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Original article

# Results with all-inside meniscal suture in pediatrics

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ABSTRACT

*Introduction:* Incidence of meniscal lesions is increasing in the pediatric population. Given the harmful impact of meniscectomy, meniscal repair is attempted whenever possible. The present study sought to assess the efficacy of FasT-Fix (Smith and Nephew) all-inside arthroscopic meniscal repair devices in childhood meniscal lesions. The study hypothesis was that functional results would be equivalent to those of other suture techniques.
*Material and methods:* Nineteen patients were assessed following arthroscopic meniscal repair, at a mean 6 years (range: 3–9 years). Mean age was 14.8 years. There was associated ACL tear in 31% of cases. Functional assessment used Lysholm, subjective IKDC, Tegner activity level and KOOS scores. Anatomic assessment of healing used MRI, arthroscopy or CT-arthrography.
*Results:* At last follow-up, the meniscal survival rate was 89.5% ($n = 17/19$). Functional results were good: Lysholm: 95.7/100; subjective IKDC: 90.7/100; Tegner: 7.64. Imaging found systematic healing.
*Discussion:* All-inside arthroscopic meniscal suture is increasingly used in adults, and can also be implemented in children or adolescents in pediatrics. FasT-Fix (Smith and Nephew) implants, although not always easy to use, ensure a perfectly functional knee and conserve long-term meniscal chondroprotection with a low risk of complications.
*Level of evidence:* IV, retrospective study.



## 1. Introduction

Childhood traumatic meniscal lesions, often with associated anterior cruciate ligament (ACL) tear, make up less than 0.15% of cases of knee trauma [1,2]. Incidence is increasing [3,4], due to increasing intensive sports activity in children and improved diagnostic performance by MRI [5]. Clinical presentation is as in adults: initial hemarthrosis, blocked meniscus, and pain at the joint line. These lesions, therefore, require specific treatment.

Due to the risk of progression toward osteoarthritis, in both adults [6–14] and children [15,16], meniscectomy is contraindicated. Meniscal sparing, which is unanimously accepted, calls for extending indications for meniscal repair to children, with an inherent risk of failure [17,18].

Repair was formerly performed as open surgery [19], and then arthroscopically, with an in-out or out-in procedure [20–24], using bioresorbable implants [25]; nowadays, an all-inside procedure is performed using FasT-Fix suture (Smith and Nephew). These implants are effective in adults [26–28] and can be used in children.

Lucas's team in Toulouse (France) recently published functional results in pediatric meniscal suture [29], using various arthroscopic techniques, with a mean 2 years' follow-up. The present study focused on FasT-Fix, in a similar population, at 6 years' follow-up.

The study hypothesis was that functional results using FasT-Fix would be similar to those of other suture techniques.

The main objective was to assess medium-term functional results of all-inside meniscal repair using FasT-Fix implants (Smith and Nephew) in a pediatric population.

The secondary objective was to assess healing rates with this technique.

## 2. Material and methods

### 2.1. Population

Twenty-two arthroscopic suture procedures for traumatic meniscal lesion were retrieved from the department's database for the period January 1st, 2006 to January 1st, 2013. Discoid meniscal

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**Table 1**
Functional scores.

| | Side | Meniscus | LCA | Healing | IKDC | Lysholm | Tegner before injury | Tegner after | KOOS Symptoms | KOOS pain | KOOS daily | KOOS Sport | KOOS life quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Patient nº 1 | Left | Lateral | No | Yes | 100 | 100 | 7 | 7 | 100 | 100 | 100 | 100 | 93.75 |
| Patient nº 2 | Right | Medial | KJ | Yes | 78.16 | 97 | 7 | 7 | 75 | 86.11 | 91.67 | 60 | 75 |
| Patient nº 3 | Left | Lateral | Clocheville | Yes | 91.95 | 99 | 9 | 7 | 92.86 | 97.22 | 100 | 80 | 81.25 |
| Patient nº 4 | Right | Medial | KJ | Meniscectomy | | | | | | | | | |
| Patient nº 5 | Right | Lateral | KJ | Yes | 75.86 | 94 | 9 | 7 | 89.29 | 97.22 | 100 | 90 | 75 |
| Patient nº 6 | Right | Lateral | Clocheville | Yes | 87.36 | 94 | 8 | 8 | 85.71 | 96.88 | 100 | 95 | 62.5 |
| Patient nº 7 | Right | Medial | No | Meniscectomy | | | | | | | | | |
| Patient nº 8 | Left | Lateral | Clocheville | Yes | 70.11 | 70 | 7 | 5 | 64.29 | 77.78 | 86.11 | 70 | 25 |
| Patient nº 9 | Right | Lateral | Clocheville | Yes | 90.8 | 100 | 9 | 10 | 100 | 100 | 100 | 90 | 100 |
| Patient nº 10 | Left | Medial | KJ | Yes | 98.85 | 100 | 7 | 7 | 100 | 97.22 | 100 | 90 | 100 |
| Patient nº 11 | Right | Lateral | No | Yes | 98.85 | 100 | 7 | 7 | 100 | 100 | 100 | 95 | 100 |
| Patient nº 12 | Left | Lateral | No | Yes | 98.85 | 100 | 9 | 9 | 82.86 | 97.22 | 100 | 95 | 93.75 |
| Patient nº 13 | Left | Lateral | No | Yes | 93.1 | 82 | 9 | 9 | 89.29 | 97.22 | 95.83 | 95 | 93.75 |
| Patient nº 14 | Right | Medial | No | Yes | 89.66 | 100 | 8 | 8 | 96.43 | 97.22 | 100 | 100 | 93.75 |
| Patient nº 15 | Right | Lateral | Clocheville | Yes | 97.7 | 100 | 9 | 9 | 92.86 | 100 | 100 | 95 | 93.75 |
| Patient nº 16 | Left | Lateral | No | Yes | 86.21 | 96 | 3 | 3 | 92.86 | 97.22 | 100 | 10 | 81.25 |
| Patient nº 17 | Right | Lateral | Clocheville | Yes | 95.4 | 100 | 7 | 7 | 92.86 | 97.22 | 100 | 95 | 93.75 |
| Patient nº 18 | Left | Lateral | Clocheville | Yes | 100 | 100 | 7 | 7 | 100 | 100 | 100 | 95 | 100 |
| Patient nº 19 | Left | Lateral | No | Yes | 89.66 | 95 | 8 | 7 | 100 | 97.22 | 98.61 | 80 | 87.5 |

lesions and open arthrotomy procedures were excluded. Two patients were lost to follow-up, and 1 refused to respond. Thus, 19 patients with arthroscopic suture using FasT-Fix devices for traumatic meniscal lesion were included, with the following data: age, gender, side, activity level, and arthroscopic lesion assessment with diagram of lesions and sutures (Appendix A).

Nineteen patients (Table 1) were followed up at a mean 6.1 years (range: 3–9 years): 12 boys, 7 girls; 11 right knees; mean age: 14.8 years (range: 9.1–16.3 years).

There were 14 lateral meniscal lesions: 11 posterior and 3 medial segments, with 4 vertical fissures, 4 bucket-handle dislocations (Fig. 1), 2 horizontal fissures, 2 parietal lesions and 2 radial lesions. The 5 medial meniscal lesions were all bucket-handle dislocations, 3 of the medial and 2 of the posterior segment.

There was associated ACL tear in 11 cases (61%), treated by Kenneth-Jones arthroscopic ligamentoplasty in 4 cases and by Clocheville ligamentoplasty in 7 knees in which the growth plate had not closed.

### 2.2. Procedure

Surgery was performed entirely under arthroscopy, with an anterolateral and an anteromedial approach. When arthroscopic exploration found a lesion in the red or red-white region, the edges were freshened and suturing was performed with one or more FasT-Fix devices (Smith & Nephew) every 5 mm, to achieve satisfactory intraoperative stability (Fig. 2). In case of associated ACL tear, ligamentoplasty was performed in the same step. Femoropedal cast immobilization was implemented for 45 days, to control rotation.

### 2.3. Functional assessment

A telephone interview assessed physical activity before trauma and at last follow-up, on Tegner score [30,31] (Appendix B). Functional results were assessed on Lysholm [32] (Table 2), International Knee Documentation Committee (IKDC) and Knee Injury and Osteoarthritis Outcome Score (KOOS) scores.

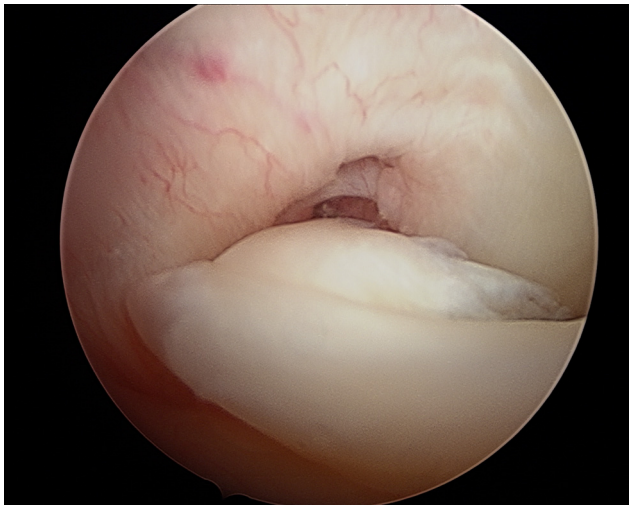

**Fig. 1.** Bucket-handle meniscal lesion.

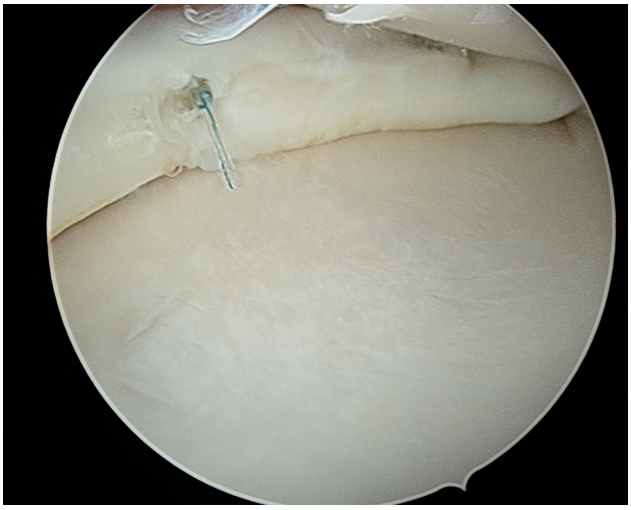

**Fig. 2.** FasT-Fix suture.