>
<td>Plaster cylinders for 6 weeks</td>
<td>10 weeks after operation used a walking frame Flexion = 5-115°; 5-120°</td>
</tr>
<tr>
<td>3</td>
<td>54</td>
<td>Same day</td>
<td>Nylon sutures around lower patella and through quadriceps tendon</td>
<td>Plaster cylinders for 6 weeks</td>
<td>6 months after operation used a walking stick Flexion = 20-100°; 35-110°</td>
</tr>
<tr>
<td>4</td>
<td>80</td>
<td>6 days</td>
<td>Chromic catgut mattress sutures</td>
<td>Plaster cylinders for 6 weeks</td>
<td>8 weeks after operation used a walking frame Flexion = 10-70°; 10-90°</td>
</tr>
<tr>
<td>5</td>
<td>74</td>
<td>1 day</td>
<td>Steel sutures passed through patellar drill holes</td>
<td>Plaster cylinders for 6 weeks</td>
<td>4 months after operation used a walking stick Flexion = 0-95°; 0-120°</td>
</tr>
</tbody>
</table>

### Table II. Summary of cases in the literature

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Time before repair was undertaken</th>
<th>Method of repair</th>
<th>Additional factors</th>
<th>Postoperative regime</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalal and Whitham (1966)</td>
<td>63</td>
<td>Same day</td>
<td>Chromic catgut mattress sutures</td>
<td>Obese</td>
<td>Plaster cylinders for 6 weeks</td>
</tr>
<tr>
<td>Levy et al. (1971)</td>
<td>54</td>
<td>Same day</td>
<td>Scuderi technique</td>
<td>Gout</td>
<td>Plaster cylinders for 6 weeks</td>
</tr>
<tr>
<td>Preston and Adicoff (1962)</td>
<td>33</td>
<td>8 months</td>
<td>McLaughlin technique</td>
<td>Duodenal ulcer; parathyroid adenoma</td>
<td>Plaster cylinders for 6 weeks</td>
</tr>
<tr>
<td>Siwek and Rao (1978)</td>
<td>82</td>
<td>Same day</td>
<td>Chromic catgut mattress sutures</td>
<td>—</td>
<td>Plaster cylinders for 6 weeks</td>
</tr>
<tr>
<td>Steiner and Palmer (1949)</td>
<td>67</td>
<td>2 days</td>
<td>Silk mattress sutures</td>
<td>Obese</td>
<td>Elastic bandages guarded active and passive motion from 14 days after operation</td>
</tr>
<tr>
<td>Wetzler and Merkow (1950)</td>
<td>46</td>
<td>47 days</td>
<td>Patellar drill holes; silk mattress sutures</td>
<td>Unilateral rupture 8 years previously</td>
<td>Plaster cylinders for 8 weeks</td>
</tr>
</tbody>
</table>

**Case 4.** An 80-year-old man slipped on a step and fell to the floor. He was examined in Casualty, thought to have bilateral effusions and referred to the Fracture Clinic five days later. The correct diagnosis was then made and operative repair carried out the following day, using interrupted catgut sutures.
Plaster cylinders were worn for six weeks, followed by outpatient physiotherapy. At four months he walked with a stick; the range of movement was from 0 to 95° in one knee and from 0 to 120° in the other.

DISCUSSION

There are only six previous single case reports of bilateral quadriceps tendon rupture in the English literature (Steiner and Palmer 1949; Wetzler and Merkow 1950; Preston and Adicoff 1962; Dalal and Whittam 1966; Levy et al. 1971; Siwek and Rao 1978). A summary of these case reports is given in Table II. The ages of these patients ranged from 33 to 82 and all were male. Although four of these cases appeared to be spontaneous and without pre-existing pathology, one (Levy et al. 1971) occurred in a patient with gout, and another in a patient with hyperparathyroidism (Preston and Adicoff 1962).

The commonest cause of bilateral simultaneous rupture appears to be sudden violent contraction of the quadriceps mechanism with the knees slightly flexed and the feet fixed. All patients so far reported have been male and most were over 50 years of age. Obesity was sometimes a feature but not invariably.

Rupture is thought to be due to weakening of the quadriceps tendon (Conway 1940) resulting from one of several causes; these include obesity, degenerative changes and repeated minor injury. Other possible predisposing factors include gout and the calcification associated with hyperparathyroidism.

Two of the patients in the literature had delayed repair of their ruptures. Wetzler and Merkow (1950) stated that their patient had been investigated for "neurological paralysis" for 47 days before referral; he had previously had one quadriceps tendon repaired after direct trauma to the knee eight years earlier. On this second occasion the tendon was approximated to the patella with silk mattress sutures through drill holes.

Preston and Adicoff (1962) also reported late repair in a 33-year-old man whose knees "gave out" on stepping from his car. He was initially diagnosed as having rheumatoid arthritis and treated with physiotherapy. He developed epigastric pain and partial gastrectomy was necessary; during the pre-operative investigation for this a raised serum calcium and impaired renal function were noted and hyperparathyroidism was diagnosed. A parathyroid adenoma was located and removed. Radiographs of the knee showed low patellae and suprapatellar calcification; a diagnosis of quadriceps ruptures was made. Operative repair using the McLaughlin technique was carried out successfully eight months after the rupture.

In three of our cases the diagnosis was not made immediately. It seems that, since this injury often happens to elderly people, there is diagnostic confusion with other causes of inability to use the legs, notably with "mild strokes". Case 1 was unable to walk and was treated in bed for four weeks; he was thought to have had a cerebrovascular accident. Two further patients were not diagnosed until they were seen at a casualty review clinic five and six days after injury. In four of our five cases the diagnosis was not made by the referring doctor. It would seem that a bilateral injury is thought so unlikely that the possibility is not suspected.

Three cardinal features have been present in each case: first, swelling diffusely around the knee; second, visible or palpable suprapatellar defects; and third, inability to lift the straight leg in the presence of a functioning quadriceps and normal activity in all other muscle groups in the leg.

The results of operation were satisfactory in all cases. All our patients were over 50 years of age and two were octogenarians. Operative repair of both sides was carried out in all cases and although a variety of methods were used, protection by wire pull-out sutures was not necessary. Following successful repair, all patients were able to return home and all were independent with or without a walking aid. No patient required long-term external knee splintage. All were treated by immobilisation in plaster cylinders for about six weeks before being mobilised.

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REFERENCES