CASE REPORT

Multiple hybrid sutures of bucket handle injury on the lateral and medial meniscus of the knee

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SUMMARY

The objective of the study is to show possibilities of several combinations of suture techniques in a rare bicompartamental bucket handle injury. According to specific injury characteristics, combined suturing techniques were used. The option for different meniscal suture techniques in the two knee compartments allowed the patient, after completing the treatment, to return to his activities with a preserved meniscus. Although meniscectomy continues to be a chosen technique in bucket handle injury, we attempted to show a case of bicompartamental meniscal suture with different techniques. In this, which could be a case of rapid resolution and quick return to activities with bicompartamental meniscectomy, we chose to preserve the menisci with more complex techniques and longer rehabilitation, believing that the preservation of this structure could be extremely valuable in the long term.

BACKGROUND

The incidence of meniscal injuries makes up 0.74/1000 inhabitants per year in American population, being 10 times more common in active young population.^{1 2} About 10% of meniscal injuries are bucket handle; it occurs in horizontal and vertical lesions, when the meniscus central part moves towards the intercondylum, maintaining the peripheral insertion. The injury mechanism involves a combination of compression and torsion forces. The patient may evolve with pain, instability and mechanical blockage.³⁻⁶ The treatment for bucket handle meniscus injuries is surgical. Although the meniscectomy presents 85% of good to excellent functional results in 20 years, the indication is limited (white-white area, horizontal injuries, degenerative injuries, patients >30 years) due to direct association with degenerative arthritis.^{7 8}

The ideal treatment seems to be meniscal suture, with success rates from 70% to 90%. The success includes greater width of meniscal border, concomitant anterior cruciate ligament (ACL) reconstruction, shorter length and shorter injury time. Width of lesion border is the most important factor.^{9 10} All-inside, inside-out and outside-in meniscal repair techniques were described for bucket handle injuries, none of which proved to be superior.^{4 11 12} The suture failure in bucket handle injuries with the outside-in technique was 17%, and with the all-inside technique was 19% in 38.1 months of follow-up.⁵ The current trend is suture combination, inside-out technique to mid-third lesion and all-inside technique for posterior lesions. The technique combination benefits include a lower risk of neurovascular injury with all-inside and a lower cost with the inside-out suture.¹¹ The hybrid technique was successful in 89.6% of 67 bucket handle injuries associated with ACL lesions.⁹ The case report's objective is to show the possibility of meniscal suture combination techniques in a rare simultaneously bicompartamental bucket handle injury.

CASE PRESENTATION

A 33-year-old man, 1.70 m, 75 kg, suffered left knee sprain during a squash match. The patient heard a knee click and evolved with intense oedema and knee pain, with gait limitation. He was taken to the emergency room, where temporary immobilisation with orthopaedic brace (extension) and crutches for analgesia was performed. Analgesic and anti-inflammatory medication were prescribed.

INVESTIGATIONS

He returned 15 days later when he was examined and diagnosed with a bicompartamental meniscal injury and knee ligament instability (table 1).

Magnetic resonance showed ACL and bicompartamental bucket handle meniscus injury (figure 1). Surgical treatment was chosen for ACL reconstruction and meniscal repair.

DIFFERENTIAL DIAGNOSIS

Partial ACL injury and simple meniscal injury.

Treatment

During the surgery, an anteromedial route was performed for hamstring graft harvest in a tourniqueted knee. Arthroscopy through the anteromedial and anterolateral portals was performed. The joint inventory showed a bucket handle meniscus

Figure 1 Magnetic resonance. Coronal (A) and sagittal (B) sections demonstrating bicompartamental lesion in bucket handle.

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Table 1 Physical examination performed 15 days after the initial injury: anterior cruciate ligament (ACL), bilateral meniscal lesion, normal alignment and motor force + refers to the intensity of the test (+ less positive test, +++ more positive test).

ACL	
Anterior drawer test	+++
Lachman	++
Pivot shift	+++
Meniscus	
Apley	+
McMurray	+
Smillie	+
Alignment	Neutral
Motor strength	Grade V

injury in lateral compartment affecting posterior and medial thirds of the meniscus. In medial compartment, there was also a bucket handle injury, with intercondylar dislocation, involving the posterior third. An ALC complete injury was present (figure 2). Starting from the lateral compartment, two vertical sutures were performed using the all-inside technique with meniscal viper (Arthrex) in posterior horn. A 3 cm posterolateral longitudinal incision was made in the posterolateral region for middle meniscal suture using the inside-out technique. Three vertical sutures were made with meniscal protector (Arthrex), sutured in posterolateral capsule, after neurovascular protection. In medial compartment, after a 3 cm posteromedial incision, in posterior meniscal horn, the meniscus was reduced by vertical suture and two more sutures in 'X' were made with meniscal protector (Arthrex). The nodes were tied to the capsule (figure 3). After suture was completed, ACL reconstruction was performed.

OUTCOME AND FOLLOW-UP

After surgery, a brace was performed. Physiotherapy was started after 7 days of surgery, following the rehabilitation protocol. The patient was hospitalised for 24 hours, receiving prophylactic antibiotic therapy and analgesia during this period; he was discharged from hospital without complaints, wandering with partial load and orthopaedic brace immobilisation. He underwent a rehabilitation protocol for the ACL, avoiding flexion in the first two weeks. After 12 months of surgery, the patient returned to his sport activities without any restrictions or complaints (table 2).

Figure 2 Arthroscopic view of bucket handle lesions. Medial meniscus is dislocated until the intercondylar notch (A) and reduced in lateral compartment (B).

Figure 3 Surgical technique. (A–C) The medial meniscus suture by the all-inside technique. (D–F) The suture, also of medial meniscus, by the inside-out technique. (G–I) The lateral meniscus suture by the inside-out technique.

Table 2 Physical examination 12 months after meniscal suture surgery and anterior cruciate ligament (ACL) reconstruction: slight anterior tibial translation, no rotational instability or meniscal pain, normal alignment and motor force + refers to the intensity of the test.

ACL	
Anteriordrawer test	+
Lachman	–
Pivot shift	–
Meniscus	
Apley	–
McMurray	–
Smillie	–
Alignment	Neutral
Motor strength	Grade V

DISCUSSION

The use of hybrid sutures is based on the fact that there is no superiority between the types of meniscal sutures¹³ and the excellent results presented in the studies using combined techniques.^{4 9 11 14} It is known that all possibilities of sutures avoid risks and associated benefits.^{15–21}

Bucket handle injury makes up 10% of meniscal lesions and is extremely rare when it occurs simultaneously in two compartments (Jack and Jill's injury). In addition, the number of meniscal postsuture failure is greater in bucket handle lesions; it may occur up to 23%.^{22–27} The preference for partial meniscectomy in these cases is usual because it requires less surgical time and makes an earlier return to activities. However, it is known that meniscus plays a fundamental role in knee joint and its resection is associated with early joint degenerative processes. It is believed that meniscal repair should be stimulated whenever possible.⁵

In general, the meniscus can heal in 70%–90% of suture cases. According to the technique used, the failure of healing can vary, reaching 17% of cases in the outside-in sutures, up to 19% in all-inside sutures in a study with a follow-up of 38.1 months

post surgery. More recent studies show that the combination of two or more techniques decreases the failure rate from 11% to 17% of the cases.^{4 9 11 14}

Considering a rare case of bicompartamental bucket handle injury, we show good results obtained by the application of combined repair techniques, allowing the patient an adequate sport practice return. Good short-term results with bicompartamental meniscectomy can be seen in similar situations, but the main complication does not appear at this time; a bicompartamental meniscectomy involves a large meniscal area, resulting in biomechanical changes and increasing the risk of joint degeneration. Therefore, meniscal suture should always be attempted, especially in extensive lesions such as bucket handle lesions.^{6 24}

We know that meniscus strength repair depends on the amount of meniscal tissue collected, the configuration of the suture and the distance of lesion site from suture entry point.²⁸ It is not enough to perform the suture with hybrid techniques, but correctly characterising the lesion in order to define the technique to be used is essential. In our study, we used the maximum X sutures, seeking to combine the effects of vertical and oblique suture techniques, respecting the characteristics of the bucket handle injury presented. Vertical sutures are stronger than horizontal sutures and oblique sutures and also provide greater resistance to fixation due to the inclusion of a greater amount of meniscal tissue, leading to a greater suture–meniscal interface, reducing the impact of stress on the suture line and increasing repair tolerance.²⁹

Although meniscectomy remains the chosen technique in bucket handle injury, we showed a case in which the option for meniscal suture with different techniques in bicompartamental meniscus allowed the patient to return to his activities with the meniscus preserved. In what would be a case of rapid resolution, with bicompartamental meniscectomy and rapid return to activities, we chose to preserve their menisci with more complex techniques and longer rehabilitation, believing that the preservation of this structure can be of extreme value in the long term.

Learning points

- ▶ Meniscus should be preserved whenever possible.
- ▶ Good short-term results with meniscectomy to treat bucket handle injury of the meniscus do not avoid future osteoarthritis appearance.
- ▶ Hybrid sutures show better results than isolated techniques.
- ▶ Hybrid suture benefits include a lower risk of neurovascular injury and lower cost.
- ▶ X sutures group the best characteristics of vertical and oblique sutures.

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