Rare disease

Locked bucket-handle tears of both medial and lateral menisci with simultaneous anterior cruciate and medial collateral ligaments injury

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Summary

The authors report the case of a 38-year-old male who presented to the accident and emergency department with a locked knee after falling from a height. The knee was locked at 35° of flexion without any signs of instability in clinical examination. The patient was operated within 6 h from injury. During arthroscopy bucket-handle tears of both medial and lateral menisci were found. The bucket-handle fragments were displaced into the intercondylar notch causing the knee to lock. Additionally, tears of the anterior cruciate ligament (ACL) and the medial collateral ligament (MCL) were also found. The patient underwent ACL reconstruction with hamstrings autograft, medial subtotal meniscectomy and lateral meniscus repair. The MCL was treated conservatively. The postoperative period was uneventful and the patient returned to the preinjury level of activity within 8 months. The patient remains asymptomatic 2 years postoperatively.

BACKGROUND

Locked bucket-handle tears of both medial and lateral menisci with simultaneous anterior cruciate ligament (ACL) injury is an extremely rare injury with only four cases reported so far. In contrast with all other cases reported to date^{1–4} and despite the fact that our patient had additional medial collateral injury, no signs of clinical instability could be detected. Moreover, issues such as mechanism of injury,

postoperative rehabilitation and follow-up have not been adequately discussed so far.

CASE PRESENTATION

A 38-year-old male presented to our emergency department after a knee injury which he sustained after falling from a height (1 m). The patient did not report any previous injuries of the affected knee or symptoms of instability

Figure 1 The displaced bucket-handle meniscal fragments along with the torn ACL and the intact PCL in the intercondylar notch.

(giving way) in the past. The knee was swollen and locked in 35°. Both active and passive flexion and extension were impossible. The knee was tender in the medial and lateral joint line. No signs of anteroposterior, mediolateral or rotational instability were detected during the clinical evaluation. The anteroposterior and profile x-rays were normal.

TREATMENT

The patient was admitted in our department and was operated within 6 h of injury. During arthroscopy bucket-handle tears of both medial and lateral menisci were found. The bucket-handle fragments were displaced into the intercondylar notch causing the locked knee (figure 1). The ACL was also found to be torn (figure 1). After reduction of the menisci, a thorough examination of both medial and lateral meniscus was performed to decide whether to proceed in meniscectomy or repair. The valgus stress applied for medial compartment examination revealed medial collateral ligament (MCL) injury (video 1). Moreover, a second undisplaced longitudinal tear was found in the medial meniscus making it a double bucket-handle tear (video 2). As a result, the torn part of the medial meniscus was excised. The lateral meniscus tear was found non-degenerative and was repaired with an all-inside, suture-based, technique. The ACL was reconstructed using hamstrings autograft (semitendinosus-gracilis) and the MCL was treated conservatively. Postoperatively, a functional brace and crutches were used to limit knee motion and protect the MCL and lateral meniscus repair. During the first 3 weeks, partial weight bearing and a range of motion 0°–60° were permitted. During the 4th, 5th and 6th weeks, weight bearing as tolerated and a range of motion 0°–90° were permitted. Following the 6th week, the brace was discontinued but deep squats were prohibited for 4 months to protect lateral meniscus repair.

Video 1 MCL injury.

Video 2 Double longitudinal bucket-handle medial meniscus tear.

OUTCOME AND FOLLOW-UP

The patient returned to the preinjury level of activity (Tegner score 5) at 8 months. The criteria used to discharge the patient were: (1) full range of motion, (2) no signs of instability, (3) satisfactory muscle strength (95% compared to the uninjured side) and (4) normal proprioception (leg hop test). Two years postoperatively, the patient remains asymptomatic and the subjective evaluation with the Lysholm score is 92 while the objective evaluation according to the IKDC is grade A.

DISCUSSION

Locked bucket-handle tears of both medial and lateral menisci with simultaneous ACL injury is a rare type of injury with only four cases^{1–4} as far as we are aware being reported in the English literature so far. What makes our case unique is the fact that no symptoms or signs of instability could be found in clinical examination despite the ACL and MCL insufficiency probably due to the locked bucket-handle tears that kept the knee stable. One might argue that some of the injuries found in our case might have occurred in the past. Nevertheless, the patient did

not report any previous injuries of the affected knee or symptoms of instability allowing us to conclude that the ACL and MCL tears were acute and because of the injury. There is a possibility that our patient had an old degenerative tear of the menisci. However, he was asymptomatic without pain or locking of the affected knee. It has been reported that horizontal or oblique meniscal tears are frequently encountered in asymptomatic knees while radial, vertical, complex and displaced meniscal tears are found almost exclusively in symptomatic knees.⁵ In our case, both medial and lateral meniscal tears were bucket-handle tears (vertical, longitudinal) that were displaced into the notch. Keeping that in mind and based on arthroscopic exploration of the tear pattern, our assumption is that the complex tear of the medial meniscus was the result of the trauma onto a degenerative meniscus, while lateral meniscal tear was caused solely by the injury. All the other cases reported to date^{1–4} were either chronic cases with symptoms of giving way or were positive for Lachman-Noullis test.

The mechanism of such a complex injury has not been adequately discussed so far. There is only one report⁴ of a boot-induced anterior drawer mechanism in a skier due to landing on the back tips of the skis. In our case, a combination of knee valgus, hip internal rotation and tibial rotation during landing in the injured leg could be detected from patient's history, which is the 'valgus collapse' mechanism, commonly seen in ACL injuries.⁶

We did not use MRI for preoperative evaluation and planning. One might argue that MRI is mandatory for correct diagnosis and operation planning. Nevertheless, in our clinical setting, an MRI is not available as an emergency diagnostic tool. As a result, cases that should be investigated by MRI have to be referred to another hospital and then return back, thus causing a delay in the final treatment. The locked knee is a clinical situation requiring immediate treatment and since the x-rays were normal, bucket-handle meniscal tear was the most likely diagnosis and arthroscopic surgery, the appropriate treatment.⁷ ACL tear could also impair knee range of motion and even partial ACL tear could result in extension deficit but not in locked knee.⁸ Consequently, bucket-handle meniscal tear was expected from clinical presentation while ACL tear could only be suspected from patient's history (mechanism of injury). Consequently, we proceeded in knee arthroscopy without further investigations being prepared to deal with meniscal pathology and ACL tear as well. However, MRI is a valuable diagnostic tool that should be used, if available, for accurate diagnosis and better preparation of surgery. Bugnone *et al*¹ described the quadruple cruciate sign in which four structures are demonstrated in the coronal images: the ACL, posterior cruciate ligament (PCL) and the medial and lateral bucket-handle meniscal fragments. Kakel *et al*⁶ reported the triple PCL sign in which in the sagittal view, the PCL and the two meniscal fragments lying in the notch are seen.

The type of surgery performed was similar in all published cases so far with ACL reconstruction and meniscus repair whenever a non-degenerative tear in the vascularised area of the medial or lateral meniscus had been encountered. In our case, the medial meniscus tear was a complex degenerative one (double longitudinal tear) and

therefore medial subtotal meniscectomy was performed. Postoperatively, we used crutches and brace for 6 weeks as Tecklenburg *et al*⁴ used in their case. In fact, these two cases are almost identical in clinical presentation, having additional MCL injury and timing of surgery, within 8 h of injury. It is of interest that their patient developed arthrofibrosis that required a second operation to resolve the symptoms. The patient was followed for 6 months after the initial surgery without any other complications. Tecklenburg *et al*⁴ reported that the arthrofibrosis in their patient might have resulted by the extensive initial surgery. Information regarding physiotherapy regime, complications and more importantly follow-up evaluation, are not given in the other cases reported.^{1–3} This kind of injury is a complex one and in our opinion long-term follow-up will only reveal the natural history of such cases.

Learning points

- ▶ Locked knee is a clinical emergency in which substantial instability could be hidden.
- ▶ Patient's history and mechanism of injury remain a valuable diagnostic tool.
- ▶ When simultaneous bicompartamental medial and lateral bucket-handle meniscal tears are encountered, a complex injury should be suspected and a thorough examination should be performed.
- ▶ Orthopaedic surgeons dealing with this kind of injuries should be prepared to address meniscal pathology and ligamentous or chondral injury as well.
- ▶ ACL reconstruction and meniscus repair in non-degenerative tears, offer a satisfactory clinical outcome in these complex cases.

Competing interests None.

Patient consent Obtained.

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