Clinical outcome after Meniscus repair

- Summary of the literature
- Healing rate based on arthroscopy or MRI
- Factors, which show a positive or negative impact on outcome

Many publications are interested in meniscal repair results. Their conclusion must remain carefully because often the studied populations are not differentiated according to ACL status, type of injury, patient age, type of repairs and assessment methods are often different.

**Overall Results**

Meniscectomy is the first criteria of failure of meniscal repair. Lozano 11 reported with a literature study an average failure rate of 15% (from 0 to 43.5%) with all-inside devices. Nepple 14 found by the same method with more recent reviews, 5 years minimum follow-up, more consistent results with 23.1% (from 20.2% to 24%) of subsequent meniscectomy. This failure rate is identical to the review of the French Arthroscopy Society 3: 23% (203 repairs with a 45-month fu). With a very long follow-up this rate remains stable: 22% (with ACL reconstructions, 20 years fu) 5.

Even if subsequent meniscectomy, Pujol 18 has shown meniscal preservation achieved with an amount of resected meniscus lower (35% of cases) or equal (52% of cases) than it would have been. Tachibana 25 showed that in 34.5% a new lesion appears in a different area of the original tear.

A recent study of the French Arthroscopy Society 6 (232 patients who underwent ACL reconstruction) showed a survivorship probability of 0.77 at 10 years. Most survivorship studies show that failures occur mainly in the first 4 postoperative years 6,14. The survivorship curve then follows the natural evolution of the healthy meniscus with of stable knee 6.

In case of repaired isolated meniscal tear (without ACL injury), failure rates are between 15% and 23% 23,24.

Functional assessments by the Lysholm score often show similar results between repair and meniscectomy (> 90) 14 but the item "activity level" and "sport" are often higher in most studies.

Clinical results (pain, effusion, locking, Mc Murray test) are good for Kalliakmanis 6 (90% absence of symptoms). These results are maintained over time for Pujol 21 with more than 9 years fu (IKDC 92% good results, KOOS pain 94, symptoms 90, daily activities 98, sports 91 and quality of life 94) without influence of anatomical meniscal healing.

In a review of elite athletes followed over 5 years, Logan 10 found 26% subsequent meniscectomy (15% with of a new trauma) and sports recovery in 81% of cases, most often in same level at 10 months post-op. In this study, medial meniscus tears heal less than the lateral.
In young and active patients, the repair of horizontal tears preserve the meniscus in 80% of cases at 40 months fu with functional IKDC score 89 and KOOS score 92 \(^{19}\).

**Anatomical results**

The anatomical assessment of meniscus healing can be done by arthroscopy, MRI or arthrography.

Pujol \(^{22}\) showed that MRI finds with 10 year fu abnormal signs in 87% of repaired and stable menisci (vertical signal 30%, horizontal 39% and complex 17.5%) and concludes that this exam is unreliable to assess meniscal healing. Miao \(^{13}\) specifies that the T2 sequence has the best specificity (89.6%) and accuracy (85.4%) while the T1 sequence is best for sensitivity (91.7%).

By CT arthrography Pujol \(^{20}\) evaluated healing with 3 criteria. Healing in thickness, according to Henning criteria, shows 58% of complete healing, 24% partial and 9% of non-healing. The ratio of meniscal healing length is 73.1%. Width reducing of the meniscus is 10 to 15%. The author as shown that the tears affecting the posterior and middle segments better heal (healing rate = 79.2%) than those of isolated posterior segment (59.8%).

Recent studies with arthroscopic second look assessment of meniscal repairs \(^{14,13,25}\) show a complete healing rate of 74% to 86%, partial 7% to 15% and no healing 9% to 12%. There is an improvement compared to older repair techniques which showed complete healing in 65% of cases and 19% failure \(^{27}\).

**Degenerative Evolution**

Analysis of postoperative osteoarthritis after meniscal repair compared with meniscectomy shows a positive cartilage protection: 4% Fairbanks stage 2 with repair, versus 27% for meniscectomy \(^{23}\); 20% of stage 0 or 1 with repair versus 60% for meniscectomy \(^{24}\). Non-comparative studies show the same difference with Xray changes in 14 % to 43% with repair \(^{14,16,21,23,24,26}\) versus 21% to 64% with meniscectomy \(^{7,16,17,23,24}\). This protective effect for OA is more important in young and sporty patient \(^{24}\).

**Factors with impact on outcome**

- **The anterior laxity.** The ACL rupture and the quality of its stabilization are the main factors of the outcome of meniscal repairs. While average failure rate of repairs is 23% in the overall population \(^{14}\), Westermann \(^{29}\) found only 14% of failure with 6 years fu on 235 patients with ACL reconstruction. But meta-analysis of Nepple \(^{14}\) does not show the same difference. Traditionally reasons to explain better healing in the repaired ACL knee are the positive effect of initial hemarthrosis (and subsequent fibrin clot) and effective treatment of anterior laxity, origin of meniscal tear. When the ACL is reconstructed, residual laxity influences the result: Westerman \(^{29}\) reported a doubling of failures (27.3%) when the graft is ruptured. There is a strong correlation between failures of ligament reconstruction and meniscal repair \(^{2,4,27}\). Feng \(^{4}\) found 100% of failure if KT100 laxity is greater than 5 mm. The SFA study \(^{6}\) demonstrates the direct relationship between the survivorship probability of repair and residual laxity.
• **Tear location (medial or lateral).** Studies show opposite results with more often better healing of the lateral meniscus\(^9\)\(^10\)\(^12\)\(^15\)\(^16\)\(^28\) or identical\(^1\)\(^4\)\(^14\)\(^19\)\(^25\)\(^29\). When repair failure is found, it is earlier on the medial meniscus (2.1 years) than on the lateral meniscus (3.7 years)\(^29\). Logan\(^10\) suggests three possible reasons that lateral meniscus looks better heal than medial:
  o The type of injury may be different, the rate of acute injuries of lateral meniscus is larger compared to lesions of medial meniscus, more chronic resulting from recurrent instability.
  o The constraints on the posterior segment of medial meniscus are larger than on lateral meniscus.
  o Incomplete healing of the lateral meniscus remain asymptomatic, which may explain that clinical studies without anatomical assessment, can under evaluates residual tear.

• **Patient age.** For Lyman\(^12\) age over 40 is a better healing factor of isolated meniscal tear repair (without ACL). Other studies did not find any differences according to age\(^8\)\(^10\), Krych\(^9\), in a population of children <18 years, found 26% of subsequent meniscectomy and the results are significantly better in case of ACL reconstruction rather than with isolated meniscal tear.

• **Patient gender.** Lyman\(^12\) found in a cohort of 3890 patients with ACL reconstruction, more subsequent meniscectomy in male than in female but with a limited significance (\(p = 0.057\)).

• **Type of meniscal lesion**: Krych\(^9\) found a survivorship rate worse for complex lesions and bucket handles.

• **Location of the lesion in vascular zones (RR, RW, WW).** Feng\(^4\) reports no difference of healing between repairs in RR zone and those in RW.

• **Length of the lesion**: No difference in clinical outcomes\(^8\).

• **Time from injury**: The results of repair is worse if the time from injury is greater than 12 weeks, especially on stable knee\(^3\). But some studies did not find any significant differences\(^4\)\(^8\)\(^14\).

• **Experience of surgeon.** Lyman\(^12\) demonstrated in a cohort of 9609 meniscal repairs that the survivorship probability of repair decreased in group of surgeons performing less than 24 repairs a year.

• **Postoperative protocol.** There seems to be no difference between immediate complete and no weight bearing\(^13\).


22. **Pujol, N.; Tardy, N.; Boisrenoult, P.; and Beaufils, P.:** Magnetic resonance imaging is not suitable for interpretation of meniscal status ten years after arthroscopic repair. *Int Orthop*, 37(12): 2371-6, 2013.


