CASE REPORT

Patellar ligament rupture in an adolescent

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SUMMARY

Rupture of the patellar tendon is a well-known injury in the orthopaedic literature. However, it is unusual and rarely reported in adolescent children. On the one hand, in the immature skeleton, the most frequent lesion above the kneecap is the sleeve fracture. On the other hand, in the distal region, avulsion of the tibial tuberosity is more common. Patellar tendon rupture in an adolescent is a rare lesion. We report a case in which an adolescent sustained a fall when jumping. No predisposing factors have been found. The injury was treated with surgical repair with transosseous suturing and reinforcement with semitendinosus tendon. The aim of this study is to present a case of traumatic rupture of the extensor mechanism of the knee in an adolescent and the therapy used.

CASE PRESENTATION

A 13-year-old boy, after jumping, suffered a fall and immediately presented pain, haemarthrosis and incapacity to walk. The patient was sent to the emergency service of our hospital. Physical examination revealed oedema in the left knee, high patella and a gap at the lower pole of the patella (figure 1). He was also incapable of actively extending his leg. At the time of the trauma, the patient weighed 56 kg and his height was 1.58 m.

Radiographs on the knee showed high patella, thus confirming the diagnosis of rupture of the patellar tendon on the left side (figure 2). The patient's clinical history was investigated and blood tests for all the markers of rheumatic and renal diseases were performed. Besides this, all relationships with any systemic disease or steroid use were analysed and rejected.

Figure 1 Preoperative clinical examination of the knee. It is possible to see the valley below the left patella.

Surgery was performed 1 day after hospitalisation by using a tourniquet and straight anterior incision in the left knee. The surgical technique used was suturing of the patellar tendon with transosseous perforations of the patella, shown in figure 3 with white thin dashed lines. The semitendinosus tendon, that was harvested ipsilateral using a stripper, was used as reinforcement. The autologous tendon graft was passed through two bone tunnels. One was made in the middle of the patella and the other, 1 cm below the tibial tuberosity. The tunnels are illustrated on figure 3 by white thick dashed lines. The suture repairs were tested by means of careful flexion of the knee joint.

After the operation, the knee was immobilised with a long knee brace for 6 weeks. The immobilisation was often removed for active rehabilitation exercises in order to avoid atrophy of the quadriceps. The programme consisted of isometric exercises for the quadriceps during the immobilisation period and active exercises for the quadriceps, with progressive increase of the range of movement. Complete range of motion and fully functioning knees were achieved after 4 months.

Our patient was assessed 1 week, 15 days, 1 month, 45 days and 2 months after the operation, and then monthly until the sixth month; thereafter the consultations became quarterly. Our follow-up of this patient has reached 1 year. After 4 months, he has been able to return to his usual activities and is continuing the follow-up with radiological control examinations in order to evaluate the height of the patella and knee function using the modified Lysholm classification score.¹ The mean scores obtained are 91 points which is considered to be 'excellent' mean scores in this system of evaluation.

DISCUSSION

In our case report, the sex affected was male, which corroborates reports in the literature regarding predominance of such cases among males in relation to females (14/1).² In the immature skeleton, the muscles, ligaments and tendons are generally stronger than the growth plates. For this reason, it is rare to observe rupture of the substance of the tendon in children or adolescents. It has been estimated that a force of 17.5 times the body weight is needed to cause rupture of the patellar tendon in healthy individuals.³ In our patient, injury to the lower pole of the patella was observed in the left knee along with haemarthrosis of the knee; this showed the traumatic and acute nature of the injury.

From reviewing the literature for papers published in English on total rupture of the patellar

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Figure 2 Preoperative radiograph of the left knee showing the patella alta.

ligament in individuals with an immature skeleton, only three articles were found; this confirms the rarity of this lesion and the importance of case reports.^{4–6}

There has been an investigation on structural alterations in the tendon resulting from microtrauma or tendon degeneration

thereby causing traumatic rupture.³ Still, other researchers have suggested that direct trauma on the knee could cause patellar injury in healthy patients.⁷ In our study, as the patient was an adolescent without previous symptoms or systemic diseases, we believe that the injury mechanism was direct trauma as corroborated by Cree *et al.*⁸ Nonetheless, we agree that structural alterations increase the risk of lesions of the knee extensor apparatus.

In our view, the diagnosis of patellar tendon injury is basically clinical, achieved by means of palpation of the gap. With regard to complementary examinations, radiography on the knee (trauma series) provides good accuracy for diagnostic confirmation, as well as being a low-cost method. We did not use ultrasonography because this is an examiner-dependent test. MR is the gold-standard complementary examination for diagnosing this type of injury. Unfortunately, because of its high cost, it is not yet available in all Brazilian hospitals. In the future, as this examination becomes more popular, it will start to contribute greatly towards analysis on the condition of the tendon and the structures around the knee.

Early diagnosis and repair of the injury are essential for successful treatment (figure 4). We used reinforcement with the autologous semitendinosus tendon to protect the knee. This graft is widely used for tendon reconstructions because of its strength, long size and minimal impact on knee flexion function. We did not use cerclage with a steel wire or graft bank tissue. We prefer to use this technique when we treat chronic lesions of the patellar tendon. Muratli *et al*⁵ performed injury repair using cerclage with a steel wire in association with graft bank tissue. Our opinion in this regard is that the steel wire would have had to be removed in a second surgical procedure and this could give rise to emotional stress in this adolescent. Moreover, in relation to the using of tissue from a graft bank, there is a risk of disease transmission. Kim *et al*⁶ used anchors to repair the patellar tendon, claiming that this technique provided better quality than seen with the traditional method. However,

Figure 3 Intraoperative evaluation of the left knee. On the left picture, black arrows shows the gap between the kneecap and the patellar ligament. On the right, the transosseous sutures are represented by white dashed lines and the white arrows shows semitendinous tendon reinforcement.

Figure 4 Four months functional evaluation of the operated knee, with full range of motion.

we observed that in a comparative study in the literature between these two surgical techniques, there was no difference in the repair failure rate.⁹

There is some controversy regarding whether patients should be kept immobilised during the postoperative period and how long this immobilisation should last.¹⁰ We need to keep in sight that this injury occurred in an adolescent. It is given that in this population group, medical orders are at greater risk of being flouted. Besides that, in the immature skeleton, there is less risk of joint stiffness unlike that in the adult population. For both reasons, brace use was maintained for 6 weeks, with daily removal for exercises that were aimed at achieving gains in range of motion and muscle development.

Patellar tendon rupture without previous diseases in an adolescent is an extremely rare injury. Our patient has been followed up for 1 year after the operation, with an excellent result according to the modified Lysholm scoring system.

Learning points

- ▶ Despite of the main lesion of the knee extensor mechanism below the kneecap in adolescents is the tibial avulsion, the tendon rupture can occur.
- ▶ The suture reinforcement is required to prevent re-rupture of the patellar ligament.
- ▶ Rigidity is not a significant problem after immobilisation of adolescents and prolonged immobilisation can protect them from new injuries during healing.

Contributors RSPA examined the patient, performed the surgery and follow-up of the patient. GCSdA organised the bibliographic review and discussion. PJL wrote the initial draft of the case report. VSG reviewed the work and the manuscript. All authors took part in the writing of the manuscript.

Competing interests None.

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