



Long-term outcome after all inside meniscal repair using the FasT-Fix system[☆]



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ABSTRACT

Purpose: Meniscal surgery is one of the most performed orthopaedic procedures. Because of its chondroprotective properties, meniscal repair should be attempted whenever possible. Several techniques are described in literature, e.g. all-inside repair using FasT-Fix System from Smith & Nephew. The aim of this study was to evaluate the outcome at a minimum of 12 years following meniscal repair using FasT-Fix System.

Materials and Methods: Patients who underwent meniscal repair using FasT-Fix System in the time from 2001 to 2003 were analyzed. We included isolated meniscal tears and combined tears with a concomitant ACL rupture. A median 12-year follow-up was conducted in 2015. Failure was defined as a new surgical procedure to the same meniscus. Moreover, functional outcome was evaluated using the KOOS and tegner activity score (TAS).

Results: At follow-up 27% had undergone further surgery to the repaired meniscus. There was no significant difference between isolated and combined group ($p = 0.582$). The failure rate was significantly higher in females (female 48% versus male 15%; $p = 0.005$). Comparing sports there was a significantly higher failure rate within soccer and indoor sports group ($p = 0.002$).

Comparing isolated and combined injury groups there was no difference in the TAS ($p > 0.05$). Only 1 item of KOOS showed no significant difference: 95.33 versus 94.48 for daily life activities ($p > 0.05$). The other items showed significant differences.

49 out of 51 patients with combined injuries suffered an additional ACL rupture. There was no significant difference regarding the meniscal repair failure rate when comparing the groups of simultaneous and delayed ACL repair ($p = 0.521$).

Conclusions: At 12 years' follow-up 73% had a successful surgery. KOOS was significantly better within isolated meniscus tears. Both groups showed no difference in the TAS. There were no differences regarding failure rate in the comparison of simultaneous or delayed ACL-reconstruction.

1. Introduction

Meniscal lesions are commonly found during knee arthroscopies,¹ in order to treat these injuries arthroscopic partial meniscectomy is one of the most performed orthopaedic surgeries worldwide.^{2–4} However the loss of meniscal tissue can lead to an early onset of osteoarthritic changes in the long term.^{5–8} In pediatric and adolescent patients meniscectomies seem to be even more disadvantageous.^{9,10}

Many studies have shown a chondroprotective effect of meniscal preservation in the recent years.^{11,12} Therefore, meniscal repair should be attempted whenever possible. To perform meniscal repair a variety of techniques were described over the years. In the 1980s arthroscopic techniques were evolved in order to achieve a shorter rehabilitation period, a better visualization and a lower morbidity.^{13,14} In 1980

Charles Henning introduced an inside-out technique,¹⁵ but there was a potential risk of neurovascular injuries. Therefore Russel Warren developed the outside-in technique to reduce neurovascular complications.¹⁶ Finally the all-inside technique was introduced by Craig Morgan in 1991.¹⁷ The procedure was effective but technically demanding. To avoid an additional posterior incision several industrial devices for performing an all-inside meniscal repair were developed – for example the T-Fix device, which was introduced in the mid-1990s.¹⁸ Two anchors were placed near to the tear side and finally tied together. To avoid the manually knot tying the FasT-Fix System (Smith & Nephew) was designed, which attaches two T-Fix suture bar anchors to a nonabsorbable suture. By tightening this suture it forms a tight suture sling between the two T-Fix bars^{19,20} (Fig.1).

The aim of this study was to evaluate the outcome of at least 12

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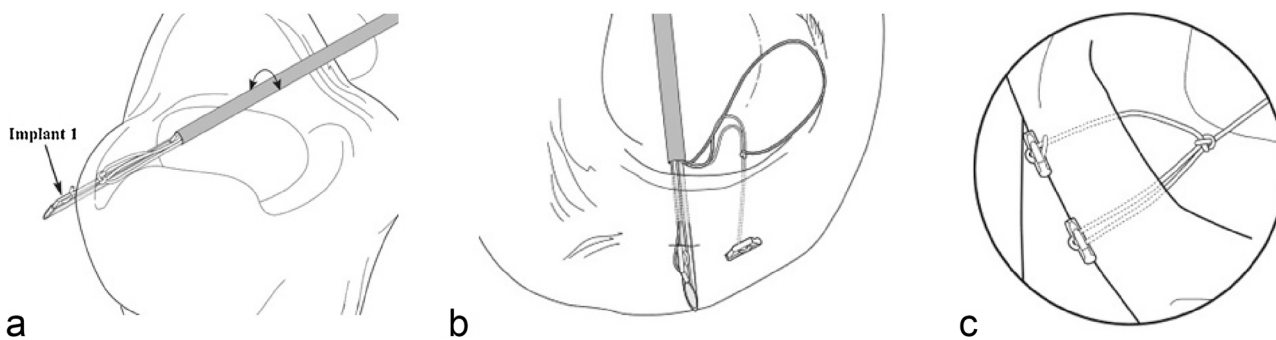


Fig. 1. Scheme of the performed Procedure: a) a needle is pulled through the meniscus releasing implant 1 behind the meniscus b) the needle is inserted approximately 5 mm next to implant 1 on horizontal, vertical or oblique plane in order to release implant 2 c) the needle is removed from the knee and the sliding knot will reduce the meniscal tear (©Smith&Nephew).

years follow-up after meniscal repair using the all- inside FasTFix-System. In addition, we analyzed whether there were any differences between isolated meniscal tears or multiple injured knees.

2. Materials and methods

Between January 2001 and December 2003, a total of 325 patients underwent all-inside meniscal repair using the FasT-Fix System (Smith & Nephew). We retrospectively analyzed these patients at a follow-up of at least 12 years (mean follow-up: 155 months (136–171)). Human research ethics approval was obtained from the local review board (No. F-2015-007, Ethikkommission Landesärztekammer Baden-Württemberg, Germany) prior to the initiation of any study activities. We tried to contact all patients by mail or telephone call and, in addition, data was collected through patient’s medical records. At the time of follow-up the Knee injury and Osteoarthritis Outcome Score (KOOS), Tegner Activity Score (TAS) and failure rates were obtained. Treatment failure was defined as a new surgical procedure to the same meniscus, including repair or resection of the affected meniscus.^{21, 22} Out of the 325 patients 2 patients died during the period of follow-up, 2 patients denied the questionnaire, 90 patients moved away and could not be interviewed and 168 patients did not answer the questionnaire. Therefore, we could include the data of 63 patients in this study. The demographics of the 63 patients are summarized in Table 1. Fig. 2 shows a MRI picture of a vertical posterior horn medial meniscus tear preoperative and one year postoperatively.

2.1. Surgical technique

All patients underwent arthroscopic all-inside meniscal repair using FasT-Fix implants (Smith & Nephew) in accordance with the manufacturers’ technique guidelines if the meniscus was found to have a repairable tear in the red-red or red-white zone (Fig. 3). In the case of a concomitant ACL injury, an ACL reconstruction was performed simultaneous or within six weeks of meniscal repair. The ACL reconstruction was performed using 4- strand gracilis and semitendinosus tendon autografts, fixated with an Endobutton and a bioabsorbable screw.

Table 1 Demographics of patients.

Mean age at surgery (years)	29 (14–49)
Male to female (no)	40:23
Right:Left Knee (no)	34:29
Medial:Lateral Meniscus (no)	42:21
Isolated tear:Combined injury	12:51

2.2. Statistical analysis

Statistical analyses were conducted using the SPSS version 21 (IBM, Armonk, USA). The failure rate and differences in PRO-Scores (KOOS, TAS) were calculated for isolated repairs and those combined with ACL-reconstruction, with 95% confidence intervals (CIs). The paired t-test was used for analysis of quantitative data and chi-quadrat test was used for the comparison of failure incidence in the subgroups of patients. Significance was defined as $p < 0.05$.

3. Results

At a mean follow-up of 155 months 17 out of 63 patients (27%) had undergone further surgery to the repaired meniscus. Approximately the half of the failure-group (53%) reported an adequate trauma that led to the new meniscal tear. Eight out of the 17 failures occurred within the first two years. In all the patients with a second surgery a partial resection of the re-torn meniscus was performed.

Overall the patients showed at follow-up a mean TAS of 5.57 and KOOS subscales of: 91.35 for pain; 86.56 for stiffness; 94.65 for daily life activities; 80.34 for sport and leisure; 77.28 for quality of life.

Looking at gender differences, the failure-rate was significantly higher in the female patients (female 48% versus male 15%; $p = 0.005$). There were no significant differences regarding patients’ age, height and weight ($p > 0.05$).

Comparing the sports, we were able to build three groups: soccer and indoor-sports, alpine-sports and track-and-field-sports. There was a significantly higher failure rate within the soccer and indoor-sports group (soccer and indoor sports 24%, alpine-sports 18%, track-and-field 18%; $p = 0.002$).

3.1. Isolated meniscal repair versus meniscal repair with combined injuries

Combined injuries were found in 81% (51 patients). These included ACL ruptures in 49 patients, an additional lateral meniscus tear in one patient and an additional chondral lesion of the medial femoral condyle in another patient. The latter was treated with microfracturing. The isolated and combined groups showed identical distribution of medial and lateral meniscus tears (2:1). There was no significant difference in the failure-rate between the isolated (33%) and combined group (25%) ($p = 0.582$). Comparing the two groups there was no difference in the TAS (5.75 for the isolated group and 5.53 for the combined group, $p = 0.75$). Only 1 subscale of the KOOS showed no significant difference: 95.33 versus 94.48 for daily life activities ($p = 0.316$). The other items of the KOOS showed significant differences that are presented in Table 2.

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