

Minimally Invasive Meniscal Repair With Fibrin Glue (Tisseel®) And ACS (EOT II®) Under MRI Control

1 Year Follow-Up (N = 50)

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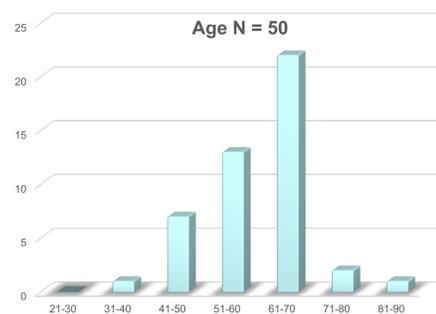
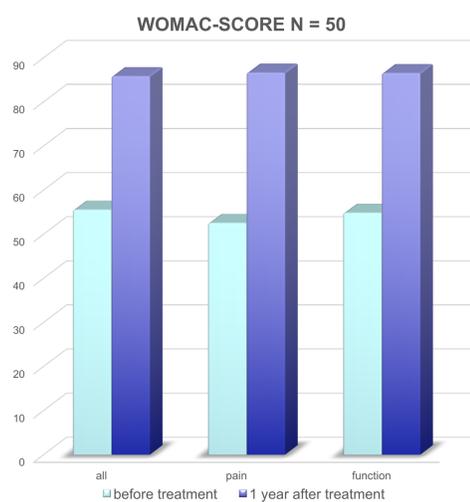
Abstract

Over a period of 2.5 years 202 minimally invasive repairs of meniscal and tendon tears were performed under MRI-guidance. Overall 141 meniscal tears were treated with MRI-guided fibrin glue injections (3) into or near the meniscal tear followed by intraarticular injections of autologous conditioned serum (4) once a week for 28 days. We present the results of a 1 year follow-up of 50 treated patients who all underwent a diagnostic MRI-scan before, as well as 6 weeks and 1 year after treatment. The condition of patients was evaluated by the WOMAC-Score. 4 Patients had to be operated after treatment due to persisting symptoms. The improvement of the WOMAC-Score after 1 year was highly significant ($p < 0.0001$).

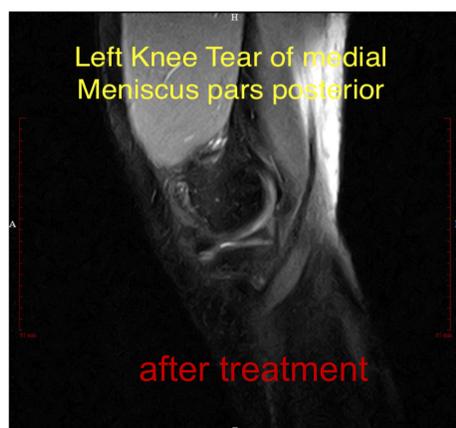
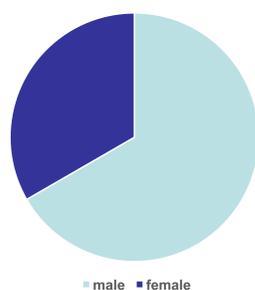
Background

If conservative therapy does not lead to desired results the currently established therapies for repair of menisci tears are arthroscopic surgical meniscal remodelling, mostly with shaving or partial resection of meniscal tissue. Less frequently meniscus tears are repaired by suturing the torn pieces together. Rarely performed are meniscal replacements with collagen implants. Though the increasing risk of osteoarthritis following meniscal resection is well known, it is the most executed procedure, probably because suturing and replacement techniques are more elaborate and lead to longer rehabilitation time. Besides loss of cartilage tissue also meniscus tears lead to higher levels of matrix-metalloproteinases (ADAMTS5 and MMP3) in the chondrocyte-like cells of menisci, what also may trigger enzymatic degradation of cartilage (1) and subsequently lead to progression of osteoarthritis. Minimally invasive meniscus tear therapy with fibrin glue and ACS could close a gap between conservative and surgical therapy.

Objective

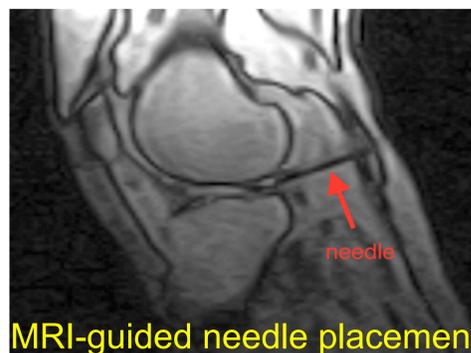


Gender N = 50

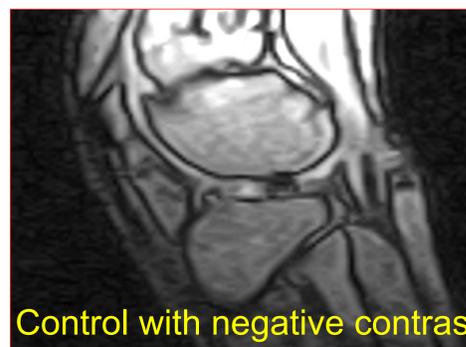


Methods

A MRI-suitable needle (5) was introduced into the meniscal tear under local anesthesia.



Distribution of contrast agent (6) indicates the following allocation of fibrin glue



Then Injection of 2 ml fibrin glue (3).

Post-interventional procedure: The two-component fibrin glue coagulates completely within 60 s after injection. Since the fibrin network is formed directly, weight bearing of the treated knee (from extension to 60 degrees flexion) was allowed straight away. When there is no weight at the joint e.g. while seating, the knee can be bent as usual. Patients were advised to avoid any activity that could cause torque at the treated joint for 6 weeks.

From week 1 to 4 after initial therapy 2 ml ACS (4) (2) (7) were injected near the tear once a week.



Summary

50 patients with typical signs of non-dislocated meniscal tear in MRI and characteristic clinical symptoms like pain, joint effusion, swelling and malfunction underwent minimally invasive MRI-guided treatment with fibrin glue and afterwards four ACS – injections. In the 1 year follow-up 4 patients needed additional surgery because of unsatisfying results. In contrast 46 patients obtained normal function and relief of pain what shows the significant ($p < 0.0001$) improvement of the WOMAC-Score. In comparison to the initial MRI scans a significant regression of secondary signs for meniscal tears (subchondral edema, effusion) could be observed. In some cases a slight conversion of MRI signal could be detected in meniscal repairs over time what is consistent with conversion of fibrovascular to fibrocartilage tissue. Besides mild hematoma no complications occurred.

Discussion

The first 50 patients which were treated with the new method of meniscal repair and followed-up over 12 month show promising results. MRI scans after treatment seem to show a healing process especially a significant regression of joint effusion and subchondral edema. From 50 patients which were candidates for arthroscopic surgery, over 90% became free of symptoms and regained normal function of the knee in every day life. No severe complications occurred. Though there is no histological proof of meniscal healing after treatment and MRI can not proof healing either, the clinical outcome, above all the increasing WOMAC-Score, encourages for further investigation. The presented procedure seems to be excellent to avoid surgery in a high percentage and at low risk level when conservative treatment fails and keeps surgical options open.

- Advantages:
- No operative risk
 - No risk of general anesthesia
 - No radiation
 - No need for hospitalisation
 - Meniscus can be preserved
 - Leaks of proteolytic enzymes out of damaged meniscus cells are sealed
 - No immobilisation, therefore no muscle atrophy
- Disadvantages:
- Not all tears are suitable for this treatment

References

- Ishihara G, Kojima T, Saito Y, Ishiguro N.: Roles of metalloproteinase-3 and aggrecanase 1 and 2 in aggrecan cleavage during human meniscus degeneration. Orthop Rev 2009; 1(2):e14
- Rudolf W. Strümper: Clinical experience with intra-articular injections of autologous conditioned serum in cases of meniscal lesions of the knee. International Symposium for Molecular Medicine 10.+11.6.2016, Düsseldorf, Germany
- Tisseel®
- ACS (EOT II®)
- ITP®
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