

Degeneratiivne menisk

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**TÜK traumatoloogia-
ortopeedia kliinik**

**Päevakirurgia erakliinik
Medex**

2016



Conflict of interest: none



Figure 1: degenerative meniscus lesion (posterior segment of the medial meniscus; left knee)

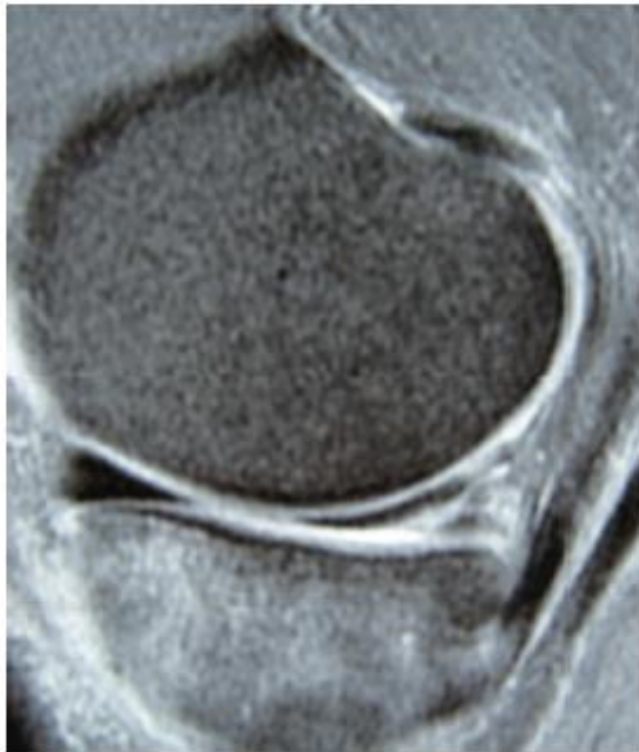
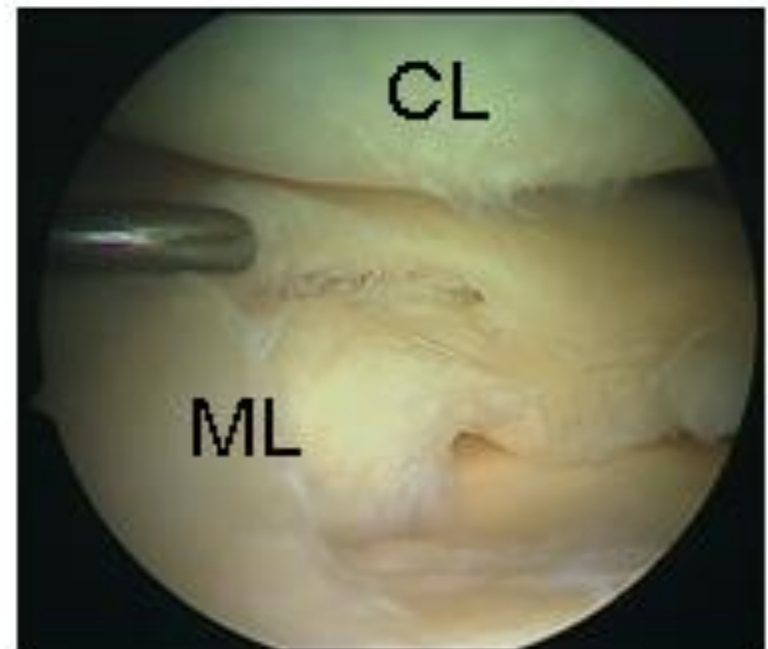


Figure 2: MRI (sagittal view T2 FS): grade3 degenerative meniscus lesion

Meniski degeneratiivne rebend



Microcirculation of the meniscus

•Blood Supply

Age Dependent

Inferior/Superior Geniculates

Red zone peripheral 1/3 (3mm)

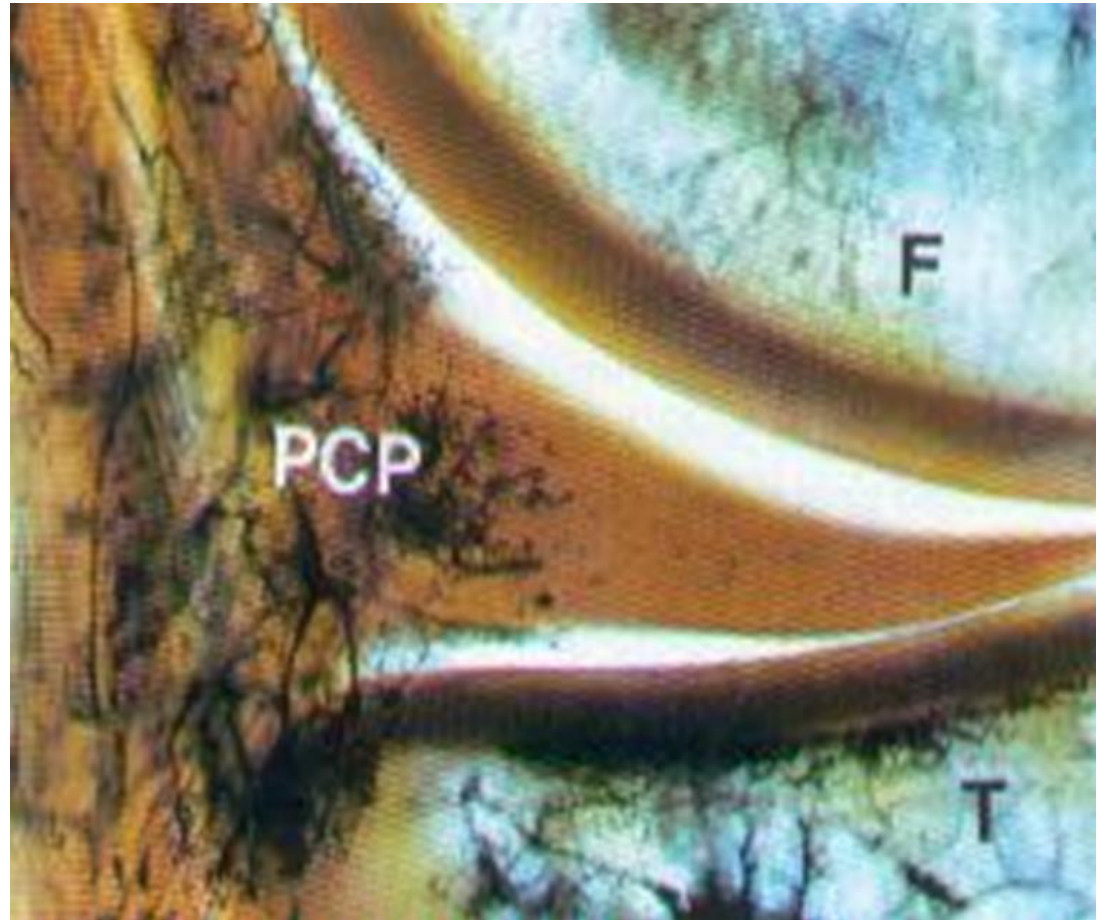
Red/White zone Mid 1/3 (3-5mm)

White zone Inner 1/3 (5mm)

•Nutrition

Inner 1/3 from vascular supply

Outer 2/3 from synovial fluid



Meniski funksioon

- In the USA, 61 of 100,000 people experience an acute tear of the meniscus at some point in their life (850,000 meniscus surgeries are performed in the USA each year,
- The principal functions of the meniscus are load transmission and shock absorption, based on the meniscal collagen architecture, the biochemical fluid composition, and the proteoglycan-collagen meshwork. The mobile menisci transmit 50-90% of load over the knee joint, depending on knee flexion angle, femoral translation and rotation. The meniscus contributes to knee joint proprioception and probably also to joint stability.

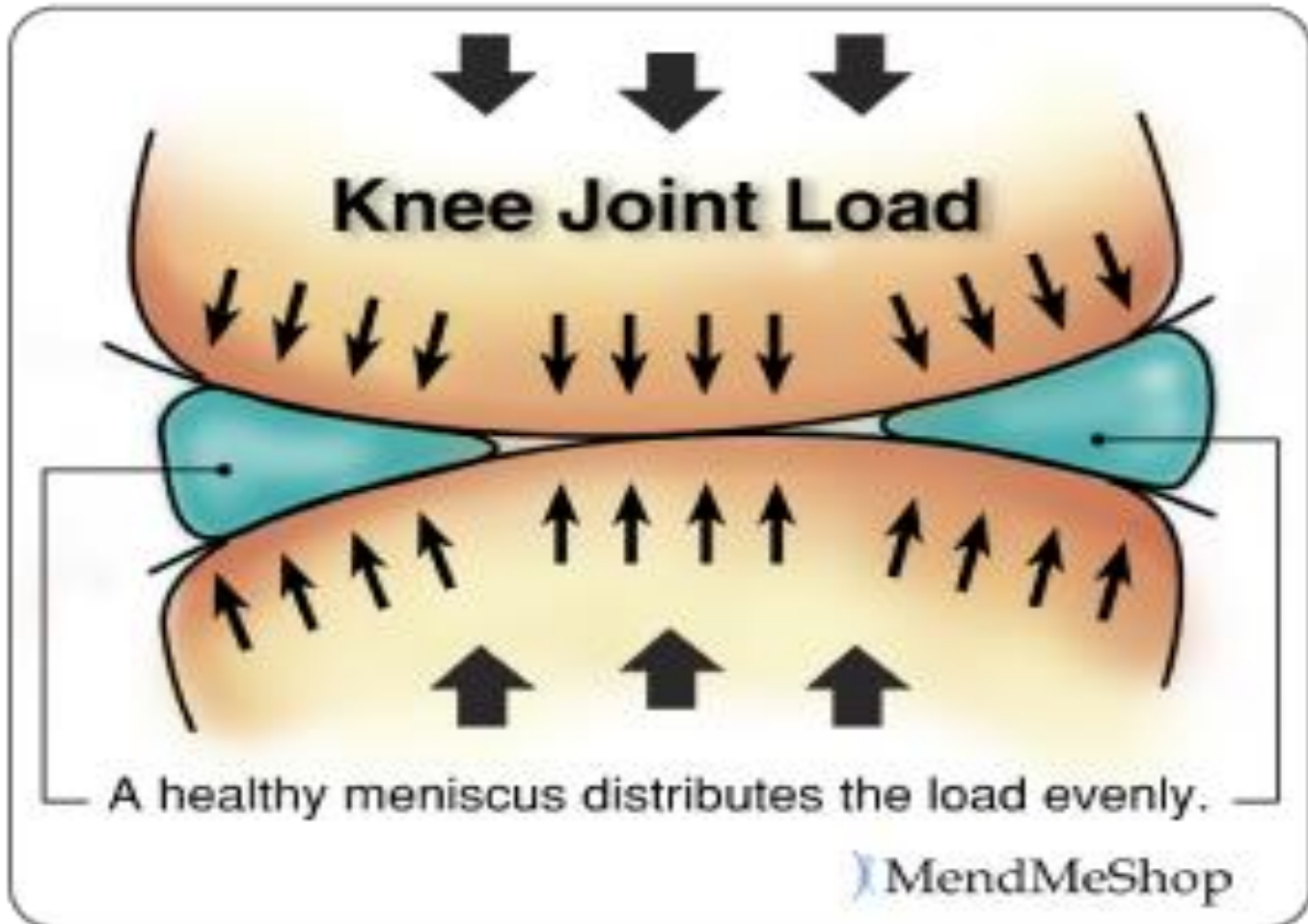
Functions of the meniscus

- **enhances the joint congruency**
- **shock absorber**
- **loading transfer**
- **energy absorption**
- **enhancing stability**
- **lubrication**
- **proprioception**

lubrication and stability

- Removal of meniscus → friction in the joint + 20%
- In a stable knee removal of the meniscus does not add AP translation
- ACL rupture and removal of meniscus → AP translation + 50%

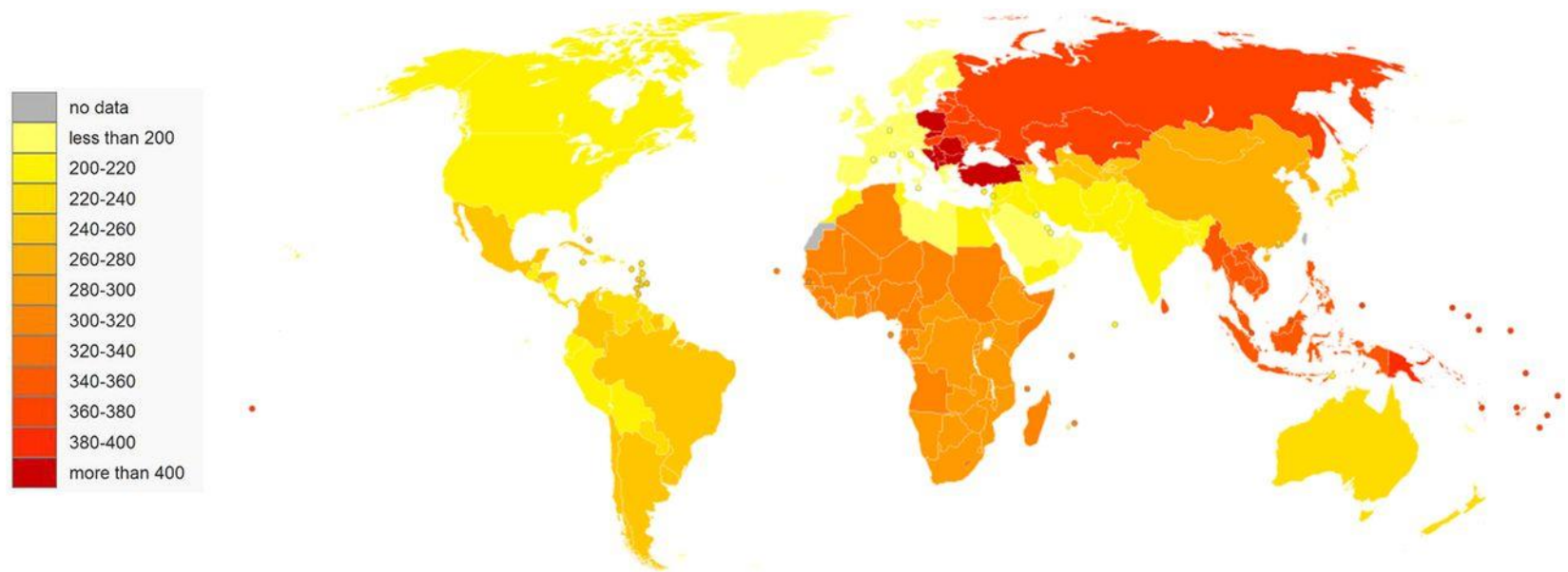
Meniski funktsioon



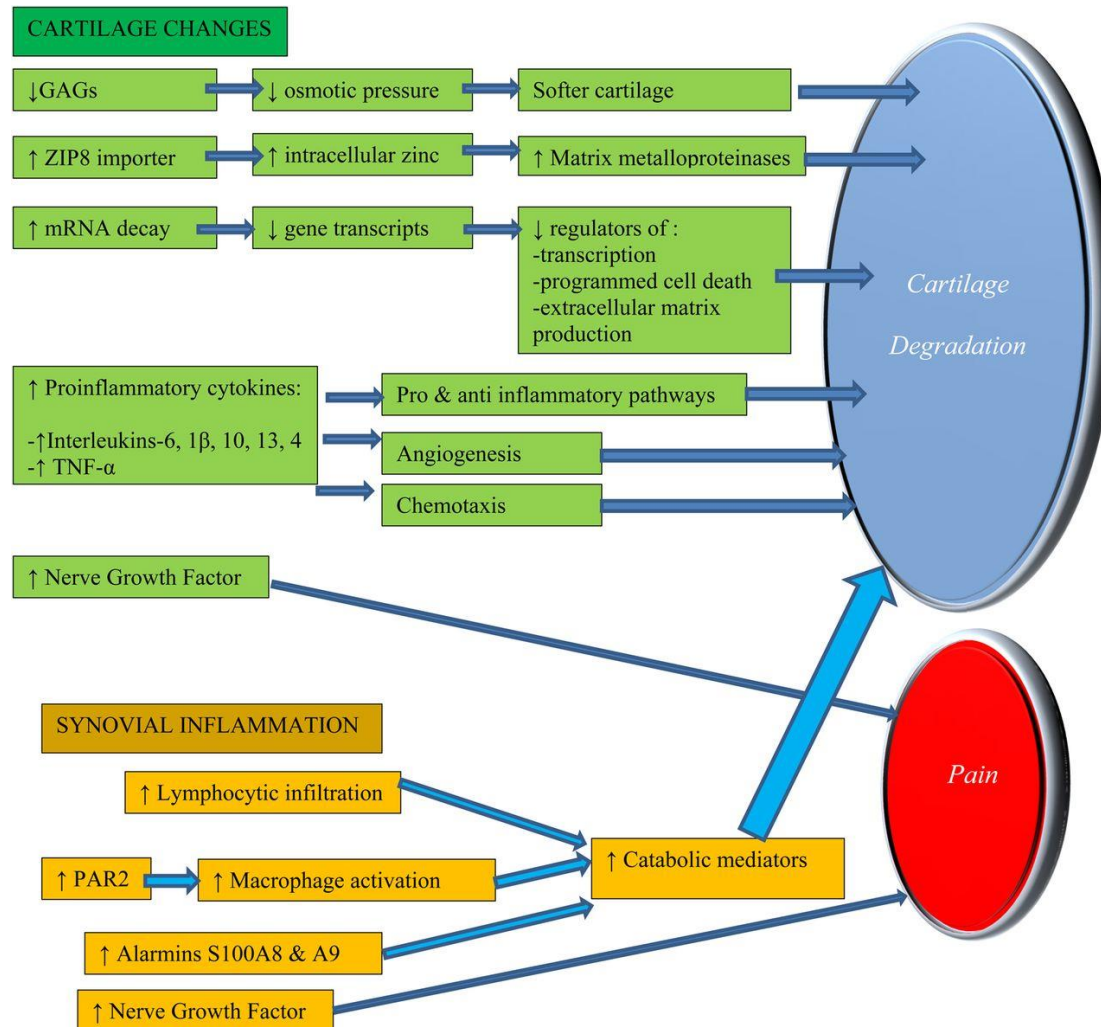
Epidemiology of the meniscal injuries

- incidence 60-70/100,000/year
- male / female 2,5-4.0/1
- Peak ages in meniscal injuries
 - male 20-30v
 - female 15-20v
- med meniscus / lat meniscus 4/1

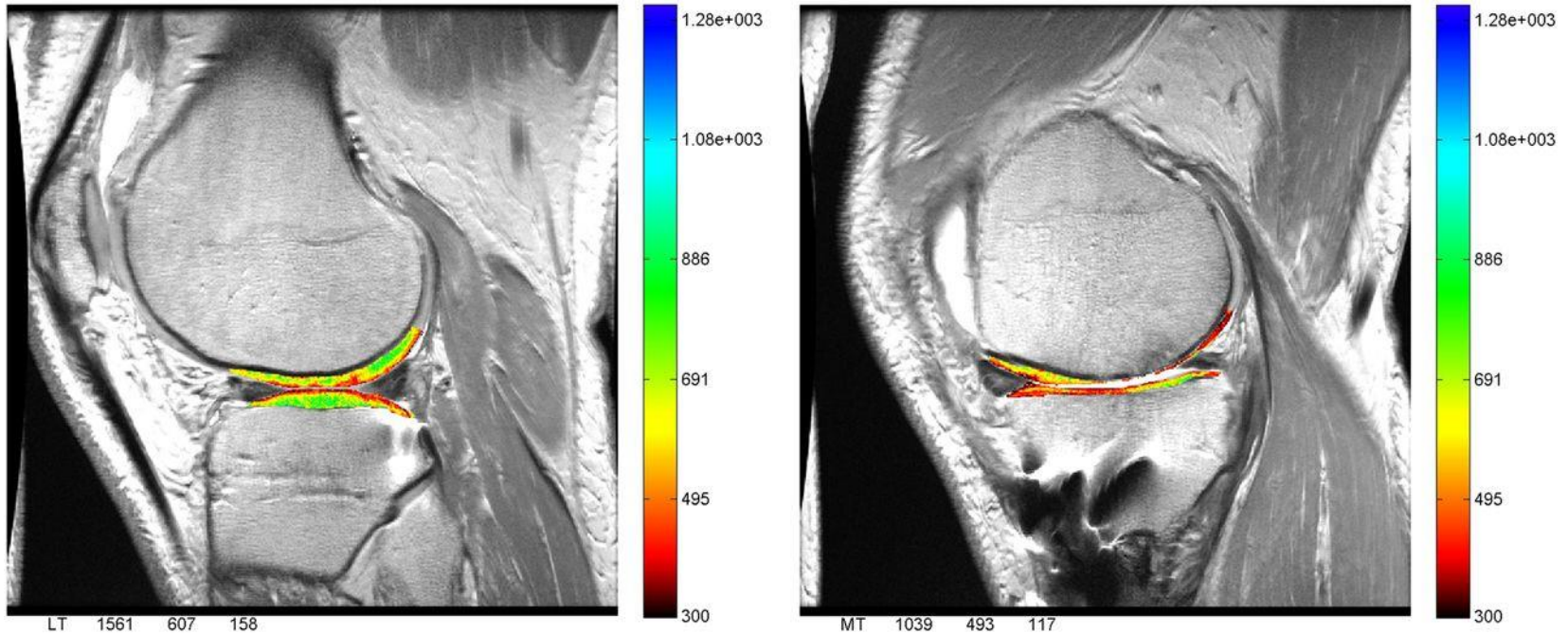
Age-standardised disability-adjusted life year rates for osteoarthritis by country (per 100 000 inhabitants) using WHO data.11.



Summary of some of the pathways involved in the pathogenesis of osteoarthritis.



Example of physiological MRI: delayed gadolinium-enhanced MRI of cartilage fixed charge density sagittal images where proteoglycan content is represented by a colour scale (blue/green=high content; yellow/red=low content).

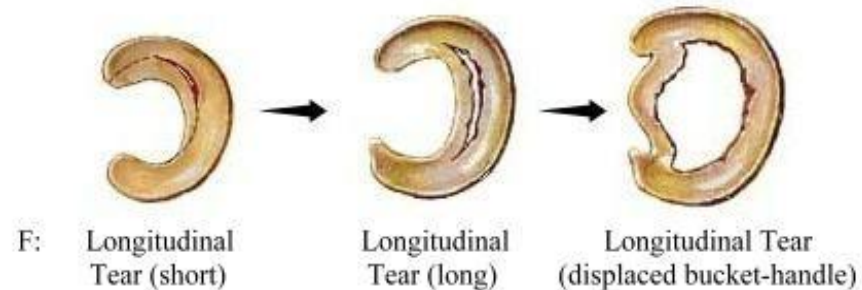
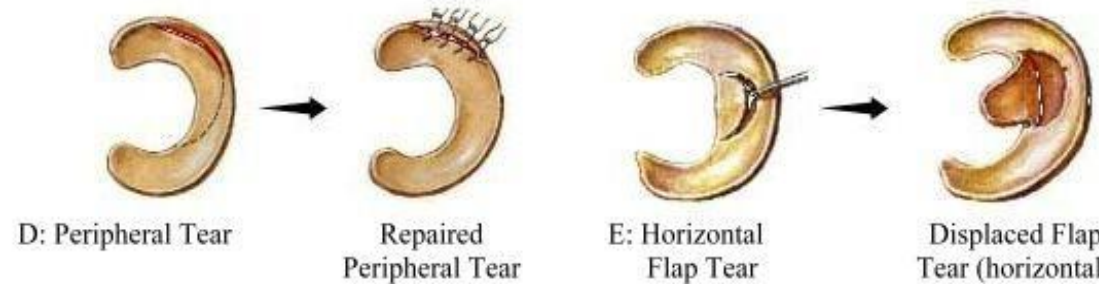
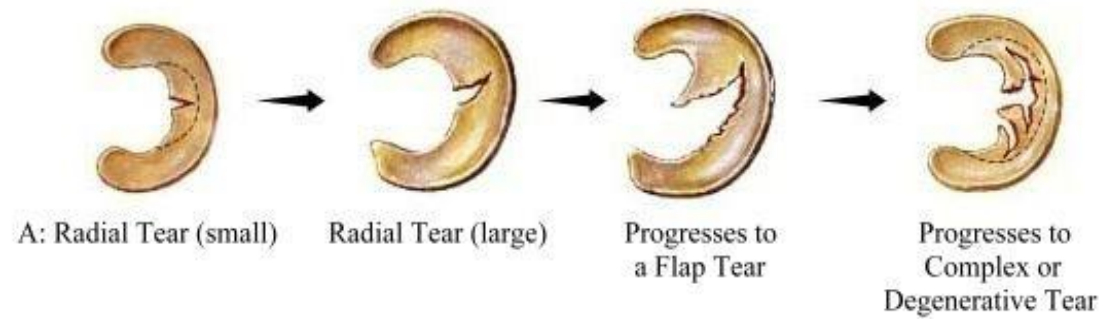


menisk



Meniscus tears

- Radial
- Flap
- Discoid
- Peripheral
- Horizontal
- Longitudinal
- 20% traumatic



Save the Meniscus

JAMES H. LUBOWITZ, M.D. (ASSISTANT EDITOR-IN-CHIEF)

GARY G. POEHLING, M.D. (EDITOR-IN-CHIEF)

Our core belief is that minimally invasive arthroscopic partial meniscectomy preserves knee joint function and minimizes progression of arthritis. In support, Petty and Lubowitz show that, at a range of 8 to 16 year follow-up, clinical symptoms of osteoarthritis were not observed after arthroscopic partial meniscectomy. However, clinical outcomes did not correlate with radiographic findings, and radiographic signs of osteoarthritis were significant, as 77% of knees had some evidence of Fairbank's radiographic changes 8 to 16 years after arthroscopic partial meniscectomy, compared with 30% evidence of Fairbank's changes in those same patients' contralateral knee

March 2011 issue of *Arthroscopy*,

Save the Meniscus

**JAMES H. LUBOWITZ, M.D. (Assistant
Editor-in-Chief)**

GARY G. POEHLING, M.D. (Editor-in-Chief)

- Now the bad news. Our rallying cry is “Save the Meniscus,” but the bad news is that arthroscopic partial meniscectomy is the most common orthopaedic procedure performed in the United States of America. Are American orthopaedic surgeons criminal? Of course not! The vital point is that while orthopaedic surgeons treat pathology, we surgeons are clearly not responsible for causing the pathology, and meniscal pathology seems epidemic. Furthermore, when it comes to meniscal pathology, we orthopaedic surgeons do our very best to prevent meniscal tears.

March 2011 issue of *Arthroscopy*,



McMurray 50%/40%



Apley 60%/50%



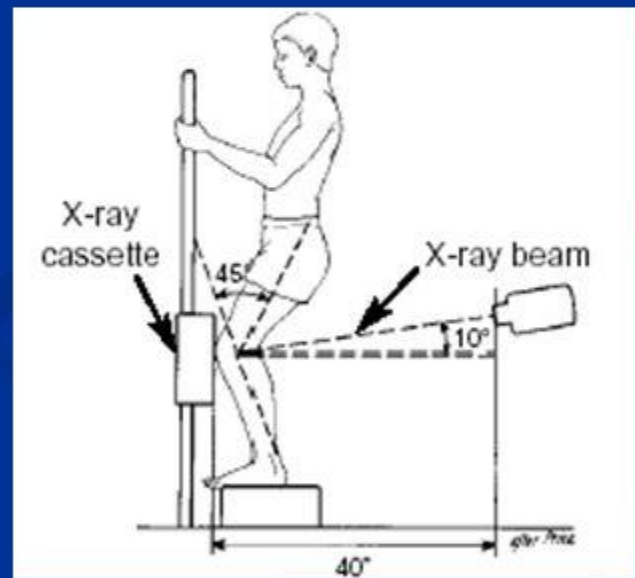
Thessaly (sensitivity90% specificity 98%)

Radiographic Evaluation

■ Best Method To Evaluate Arthritis

■ Plain X-Rays

- Standing Radiographs
- AP/ Lateral
- Schuss/Rosenberg Views



Radiographic imaging classification for osteoarthritis of the knee; the Kellgren-Lawrence Grading System

Grade 0 No feature of osteoarthritis

Grade 1 Doubtful narrowing of joint space and possible osteophytic lipping

Grade 2 Definite osteophytes and possible narrowing of joint space

Grade 3 Moderate multiple osteophytes, definite narrowing of joint space, and some sclerosis and possible deformity of bone ends

Grade 4 Large osteophytes, marked joint space narrowing, severe sclerosis and definite deformity of bone ends

L







Figure 1. The development of intrameniscal signal into a horizontal cleavage lesion in the posterior horn of a medial meniscus over the period of 4 years captured on repeat 3-Tesla knee MRI.

Which MRI criteria characterize a degenerative meniscus lesion?

A degenerative meniscus lesion is usually characterized by linear intrameniscal MRI signal (including a component with horizontal pattern) often communicating with the inferior meniscal surface on at least two image slices. A more complex tear pattern in multiple configurations may also occur. The most common location of a degenerative meniscus lesion is the body and (or) posterior horn of the medial meniscus.

Grade B

Meniscus tears can in general be categorized as follows:

- i)horizontal, defined as a tear parallel to the tibial plateau separating the meniscus into upper and lower parts;
- ii)oblique (parrot-beak), defined as a tear oblique to the circumferentially oriented collagen fibres;
- iii)longitudinal, defined as a vertical tear perpendicular to the tibial plateau and parallel to the orientation of the circumferential fibres;
- iv)radial, defined as a vertical tear that begin in the central free margin and is perpendicular both to the tibial plateau and to the circumferential fibre orientation;
- v)complex, defined as multiple tears in more than one configuration;
- vi)root, defined as a tear in the posterior or anterior centralmeniscal attachment

The absence of meniscal tissue owing to complete maceration, destruction, or surgical resection can be classified as vii)meniscal destruction.

What is the prevalence of degenerative meniscus lesions?

The prevalence of meniscus lesions in the general population (intrameniscal signal extending to surface according to the two-slice touch rule) has been evaluated as follows:

- Age 50-59 years \approx 25%
- 60-69 years \approx 35%
- 70-79 years \approx 45%
- Patients with knee osteoarthritis \approx 75-95%

Grade B

Degenerative meniscus

There is very limited evidence that pain in the degenerative knee is directly attributable to a degenerative meniscus lesion even if the lesion is considered to be unstable. Great caution must be taken before arriving at the conclusion that the degenerative meniscus lesion is the direct cause to the patient's knee symptoms.

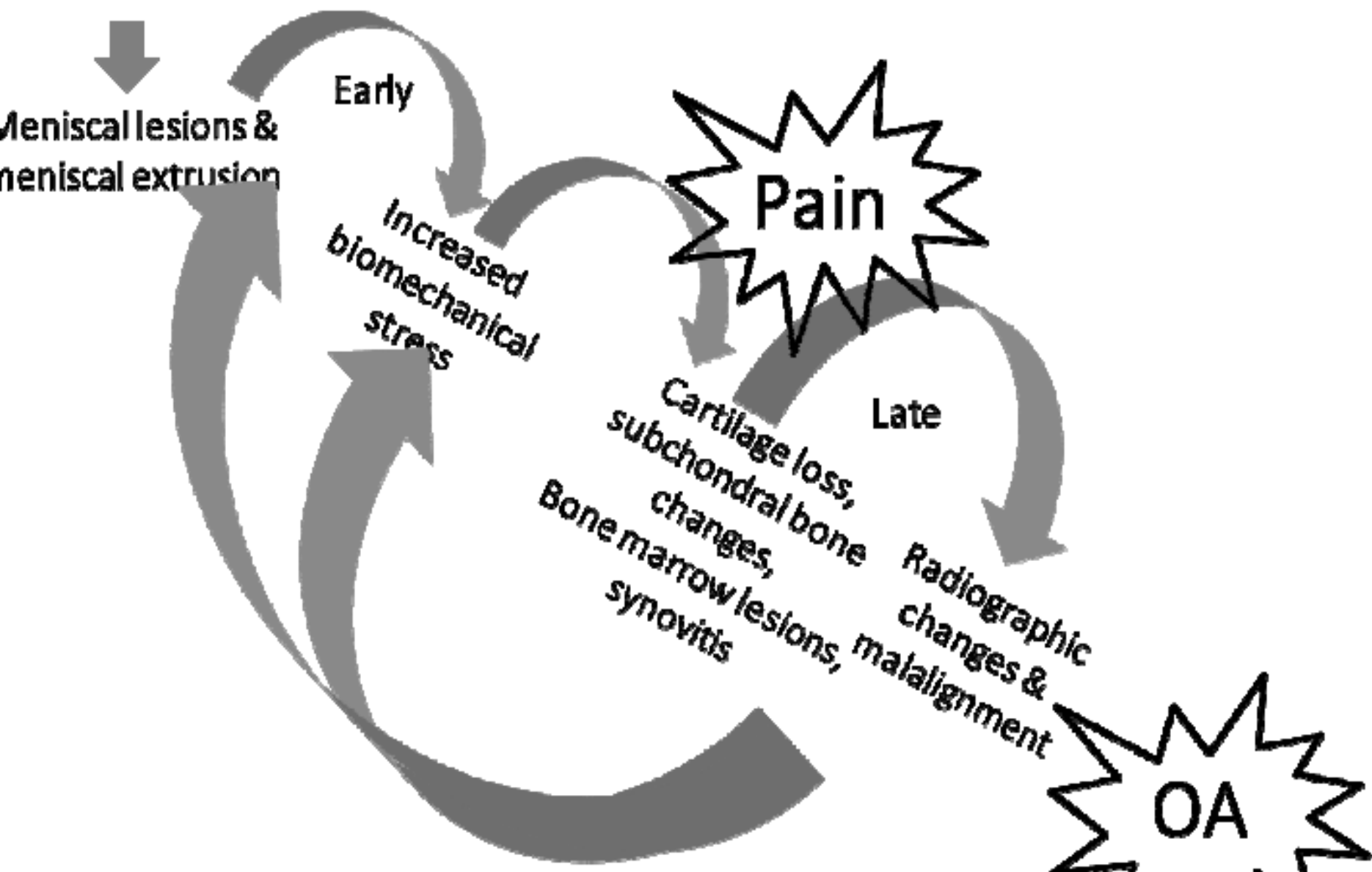
Grade B

VALU PÕHJUSED

- LIIGESKÕHR (**MENISK**) ON **ANEURAALNE** st. liigese valu tekke põhjused mujal struktuurides:
- Subkondraalne luu—mikrofraktuurid, luusäsi hüpertensioon(“bone angina”)
- osteofüüdid: periosti närvide venitus ,ärritus
- Liigesesidemed: venitus
- Liigese kapsel: põletik, venitus
- Sünoovia : põletik
- Liigest ümbritsevad lihased: spasm

RISK FACTORS:

systemic, local,
environmental, e.g., genes, joint injury, obesity



What are the consequences by a degenerative meniscus lesion in the knee?

Loss of meniscus function may negatively affect the knee in the long term. Therefore, in many people the degenerative meniscus lesion (which may impair the force transmission and load distribution capabilities of the meniscus) is a feature indicative of a knee joint with (or at increased risk of) developing osteoarthritis.

Grade B

Are degenerative meniscus lesions a cause or consequence of knee osteoarthritis?

The answer to this question is still **unclear**. However, one causal pathway does not necessarily exclude the other, i.e., **one phenotype of knee osteoarthritis may start with meniscus degradation** and degenerative lesion leading to loss of meniscus function and osteoarthritis development. In turn, **osteoarthritis** and its general degradation of the knee joint, involving multiple structures, may also **cause degenerative meniscus lesions** and extrusion that further accelerate structural progression of the disease.

Grade B

Diagnostics

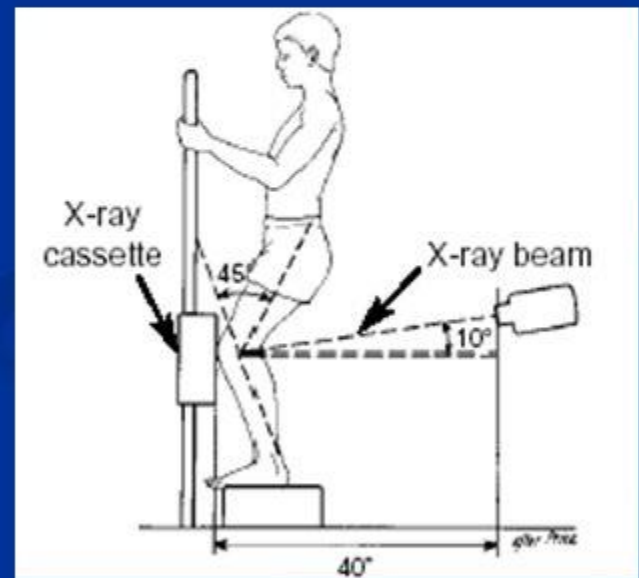
Knee radiographs should be used as **a firstline imaging tool** to support a diagnosis of osteoarthritis or to detect certain more rare pathologies of the knee. Therefore, at least **anteroposterior weight-bearing semiflexed knee radiographs including a lateral view** should be included in the work up of the middle-aged or older patient with knee pain. **Grade B**

Radiographic Evaluation

■ Best Method To Evaluate Arthritis

■ Plain X-Rays

- Standing Radiographs
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- Schuss/Rosenberg Views



Diagnostics

Knee MRI is typically **not indicated in the first line work up of middle-aged or older patients with knee joint symptoms.** However, **knee MRI** may be indicated in **selected patients with refractory symptoms or in the presence of 'warning flags' or localized symptoms indicating more rare disease.**

If a **surgical indication is considered**, based on history, symptoms, clinical exam and knee radiographs, knee **MRI** may be useful to **identify structural knee pathologies** that may (or may not) be relevant for the symptoms. **Grade B**

The Use of MRI in Evaluating Knee Pain in Patients Aged 40 Years and Older

JAAOS sept 2016

Adelani, M (level 3)

- The purpose of this study was to determine how often MRI was obtained before orthopaedic referral in patients aged ≥ 40 years with knee pain, how often weight-bearing radiographs were obtained before MRI (599 patients)
- **Results:** Prereferral use of MRI occurred in 130 patients (22%). Of these patients, plain radiographic studies were obtained for 58% before MRI and 13% had weight-bearing radiographs. Ultimately, 17% had weight-bearing radiographs that demonstrated $>50\%$ loss of joint space. Forty-eight percent of prereferral MRIs did not contribute to treatment recommendations. In patients with $>50\%$ loss of joint space, MRI was considered unnecessary in 95% of the cases.

What does non-operative treatment mean?

1. No evidence of which **time/type** of non-operative treatment should be proposed.
2. In the current literature, RCTs have proposed various rehabilitation protocols, however non-operative treatment also could consist of NSAID (if no contraindication), intra-articular injection* , physiotherapy and/or home exercises for 3 to 6 months. **Grade B.**

Arthroscopic surgery for degenerative knee: systematic review and meta-analysis of benefits and harms

april2015

Thornlund,J

- Arthroscopic knee surgery is frequently and increasingly used to treat middle aged and older patients with persistent knee pain
- All but one published randomised trials have shown no added benefit for arthroscopic surgery over that of the control treatment, but many specialists are convinced of the benefits of the surgical intervention

Arthroscopic surgery for degenerative knee: systematic review and meta-analysis of benefits and harms

april2015

Thornlund,J

- **What this study adds**
- **Interventions that include arthroscopy are associated with a small benefit and with harms; the small benefit is inconsequential and of short duration**
- **The benefit is markedly smaller than that seen from exercise therapy as treatment for knee osteoarthritis**
- **These findings do not support the practice of arthroscopic surgery as treatment for middle aged or older patients with knee pain with or without signs of osteoarthritis**

Arthroscopic or conservative treatment of degenerative medial meniscal tears: a prospective randomised trial

Herrlin.S (level2)

- **99 middle-aged patients were randomized to compare an exercise program alone to arthroscopic partial meniscectomy plus a postoperative exercise program in the treatment of degenerative medial meniscus tears. The exercise program was completed over 8 weeks, with outcomes in pain and function being assessed at the completion of the program, and again at 6 months.**

In middle-aged patients with degenerative medial meniscus tears, function and pain after 6 months were improved in patients who underwent an 8-week exercise program, similarly to those who underwent arthroscopic partial meniscectomy followed by the 8-week exercise program

A 12-week medical exercise therapy program leads to significant improvement in knee function after degenerative meniscectomy:

A randomized controlled trial with one year follow-up

2014 level 2

Osteras,H

- **42 patients with knee pain (>2 months), who had undergone partial meniscectomy for a degenerative meniscus tear were randomized to either supervised medical exercise therapy or no treatment**
- **VAS scores, quadriceps muscle strength deficit, KOOS, HADS, one-leg jump test scores, and mean isokinetic biodex scores for quadriceps and hamstring muscle strength all significantly favoured the exercise group**
- **The results from this study indicated that supervised medical exercise therapy provided patients with improved clinical and functional outcomes up to 1 year compared to no treatment**

Arthroscopic partial meniscectomy & sham surgery similar for degenerative meniscal tear

N England J Med 2013 Dec

Sihvonen, R et al (level 1)

- 146 patients with degenerative meniscal tears were randomized to determine the efficacy of arthroscopic partial meniscectomy. Participants underwent either arthroscopic partial meniscectomy or sham-arthroscopic partial meniscectomy, and were assessed for 12 months postoperatively
- Outcome following arthroscopic partial meniscectomy was no more improved than sham-arthroscopic partial meniscectomy in the treatment of a degenerative tear of the meniscus without knee osteoarthritis.
- . Additionally, there has been discussion on whether progression of knee osteoarthritis may be increased by performing surgery
- It is important to note that cases of **traumatic pathology** were excluded in this trial

Dr. Frank Smith
January 24, 2014

Orthopaedic Surgeon – Canada

The majority of patients undergoing arthroscopy for this problem are in the exclusion population. Therefore it is of minimal interest and not particularly helpful in Canada where most of the inclusion group do not get scoped, anyway

Can We Trust Knee Meniscus Studies? One-Way Crossover Confounds Intent-to-Treat Statistical Methods

Arthroscopy nov 2016

Lubowitz,J et al

- **Randomized controlled studies have a high level of evidence. However, some patients are not treated in the manner to which they were randomized**
- **This bias is a common problem in the knee meniscus literature**
- **In the opinion of the editors, knee meniscus studies using ITT require cautious analysis and nuanced reconsideration. The conclusions of such studies, whether published in our journal or in the New England Journal of Medicine, **could be incorrect****

What is the rate of conversion to surgery of patients receiving an initial conservative treatment?

**Non-operative treatment is converted to surgery (cross – over) in
0 to 35% of patients. Grade A**

Is the concept of an unstable meniscus useful for indicating meniscectomy (locking, clicking, MRI flap, etc....)?

There are controversies regarding the definition and role of mechanical symptoms as an

indication for arthroscopic partial meniscectomy (APM). The definition of

“mechanical symptoms” remains unclear and further investigations are needed, as it may cover a wide

range of symptoms with different severity and frequency. In a recent RCT , patients’ symptom history (i.e., mechanical symptoms or acute onset of symptoms) didn't affect outcomes (but patients with joint locking more than 2 seconds more often than once a week were excluded). Pooled results of all RCT’s reveal very limited added benefit of APM for degenerative meniscus regardless of preoperative symptoms (fixed locking knee

or knee with recurrent catching symptoms excluded). Grade A

A recent study did not find any benefits over sham surgery to relieve knee catching or occasional locking. Grade A.

What outcomes can be expected after arthroscopic partial meniscectomy (APM)?

1. Improvement of functional outcomes can be expected after APM.

Grade A

2. Most of the RCTs found no difference in terms of clinical outcomes after surgery compared to non-operative treatment. Grade A.

3. When Surgical treatment after non operative treatments failure, APM will result in similar but not superior results than successful non-operative treatment . Grade A.

4. 3-6% of patients will require another surgical procedure in the year following APM. Grade A.

5. Various predictive factors of poor results or treatment failures have been described in the current literature (increased BMI, lateral side, chondral damage, bone marrow oedema, meniscal extrusion , total or subtotal meniscectomy . Grade C.

What is the rate of surgical complications after meniscus resection?

The rate of surgical complication is low (0.27-2.8%). Grade A.

After APM, the rate of complications is dependent on side: i.e. a lateral meniscectomy is associated with a higher rate of complications than a medial one. Grade A

What is the risk of osteoarthritis after meniscus resection?

1. Patients treated with APM for degenerative meniscus lesion present a higher risk for symptomatic knee osteoarthritis compared to patients with normal knee (healthy subjects). Risk of OA is higher on the lateral side. Grade C

2. Patients with a total meniscectomy (removal of the peripheral rim) present a higher risk for symptomatic knee osteoarthritis compared to patients with partial meniscectomy. Grade C

3. Cartilage damage or Bone Oedema prior to APM is a major factor of failure . Grade C.

4. Meniscus extrusion is a predictive factor of local osteonecrosis after APM. Grade CG

When should APM be proposed?

- Surgery should not be proposed as a first line of treatment of degenerative meniscus lesions. **Grade A**
- After three months with persistent pain / mechanical symptoms: for a degenerative meniscus with normal X-rays/ abnormal MRI (grade III meniscus lesion), APM may be proposed. **Grade B**
- Surgery can be proposed earlier for patients presenting considerable mechanical symptoms. **Grade D**
- No arthroscopic surgery should be proposed for a degenerative meniscus lesion with advanced osteoarthritis on weight bearing radiographs. **Grade A**

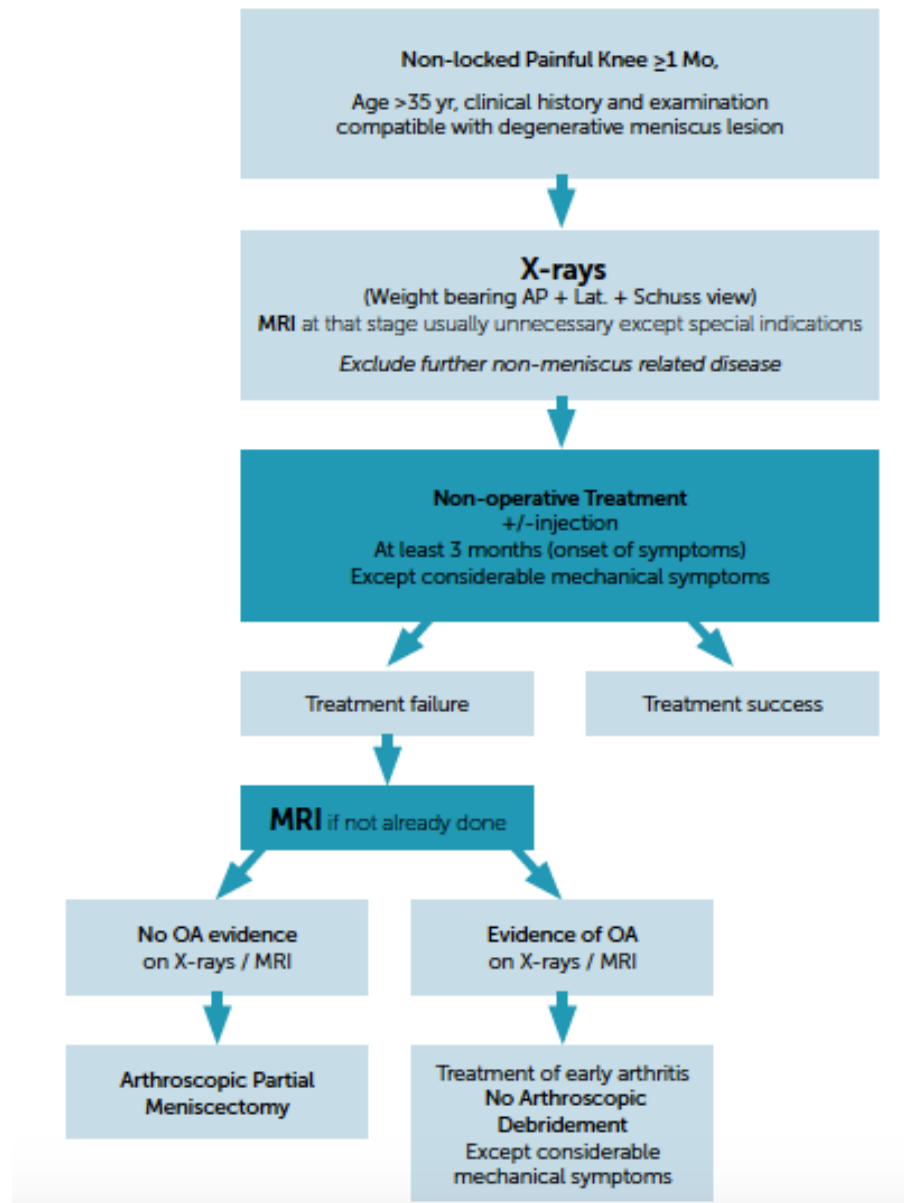
Exceptions should be discussed for young patients with considerable symptoms.

For a middle-aged patient with knee pain and a degenerative meniscal tear, our best evidence suggests that a regime of **physical therapy** would be the correct first option.

According to the UK's National Institute for Health and Care Excellence guidelines, patients with mechanical symptoms do present an **indication for arthroscopy**, even when there is Osteoarthritis.

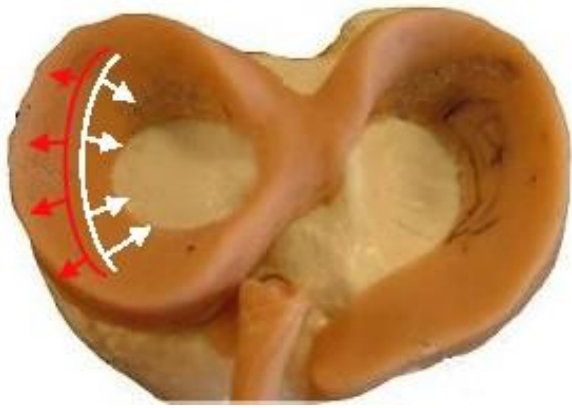
Meniscus surgery (APM)
clearly suggest that arthroscopic meniscectomy offers **advantage** against neither physical therapy nor sham surgery. Sihvonon et al for example, report no advantage to partial meniscectomy over sham arthroscopy for patients without osteoarthritis.

ESSKA Meniscus Consensus algorithm



What are the lessons we should learn from this?

- 1. Do not treat asymptomatic lesions.**
- 2. Treat the **patient** and not the **MRI**.**
- 3. When you discover asymptomatic meniscal lesions during an ACL reconstruction, consider suturing them.**

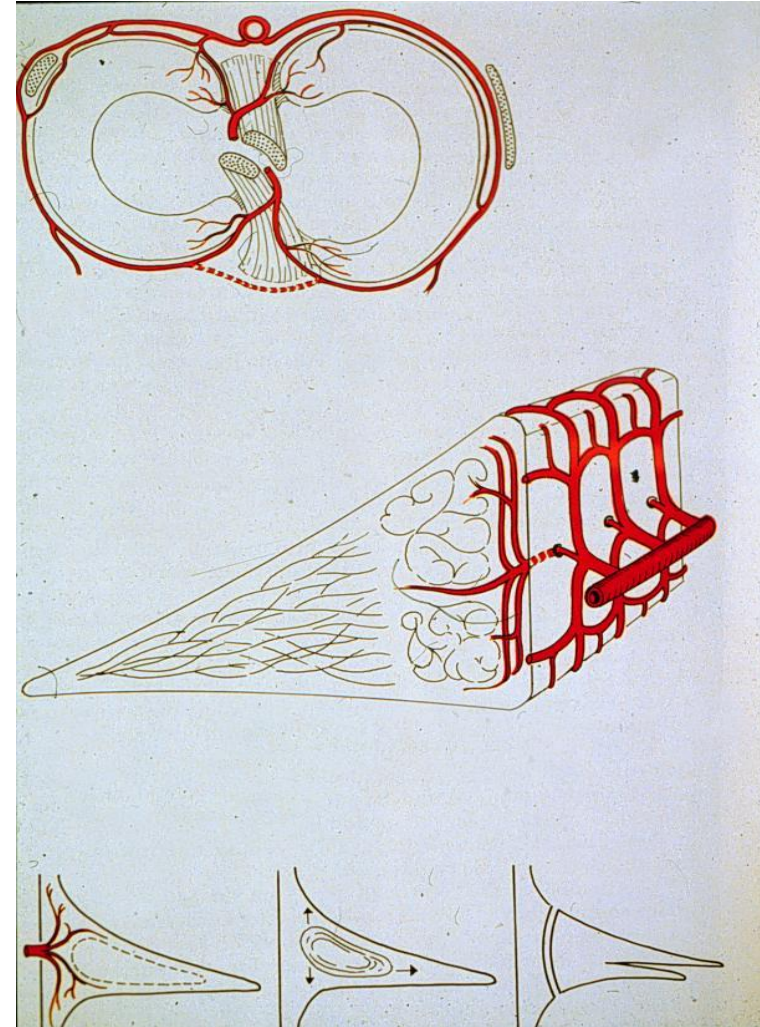


Meniscus repair

Ca 10% can be repaired

- Location(vascularity)
- Tissue quality
- Type , size of the rupture
- Chronicity
- Patients age
- Joint stability

DR W. Li





R.I.P.

Meniscus Surgery

1975-2016

"It was a good run while it lasted..."



Tartu



Euroopa Liit
Euroopa
Regionaalarengu Fond



Eesti
tuleviku heaks

aitäh

Estonia.eu
Positively surprising

