Antwerp Orthopaedic Center

knee department

Update on Cartilage Treatments

Current Concepts?

Peter Verdonk, MD, PhD; Koen C Lagae MD; Aad D'Hollander, MD, PhD and Rene Verdonk, MD, PhD
from the Antwerp Orthopaedic Center, Monica Hospitals, Belgium.

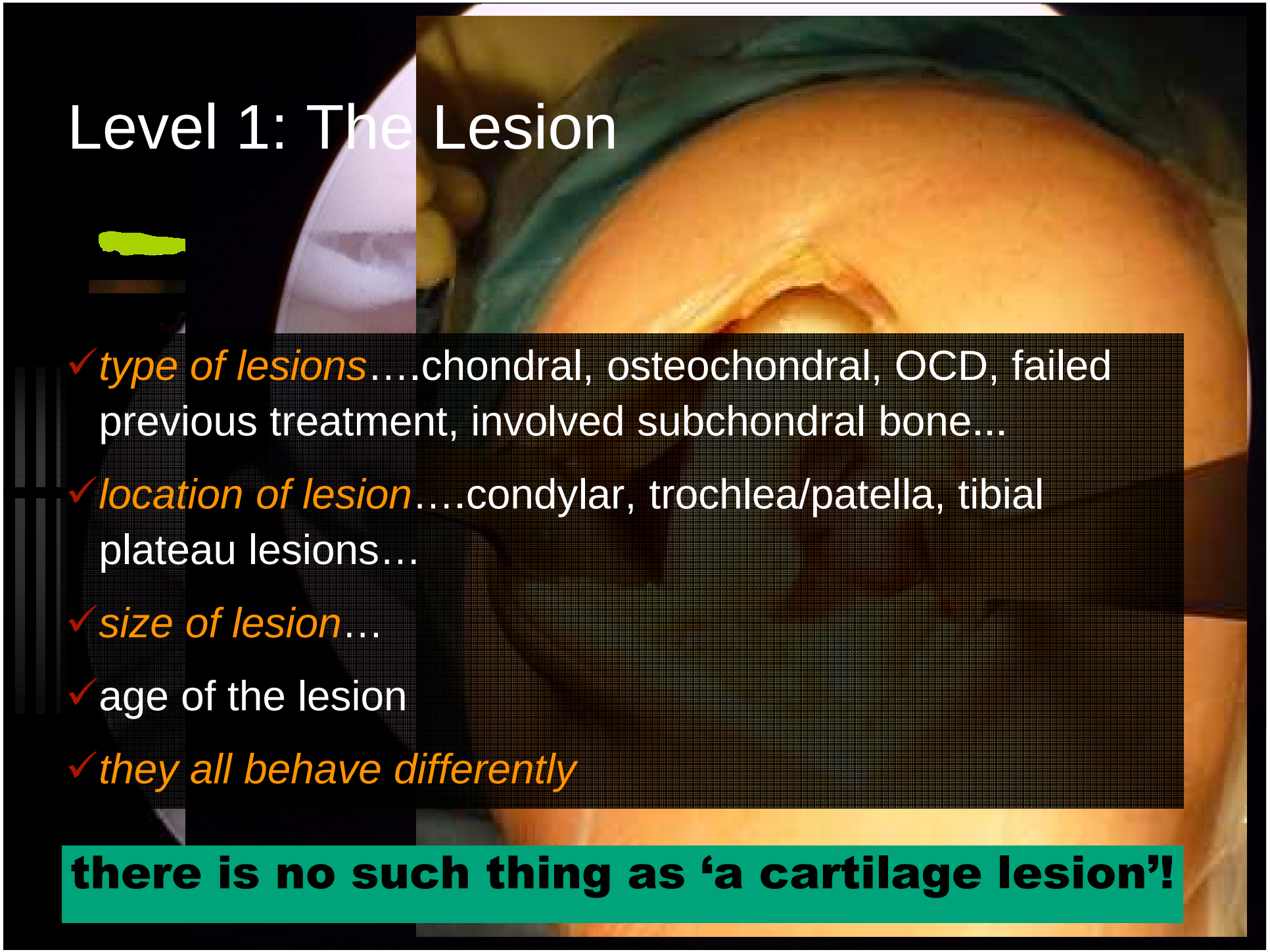
az monica

UZA

Current understanding of cartilage lesions


8
4
6
9
3
5
2
11
7
11

Level 1: The Lesion



- ✓ *type of lesions*….chondral, osteochondral, OCD, failed previous treatment, involved subchondral bone...
- ✓ *location of lesion*….condylar, trochlea/patella, tibial plateau lesions…
- ✓ *size of lesion*…
- ✓ age of the lesion
- ✓ *they all behave differently*

there is no such thing as ‘a cartilage lesion’!

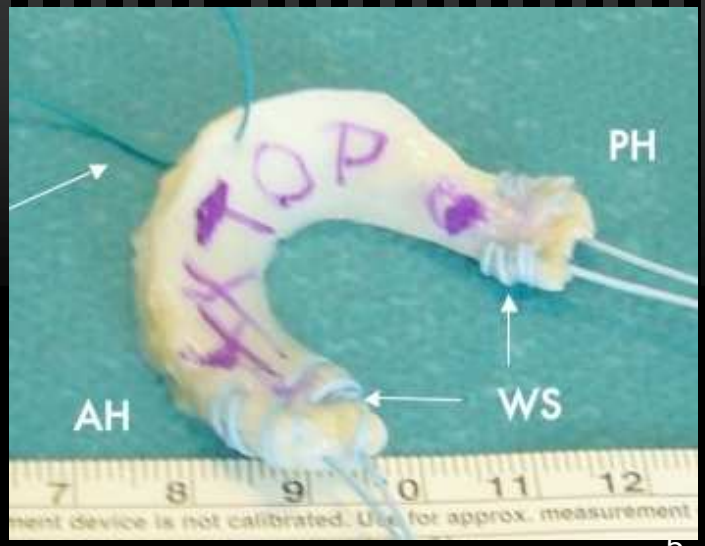
Level 2: The Knee joint

✓***CONCOMITANT or PREVIOUS INJURIES?***

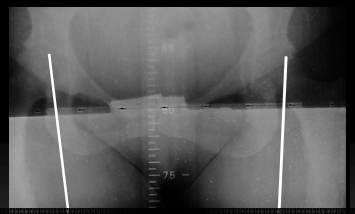
✓ligament stability?….ACL reconstruction

✓ACL reconstruction does not increase risk for cartilage lesion

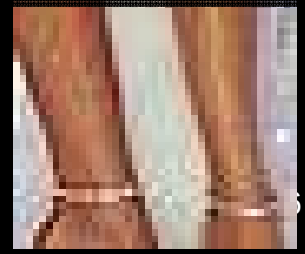
✓previous meniscectomy (lateral) increases risk for cartilage lesions



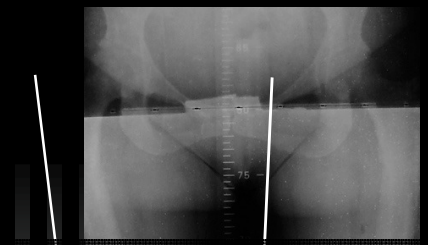
Level 3: The lower limb

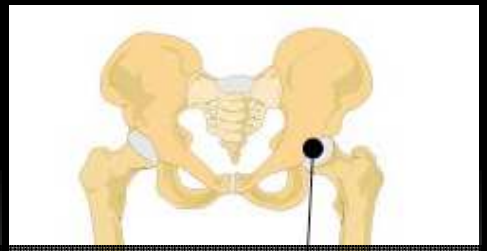


- ✓ Axial Alignment...*first think about osteotomy*
- ✓ PF alignment...*anteromedialisation is powerfull*

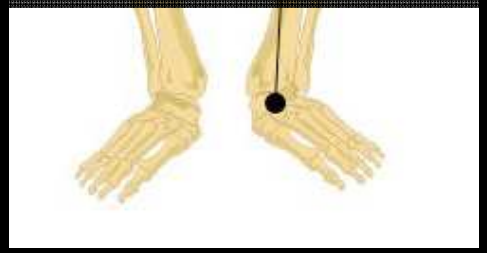


Level 3: The lower limb in Athletes?





- ✓ Axial Alignment…*high tibial osteotomy?*
- ✓ PF alignment…*Fulkerson osteotomy?*



Level 4: The Patient

- Age (physiological)
  - Age below 30 show superior outcome
  - upper age limit is 50 years…
- BMI
- occupation
- risk aversion
- return to play or long term?
- rehab commitment essential

Level 5: The unknows

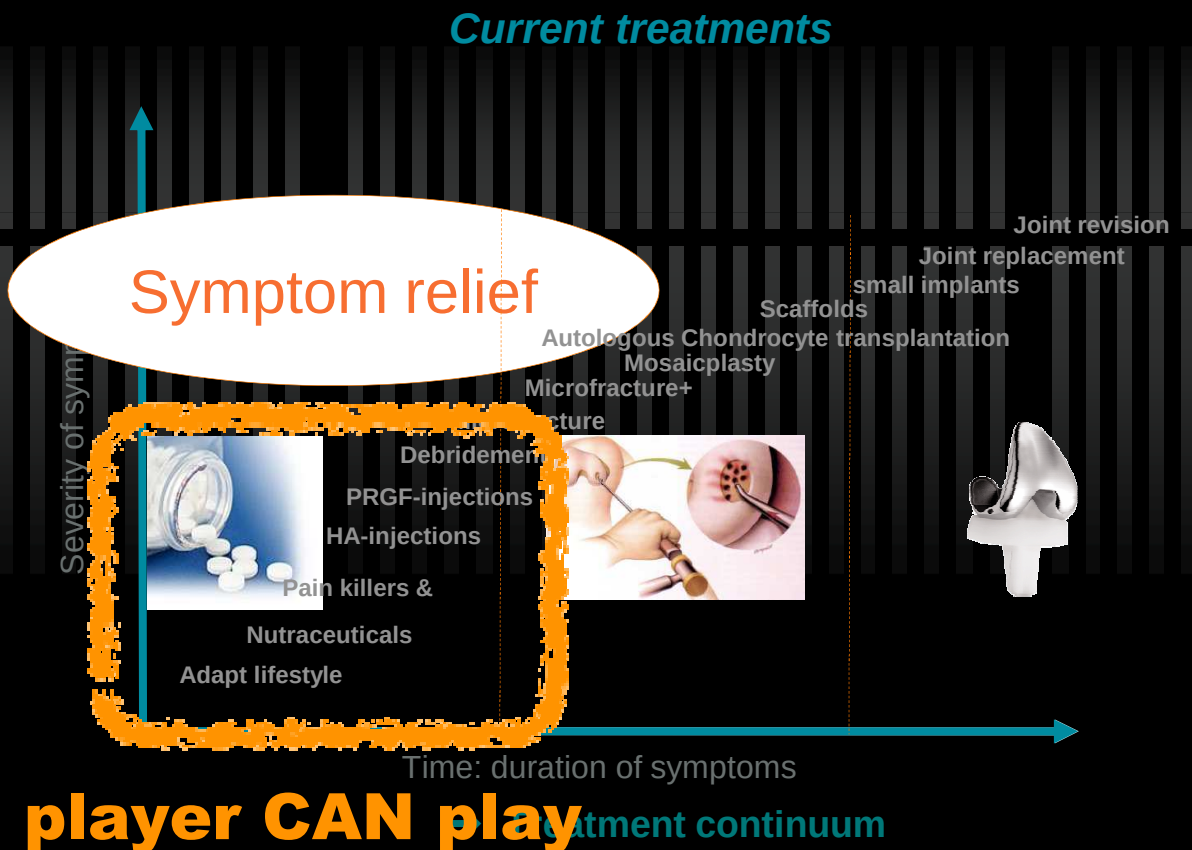
- ✓We must realize that there are still a lot of unknown variables that determine the outcome of cartilage repair….
- ✓*overall failure rate of biological treatment is 20-30%*

When to operate?

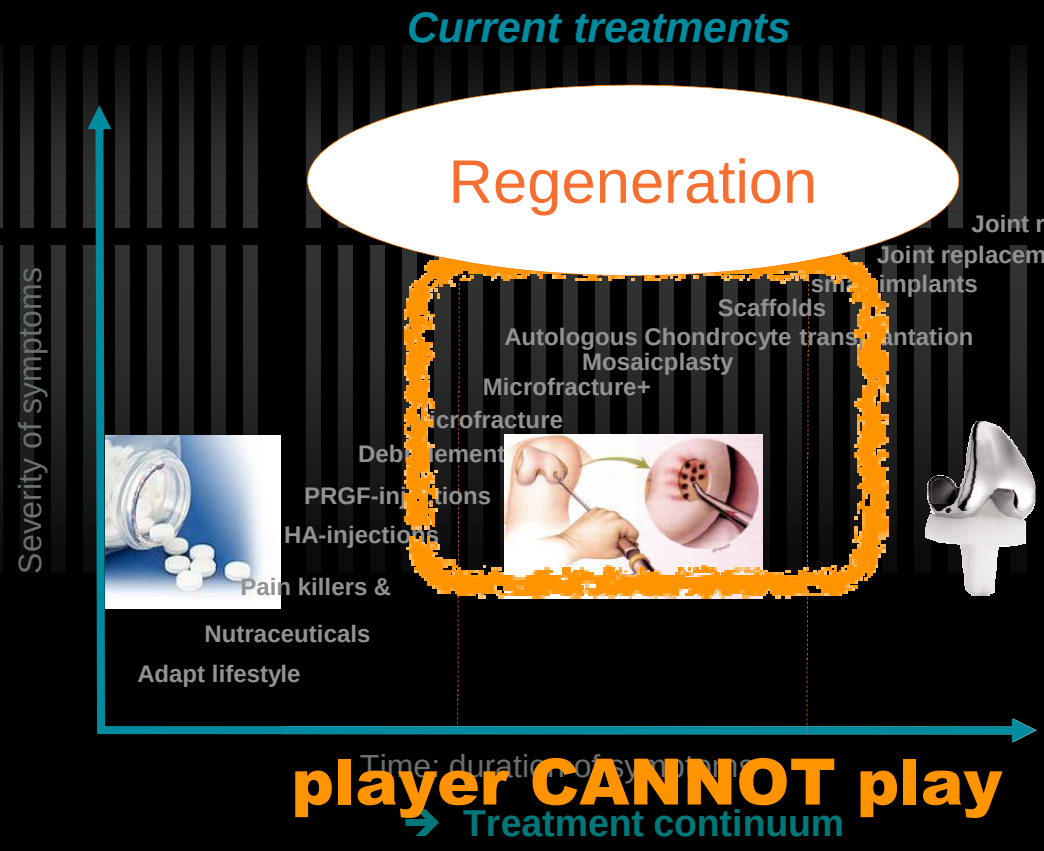
only when the symptomatic full thickness lesion stops the patient to be active

why…cartilage reconstructive surgery takes at least 6-12 months….!

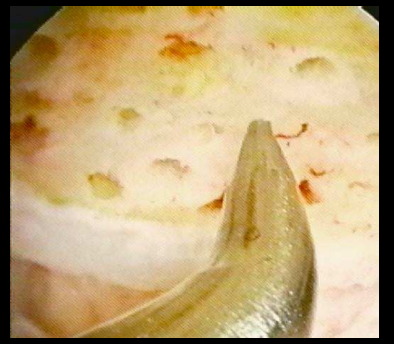
The place of biological surgical treatment within the treatment algorithm



The place of biological surgical treatment within the treatment algorithm



So…What type of Surgery?



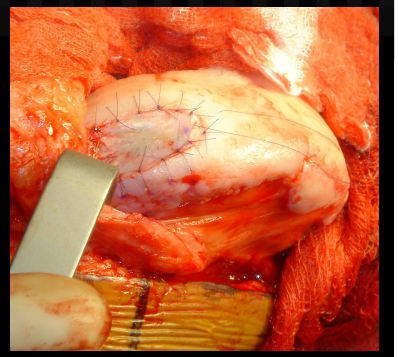
Mosaicplasty

Microfracture+

Scaffolds

Microfracture

ACI



Debridement

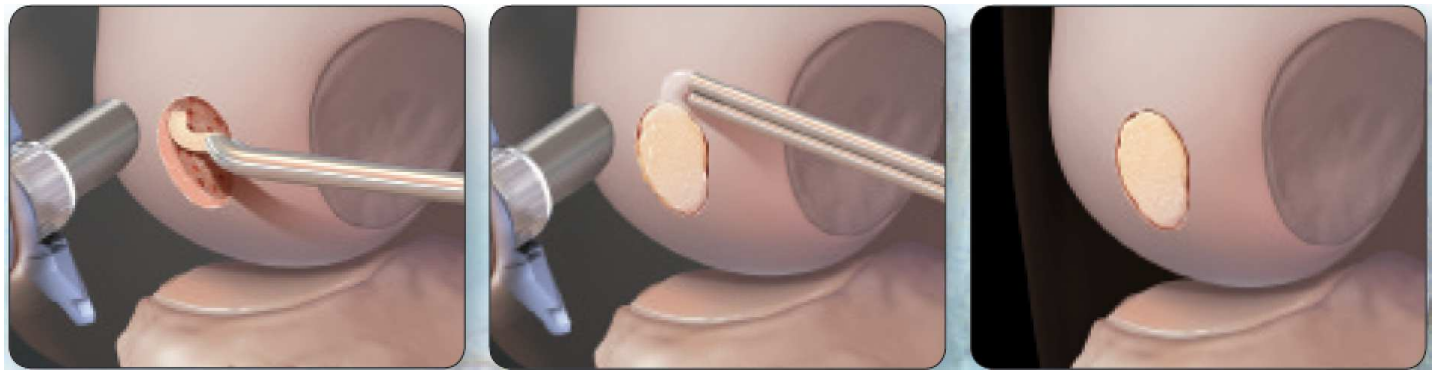
Microfracture

- In all studies: improvement during the first 24 months, but insufficient data on long term
- Deterioration of results with time
- limited hyaline repair tissue, variable repair cartilage volume
- Failure rate was variable and time dependant (2,5 % at 2 years and to 23% to 31% between 2 and 5 y)

28 studies (6 randomized, 1 prospective cohort, 12 prospective case series, 9 retrospective case series)
3122 patients
(1524 with f.u. over 5 years)
Mean age 39 y
Average F-up 41 m

Mithoefer Kai et al. 2009, Clinical Efficacy of the Microfracture Technique for Articular Cartilage Repair in the Knee.

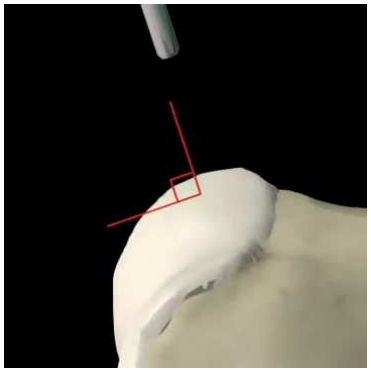
Microfracture ‘Next Generation’



- Add scaffold on top of micro fracture for improved healing**
  - BioCartilage (Micronized Allogeneic Cartilage)
  - BST Cargel (Chitosan and autologous blood)*
  - Cares 1S (dense Collagen 1 scaffold)
  - Hyalofast (crosslinked Hyaluronic Acid scaffold)
  - Autologous Matrix Induced Chondrogenesis (Collagen membrane)*

**no RIZIV reimbursment available

*available in Antwerp



MOSAICPLASTY

multiple osteochondral autografts

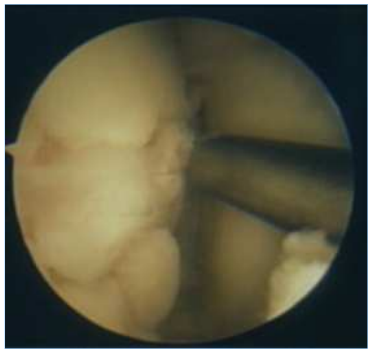
First described by L. Hangody in 1997

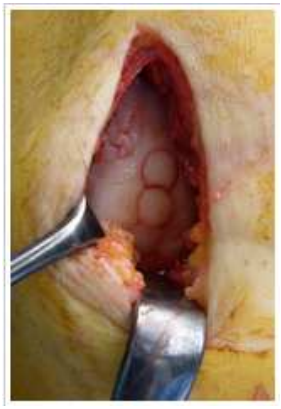
Arthroscopic

Bone-to-bone healing

Various diameter of the plugs

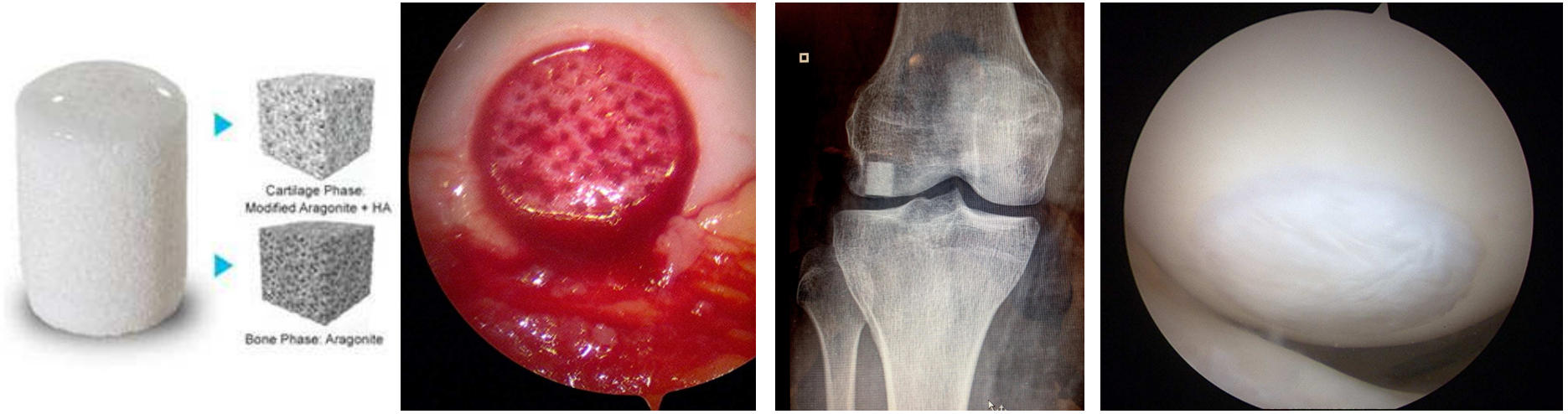
GOOD DURABLE RESULTS IN SMALLER LESIONS





works fine in lesions up to 3 plugs

Mosaicplasty ‘Next Generation’

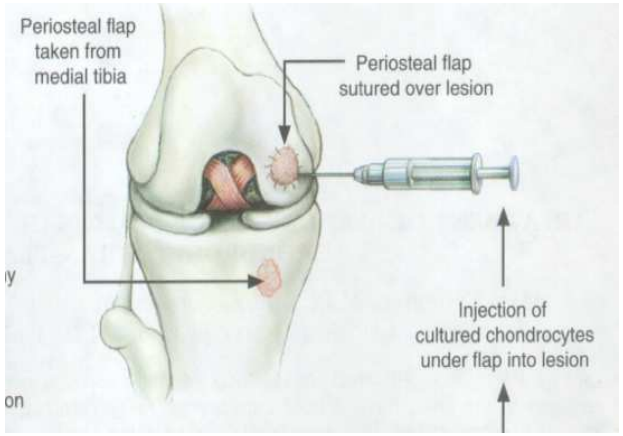


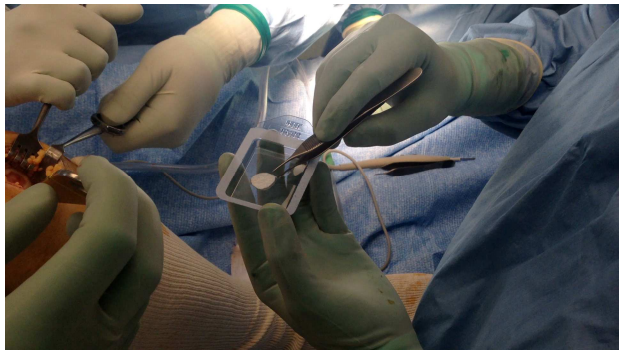
- Use scaffold in stead of autologous osteochondral graft, avoiding ‘rob Peter to pay Paul’-problem, ideal in smaller lesions**
  - Cartiheal Agili-C (coral implant, ongoing study)*

**no RIZIV reimbursment available

*available in Antwerp

Autologous Cartilage Transplantation





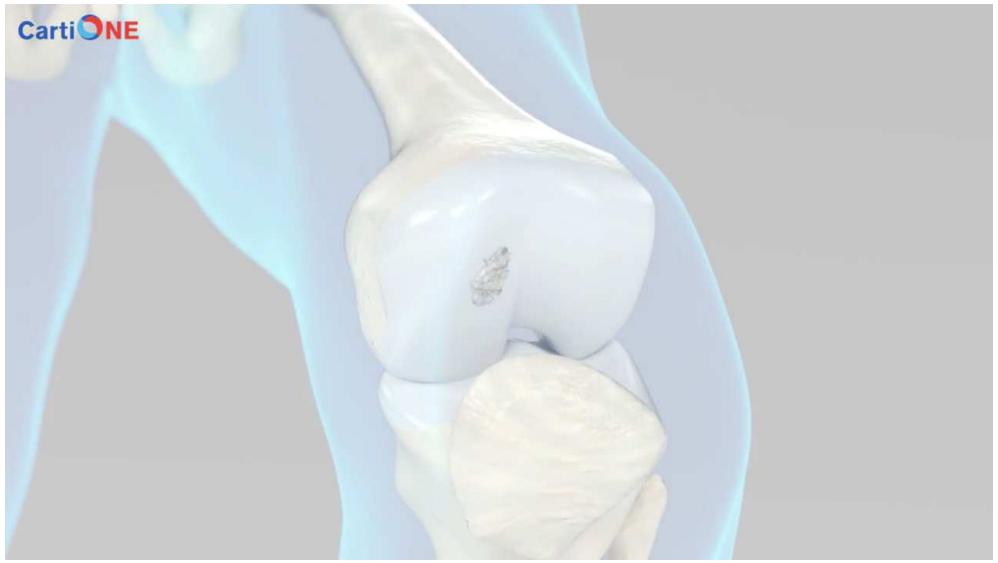
- Superior Clinical Outcome in Lesions less than 3 years old compared to micro fracture
- Long Lasting Results in larger cartilage lesions
- Superior Structural Cartilage Repair vs Micro fracture
- …but 2 step surgery….

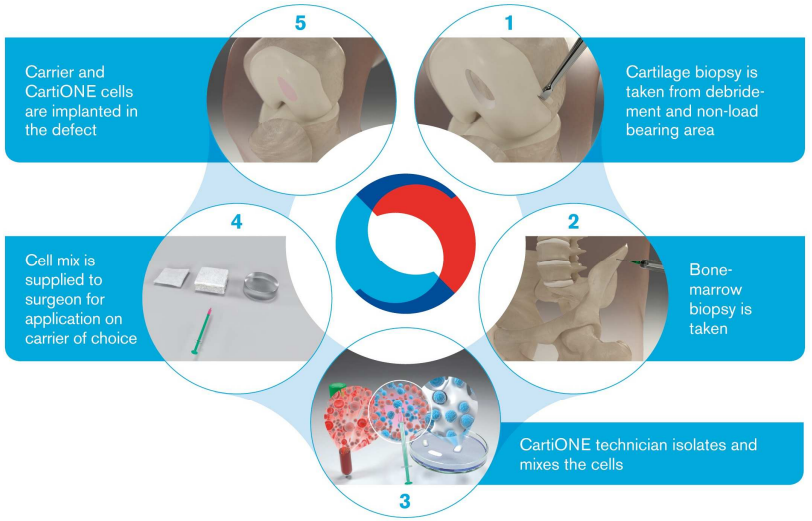
…Despite the good clinical results, no more reimbursement in Belgium…hopefully we can reverse the decision!

The American Journal of Sports Medicine

EMEA/CAT/CPWP/288934/2009
Saris, Vanlauwe et al. AJSM 2008
Saris, Vanlauwe et al. AJSM 2009
Vanlauwe, Saris et al. AJSM 2011

ACI ‘Next Generation’





- A combination of autologous chondrocytes and autologous bone marrow stem cells isolated in the OR and transplanted in a **single step** on different scaffolds**
  - CartiOne (ongoing study)*

Primary chondrocytes and bone marrow cells on a co-polymer scaffold: 2-year results of a prospective, multicenter clinical trial in patients with cartilage defects of the knee

K. Slynarski[1], W. Widuchowski[2], M. Snow[3], W. Weiss[4], J. Kruczyński[5], J. Hendriks[6], J. Guidoux[6], P. Verdonk[7]
1.Warsaw (Lekmed)/PL, 2.Katowice (Avimed)/PL, 3.Birmingham(ROH)/UK, 4.Bydgoszcz (University Hospital nb. 2 Dr. Jana Biziela) /PL, 5.Poznan (Endomedical)/PL, 6.Bilthoven(CellCoTec)/NL, 7.Antwerp(AZ Monica)/BE

**no RIZIV reimbursment available

*available in Antwerp

Scaffolds for Deeper OsteoChondral Lesions

- Osteochondral Scaffolds for the repair of large **Cartilage and Bone** Defects and Osteochondritis Dissecans**
    - Maioregen (Collagen and nanoparticle hydroxyappatite), now over 5 years of experience*

Bone Joint J. 2015 Mar;97-B(3):318-23. doi: 10.1302/0301-620X.97B3.34555.

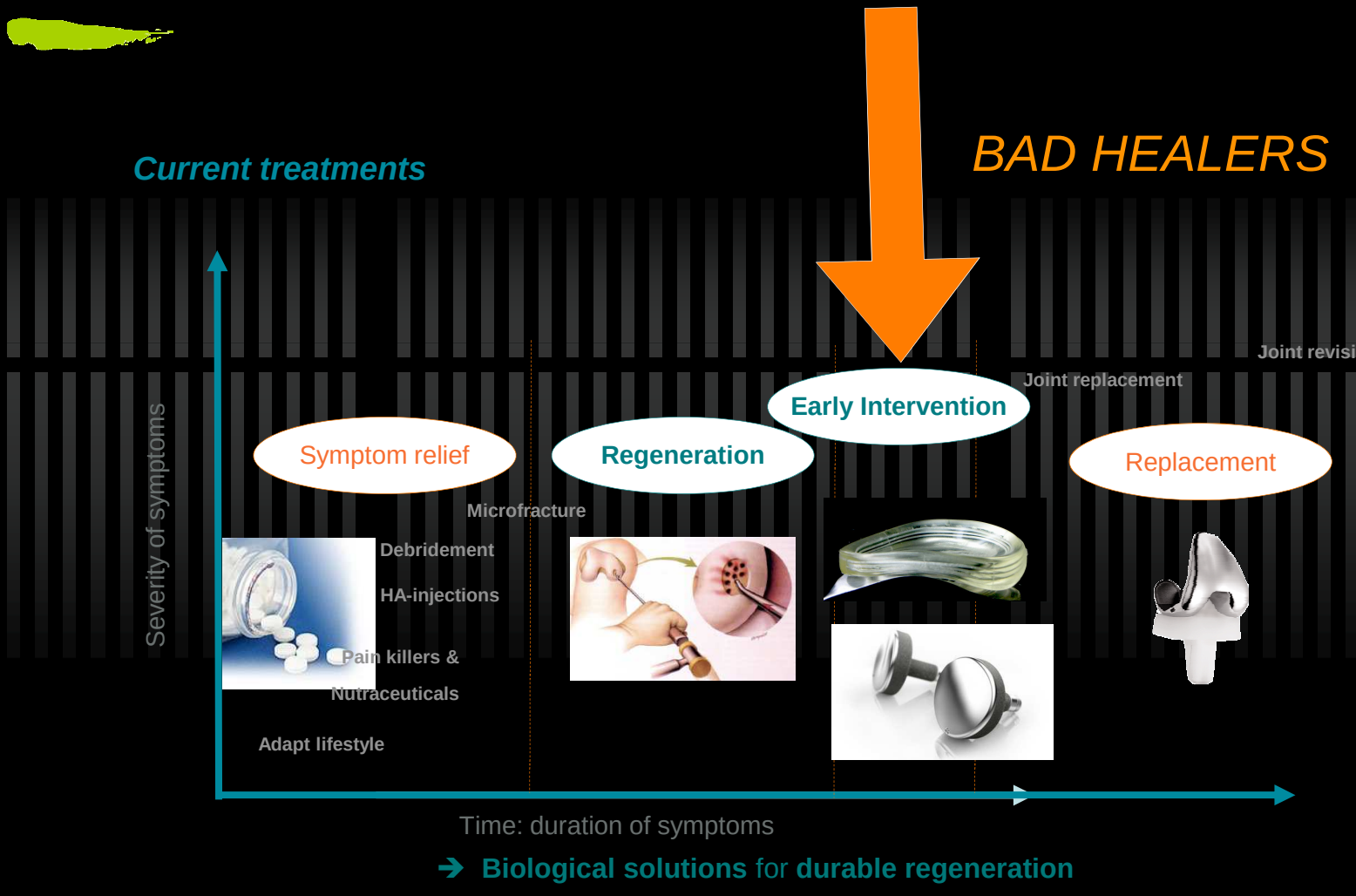
Treatment of osteochondral lesions in the knee using a cell-free scaffold.

Verdonk P[1], Dhollander A[1], Almqvist KF[2], Verdonk R[2], Victor J[2].

**no RIZIV reimbursment available

*available in Antwerp

Upcoming explosion in patient specific *Early Intervention* implants!



➔ **Biological solutions** for **durable regeneration**

www.knee.be

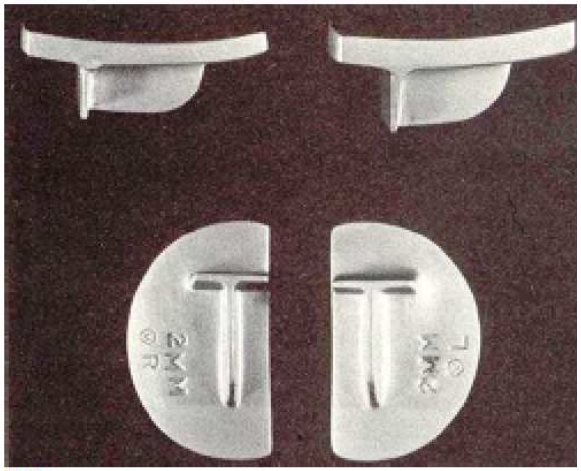


Fig. 1

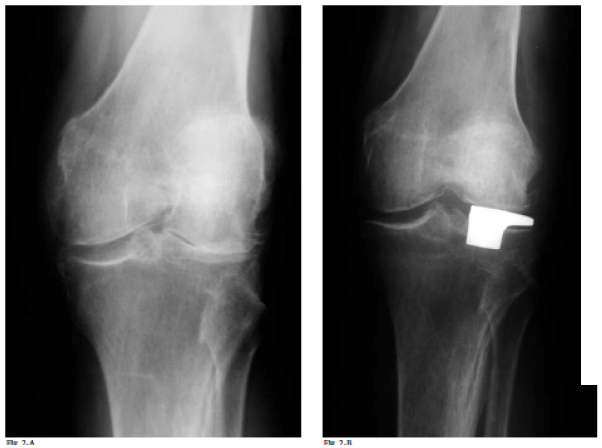


Fig. 2-A

Fig. 2-B

McKeever Hemiarthroplasty of the Knee in Patients Less Than Sixty Years Old

By Bryan D. Springer, MD, Richard D. Scott, MD, Alexander P. Sah, MD, and Richard Carrington, FRCS(Orth)

Investigation performed at the Department of Orthopaedic Surgery, New England Baptist Hospital, Boston, Massachusetts

Background: Knee arthritis in the young patient is a challenging problem that may necessitate surgical treatment. We continue to perform hemiarthroplasty with a metallic tibial implant in selected young patients who, for various reasons, are not candidates for osteotomy, unicompartmental arthroplasty, or total knee arthroplasty. The purpose of the present study was to determine the minimum twelve-year results of this procedure in young patients.

Methods: The original study group consisted of a consecutive series of twenty-four patients (twenty-six knees) who were managed with McKeever tibial hemiarthroplasty for the treatment of unicompartmental osteoarthritis of the knee. All patients were younger than sixty years of age at the time of the index procedure (average age, 44.6 years). During the study period, two patients died and one was lost to follow-up, leaving twenty-one patients (twenty-three knees) available for review. All patients were followed clinically for a minimum of twelve years or until revision. Knee Society knee and functional scores and Tegner scores were determined, and seven of the ten implants were evaluated radiographically.

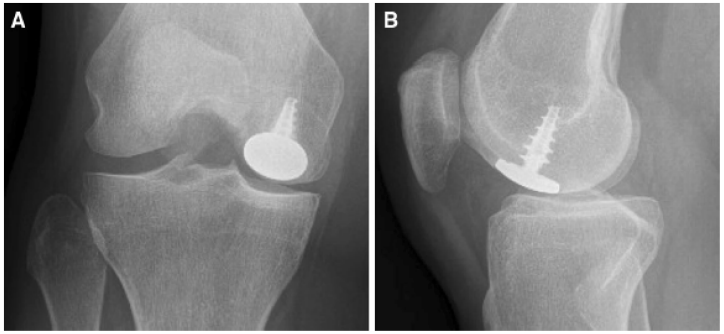
Results: Thirteen knees were revised at an average of eight years after the index procedures. All thirteen knees had an uncomplicated revision to either a unicompartmental arthroplasty or total knee arthroplasty. Ten retained implants were available for clinical review after an average duration of follow-up of 16.8 years. The mean Knee Society knee scores, functional scores, and Tegner scores, available for nine of these ten knees, were 80, 97, and 4.2, respectively.

Conclusions: We believe that the McKeever tibial hemiarthroplasty continues to be a reasonable surgical option for patients who are not candidates for osteotomy and are too young or too active for a unicompartmental or total knee arthroplasty.

Level of Evidence: Therapeutic Level IV. See Instructions to Authors for a complete description of levels of evidence.

nothing new?…developed in the 50’s

Cartilage Solutions: Focal Knee Arthroplasty



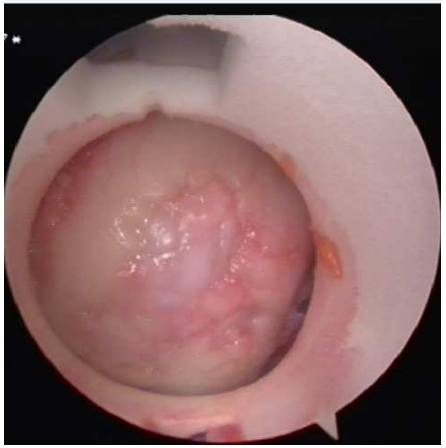
- Resurfacing the symptomatic cartilage lesion with a non-biological small metal implants
    - Hemicap (Arthrosurface)*
    - Episealer (Episurf, Patient specific, ongoing trial)*

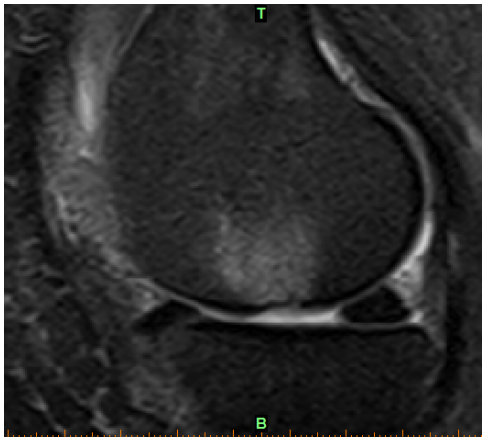
RIZIV reimbursment available YES!

*available in Antwerp

Typical Patient Profile

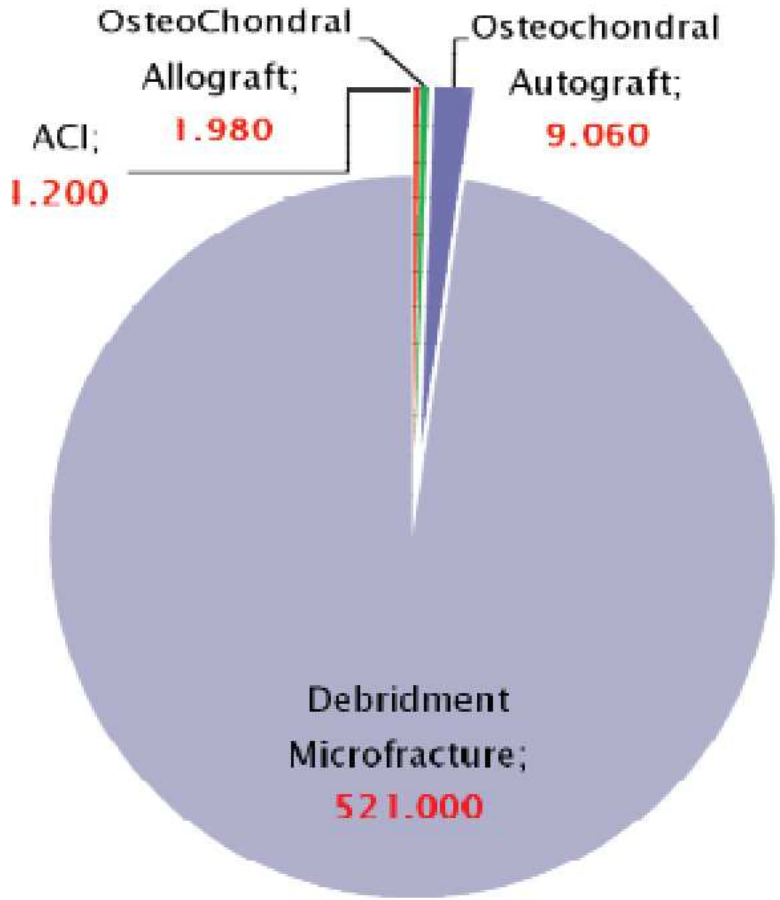
- older patient beyond biological repair age…(once you hit forty, guarantee runs out)
- symptomatic isolated focal cartilage defect 15-25mm
- failed previous cartilage surgery (f.e. microfracture)
- osteochondral disease
- normal alignment
- normal meniscus





Conclusions on Current Technologies

- Each lesion needs ‘in depth analysis’
- Getting correct cells into defect is key
- Microfracture too commonly used, decline in clinical outcome after 2 years
- Each Technique has specific its indication
- Cartilage treatment should also look for alignement, stability and meniscus!



Antwerp Orthopaedic Center

knee department

Thank you for your attention

Current Concepts?

Peter Verdonk, MD, PhD; Koen C Lagae MD; Aad D'Hollander, MD, PhD and Rene Verdonk, MD, PhD
from the Antwerp Orthopaedic Center, Monica Hospitals, Belgium.

az monica

UZA