CASE REPORT

Twin athlete brothers with open physes operated for ACL reconstruction on the same day, but with different elapsed times after injury: a 5-year follow-up

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SUMMARY

We present the case of twin brothers with open physes who practiced judo to a high level and were operated on the same day for anterior cruciate ligament reconstruction. One of them was injured a year before surgery, and the other was injured a month before the procedure. The brother who chose to undergo a conservative treatment sustained meniscus injury afterwards and showed lower objective results when evaluated 5 years after surgery.

BACKGROUND

The number of injury records for anterior cruciate ligament (ACL) of the knee in patients with immature skeleton has increased considerably in recent years. This expansion is believed to be directly related to the practice of sports in professional levels, which is increasingly common in young patients. Currently, young patients with immature or nearly mature skeleton are believed to be ready to undergo arthroscopic transphyseal ligament reconstruction. These patients match Tanner's classification for stages III and IV. However, for all patients with Tanner stages I and II, the debate continues and results in different approaches in the presence of the injury.^{1 2} Since these patients have a high physical development potential, transphyseal reconstruction might wound the growing physes and consequently result in sequelae during this further development. For this reason, and given how difficult it was to classify the patient according to Tanner stages,³ many surgeons decide to wait a specific amount of time to allow for further development of the injured patient, taking them away from sports activities until surgery is recommended. In practical terms, though, it proves to be a difficult challenge convincing the patient and their family of how important it is to restrict daily activities, and new injuries deriving from their engagement in such activities with an injured knee start to appear. In this report, we present a case of twin brothers who practiced the same sporting activity, judo, in professional level. Both of them suffered torn ACL and were operated on the same day and by the same surgeon, with the same technique and graft. However, one of them had been injured a month before, while the other had sustained injury 12 months before. Follow-up was performed through physical and imaging examinations. We

will show how each patient evolved differently after 5 years, based on these examinations and on validated questionnaires.

CASE PRESENTATION

Patients 1 and 2 are 22-year-old identical twins; they have practiced judo since the age of 10 and have been professional judo competitors in youth categories in their home country.

At the age of 16, patient 2 sprained his right knee and was diagnosed with a torn ACL. The patient was still in his development phase, as open physes were diagnosed through X-rays. An orthopaedist and a paediatrician evaluated his case and classified him in Tanner stage III. Although the medical team recommended surgery for ACL reconstruction, the patient decided not to undergo surgery at that moment, due to the imminent selection of the national judo team who would participate in the Pan American games. The patient and his family were advised on the possible consequences of their decision; physiotherapeutic treatment was suggested until the patient reached skeleton maturity. Nevertheless, recurrent episodes of knee instability followed, along with progressive pain, making him increasingly incapable of performing his sporting activities.

Eleven months after patient 2's injury, patient 1 also sprained his right knee during judo practice and was diagnosed with a torn ACL. Given the evident dissatisfaction showed by his brother, patient 1 agreed to undergo arthroscopic ACL reconstruction. After 12 months of constant complaints, patient 2 also decided to undergo surgery. Both brothers were evaluated and classified at Tanner stage III. Both surgeries took place on the same day and were performed by the same surgeon. For patient 2, surgery occurred 12 months after his injury; for patient 1, it happened 1 month after.

For both brothers, preoperative examination included the following manoeuvres: Lachman, anterior drawer; pivot-shift; McMurray; Apley; range of motion test; intra-articular leak and muscle trophism (table 1).

INVESTIGATIONS

Patient 2's preoperative MRI showed a torn ACL and longitudinal tear of the posterior horn of the medial meniscus.

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Table 1 Physical examination—preoperative and after 5 years

	Anterior drawer	Lachman	Pivot shift	McMurray	Apley	Range of motion	Trophism
Preoperative patient 2	++	++	++	++	+	Slightly reduced	Normal
Preoperative patient 1	++	++	++	+	0	Normal	Normal
Postoperative 5 years patient 2	++	+	+	0	0	Normal	Normal
Postoperative 5 years patient 1	0	0	+	0	0	Normal	Normal

Figure 1 Preoperative MRI of patient 1.

In patient 1's preoperative MRI, a torn ACL was identified with no meniscal changes (figure 1).

TREATMENT

The chosen surgery technique was the same in both cases: arthroscopic transphyseal ACL reconstruction with hamstrings tendon graft and fixation with interference screw on the tibia and on femur. Patient 2 had an associated lesion of the medial meniscus, which was treated with partial meniscectomy.

The patients were submitted to the same physiotherapeutic protocol for 6 months and was treated by the same physiotherapist until complete reintroduction to sports 8 months after surgery.

Both patients are evaluated once every 6 months; they underwent clinical and imaging evaluation, and responded to validated questionnaires 5 years after surgery for parameter comparison and potential differences deriving from immediate or late reconstruction in patients with immature skeleton.

OUTCOME AND FOLLOW-UP

Patient 2 complains about oedemas after heavy exercises and pain when crouching. Patient 1 does not have any complaints.

Physical examination

No statistical difference was found between patients in relation to results taken from questionnaires applied 5 years after surgery. However, in all results, the numbers for patient 1 (the patient operated a month after injury) were higher than the ones for patient 2 (table 2).

In patient 2's postoperative MRI, we see ACL neoligament with preserved thickness and signal and signs of partial resection of the posterior horn of the medial meniscus (figure 2).

In patient 1's postoperative MRI, we see integral ACL neoligament with preserved thickness (figure 3).

In current X-rays, we can see both patients' reconstructed ACL with no axis changes or length discrepancy between lower limbs.

DISCUSSION

There is disagreement on how to approach ACL injuries in younger patients.^{1 2 4} When facing a patient with ACL injury and instability, many surgeons choose to conduct a more conservative treatment, while others wait for a higher level of skeleton maturity before they can proceed to reconstructing this structure. Although some evidences show that the maturity staging proposed by Tanner has low intraobserver and interobserver concordance,³ especially when performed by orthopaedists, a current trend points to the use of this staging as the basis for treatment administration. In this sense, it is currently believed that patients in stages III and IV must undergo surgery, while patients in stages I and II have become the main focus of debates over the more appropriate approach. Nevertheless, most studies that have led surgeons to consider surgical treatment for patients in stages III and IV are only based on the absence of complications,⁵ even though evidences suggest a low-complication profile also present in initial stages.^{4 6–12} Some studies have tried to identify factors interfering with prognosis and treatment of injuries.^{13–15} In the present study, we attempt to identify in a different way the results obtained in a rare case of twin brothers operated on the same day and in the same place, by the same surgeon, but having different elapsed times after injury. With this effort, we were able to compare two patients with immature skeletons and similar characteristics—same age, height and weight and identical genetic features—and

Table 2 Results from questionnaires applied to both brothers 5 years after ACL reconstruction

Questionnaire	Patient 2	Patient 1
VAS	3	0
Tegner	Preoperative: 9/postoperative: 7	Preoperative: 9/postoperative: 8
Lysholm	90	95
SF-36	124.5	126.6

ACL, anterior cruciate ligament.

Figure 2 Postoperative MRI of patient 2.

Figure 3 Postoperative MRI of patient 1.

only one differentiating factor. Consequently, it was possible to observe that 5 years after both reconstructions the differences found in questionnaires for joint functioning and quality of life, along with physical examination, derive mainly from the elapsed time between injury and surgery. The patient who waited a year before had his ACL reconstructed developed a higher number of associated injuries (meniscus injury), because of which the surgical procedure was more complex and probably became the biggest factor to make this patient develop lower quality of life and knee function ratings. Although this study focuses on only two cases, the similarities between patients and conditions they were submitted to—which voids many confusing factors—have attracted our attention in relation to the different results achieved from both treatment approaches.

Learning points

- ▶ Evaluate Tanner stage.
- ▶ Operate as soon as possible.
- ▶ Longer waiting time between injury and surgery in active patients leads to new injuries.
- ▶ Twins are a good comparison parameter.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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