Simultaneous Bicompartamental Bucket Handle Injury Associated With a Chronic Anterior Cruciate Ligament Rupture: Case Report and Literature Review

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Abstract

Introduction: Simultaneously locked bucket handle injury of both menisci is a rare phenomenon. Clinically the knee is locked in flexion with pain in both joint lines. It has a high association rate with instability generated by an anterior cruciate ligament injury (ACL). There are a few reports regarding this association or without any associated injury treated either in one-stage or two-stage surgery.

Objective: To report a patient with a simultaneous bicompartamental locked bucket handle, highlighting the challenges of the surgical technique and a literature review.

Case Report: We present the case of a 42-year-old male with a simultaneous bicompartamental locked bucket handle injury associated with chronic ACL deficiency. Treated in one stage by bilateral partial meniscectomy and ACL reconstruction. We discuss the MRI findings, treatment options and performed an up-to date review.

Conclusions: Although partial meniscectomy is a common procedure, when performed in an unusual patient and in the absence of therapeutic guidelines or consensus when dealing with this association, an appropriate preoperative plan should be followed. This case provides a perioperative approach focused on a review of the most recent literature.

Introduction

Bucket handle injury is a vertical longitudinal tear of the meniscus where the internal fragment migrates towards the intercondylar notch, while the peripheral fragment remains in its insertion (1). The incidence of this type of injury is about 10% within all meniscal lesions, being this type of injury three more times frequent in the internal compartment. There are few reports of simultaneous involvement of the lateral and medial meniscus. Brammer et al. described for the first time an image of a bilateral "bucket handle" injury to the medial and lateral menisci associated with an Anterior Cruciate Ligament (ACL) tear, and named it "Jack and Jill injury" (2). The aim of this study is to present a case of a 42-year-old male with a simultaneous bicompartamental locked bucket handle injury associated with chronic ACL injury. Treated in one stage by bilateral partial meniscectomy and ACL reconstruction. The second outcome is to present the first review of the literature regarding this association of conditions.

Case

We present a 42 years old construction worker who consults for pain and a flexed blocked knee. He refers trauma to the left knee with a flexion and rotation mechanism when descending a slope. The physical examination revealed a moderated joint effusion with an extension deficit of approximately 20° and a Lachman, Anterior Drawer and Pivot Shift positive tests. Varus and valgus stress tests without particularities. Pain in both joint interlines increased in Mc Murray tests. Magnetic Resonance Imaging (MRI) showed a bicompartamental bucket handle injury displaced into the intercondylar groove and a complete chronic rupture of the ACL and an intact Posterior Cruciate Ligament (PCL). (Figures 1,2 and 3)

Treatment was performed by arthroscopic surgery five weeks after the trauma. During the exploratory arthroscopy, a bilateral bucket loop meniscus injury was evidenced with dislocation of both of them to the intercondylar notch. A small remnant of ACL was also observed in both insertions, supporting the hypothesis that it was a chronic injury. (Figure 4)

A knee arthroscopy was then indicated. A reduction and partial bilateral meniscectomy were performed, since both injuries were not plausible for meniscal suture. During the same surgical time, the ACL was reconstructed using a transtibial tunnel with an inside-out technique. An autologous semitendinosus-gracilis graft in a quadruple configuration was used and fixed into the femur using a cortical endo-button system and tibial fixation with a blunt titanium screw (Figure 4). The patient had no postoperative complications.

At one year of follow up, the patient was painless and had a stable knee with a full range of motion (ROM).

Discussion

Bucket handle injuries are longitudinal vertical tears of the meniscus that can move centrally to the intercondylar region. Clinically it manifests with pain, edema, instability and mechanical block with extension deficit. The incidence of meniscal injuries during an acute ACL tear is approximately 50%, while it increases to 80% with chronic injuries. (6) The single meniscus bucket handle generally occurs in young adult athletes, mostly soccer players and more frequently in the medial meniscus. According to the cases reported to date with simultaneous bilateral meniscus, the mean age of presentation was 30 years (range 18-42 years).

MRI is the Gold Standard diagnostic method with the highest sensitivity and specificity (around 90%). Classically, different MRI signs have been described for unicompartamental bucket-handle meniscal injuries(10, 11, 12, 13). Bugnone et al. described the “Quadruple cruciate sign” in a coronal STIR T2-weighted image, as the only MRI specific sign for bicompartamental bucket handle lesion (14). (Figure 1)

Regarding the management of meniscal injuries, we decided to perform partial meniscectomy of both bucket handles, since during the arthroscopic examination we evidenced degenerative changes in both meniscus. It is probably due to the chronicity of the ACL tear, not complying with the criteria needed for meniscal repair (15). In 5 of the 7 reported cases, the treatment performed was partial meniscectomy of both bucket handles. In another publication they performed a partial meniscectomy of one meniscus associated with meniscal suture of the other. None of them had complications in the short or medium term. Tecklenburg et al reported arthrofibrosis as the only complication found after meniscal suture in both meniscus and ACL reappearing in a single surgical time. A second intervention within the first 3 postoperative months was required to improve the ROM (1, 4, 5, 6, 7, 8, 9, 16). (Table 1)

Conclusion

Simultaneous bucket-handle injury of the meniscus is rare and uncommon. It may or may not be associated with an ACL injury, but if it is, it is usually linked to a chronic ACL deficiency. The treatment for these injuries is arthroscopic surgery. In those cases where bilateral partial meniscectomy and arthroscopic reconstruction of the ACL were performed in a single surgery, good results were demonstrated as in our experience. If a meniscal suture of both meniscus is performed, some authors suggest reconstructing the ACL in a second surgical time.

Declarations

- i. Funding: No funds of any kind were received to carry out this study.
- ii. Conflicts of interest/Competing interests: Author A declares that he has no conflict of interest. Author B declares that he has no conflict of interest. Author C declares that he has no conflict of interest. Author D declares that he has no conflict of interest. Author E declares that he has no conflict of interest. Author F declares that he has no conflict of interest.
- iii. Ethics approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.
- iv. Consent to participate: Written consent was obtained from the patient included in the study.
- v. Consent for publication: The patient has given written permission for publication.
- vi. Availability of data and material: 'Not applicable'
- vii. Code availability: 'Not applicable'
- viii. Authors' contributions: Author A: Idea, redaction. Author B: Redaction, review, translation. Author C: Redaction. Author D: Review . Author E: Review. Author F: Idea, review.

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Table

Table 1: Literature review.

Author	Year	Age of patient	Type of injury	Treatment	Complications	Follow up/ month
Cetik et al.	2006	30	SBBH with chronic ACL injury	PM of both menisci + ACLR with SGG in 1 stage	NR	NR
Tecklenburg et al.	2007	19	SBBH with acute ACL injury	First surgical time: MI: 6 sutures outside-in + 1 all inside suture. EM:4 all inside sutures + R-ACL (ST-G hamstring autograft)	Arthrofibrosis: Needed surgical resolution al 3 months	Return to sports at 9 months
Wright et al.	2010	38	SBBH without ACL injury	PM of both menisci	NR	1.5
Lykissas et al.	2010	28	SBBH without ACL injury	PM of both menisci	NR	12
Sheperd et al.	2012	18	SBBH with chronic ACL injury	2 stages: 1. Internal PM + EMS with 3 points all inside 2. ACLR with SGG at 6 weeks	NR	NR
Yang et al.	2015	30	SBBH with acute ACL injury	PM of both menisci + ACLR in one stage	NR	12
Barret et al.	2015	41	SBBH without ACL injury	PM of both menisci	NR	NR
Our case	2020	42	SBBH with chronic ACL injury	PM of both menisci + ACLR with SSG in one stage	NR	12

Legends. SBBH Simultaneous bicompartmental bucket handle, PM Partial meniscectomy, IMS Internal meniscus suture, EMS External meniscus suture, ACLR anterior cruciate ligament reconstruction, SGG Semitendinosus-gracilis graft, NR Not reported

Figures

Figure 1

PD FATSAT coronal MRI. Normal anatomy in an asymptomatic patient in A. In B and C our patient with a two-compartment bucket handle tear. Note Anterior Cruciate Ligament (short arrow in A) and posterior (long arrow in A and B), internal (star) and external (asterisk) meniscus. The posterior cruciate ligament is normal (red area). The anterior cruciate ligament is incomplete and presents an increased signal secondary to a tear in our patient (blue area). The intercondylar medial meniscal fragment is shown in yellow, and the external in green. This findings e findings are compatible with a bucket-handle tear in both menisci.

Figure 2

Sagittal T2 PD MRI. Internal parasagittal section in A, with double delta or inverted meniscus sign, represented by the anterior horn of the medial meniscus (thick black arrow) and a migrated and anteriorly rotated fragment (thin black arrow). Posterior double cruciate sign formed by the intercondylar meniscal

fragment (thin white arrow), and the intact posterior cruciate ligament (thick white arrow). In B a contiguous section showing the bucket handle in the intercondylar region (thick arrows).

Figure 3

PD FATSAT axial MRI. In A, note longitudinal bilateral meniscus tear, with displacement of meniscal fragments towards the intercondylar fossa. Medial meniscal fragment (thin arrows), and lateral fragment (thick arrows). In B a schematic image representing the structures marked in the resonance of figure A.

Figure 4

Arthroscopic view. Dislocated medial and lateral bucket loop injury from anterolateral portal to the intercondylar fossa (black arrows) (A). Insertion of the ACL at the femoral level, with a disruption of it (B). Bilateral partial meniscectomy (C). Arthroscopic ACL reconstruction with quadruple ST-R1 (D).

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