


DISCLOSURES



- o Industry:
 - Sanofi/ Genzyme: Consultant (payments to KMSF non-profit)
 - Icartilage: Consultant \$ 0
 - Ceterix: Consultant (payments to KMSF, non-profit)
 - Smith&Nephew : Institutional Support
- o Current Grant Support:
 - NIH-NIAMS: 1K23AR060275-01A1 (2012-2017)
 - Arthritis Foundation (2012-2014)
- o Editorial Board Memberships:
 - Cartilage
 - Journal of Sports Rehabilitation
 - Orthopaedic Journal of Sports Medicine
- o Reviewer for Journals:
 - AJSM,CORR,JKS, O&C, Orthopaedics, Tissue Engineering
- o Patents:
 - 09/561,524 ,PCT/EP98/06849

ARTHROSCOPIC MENISECTOMY


- o > 450,000 / yr in the U.S.
- o Most common procedure performed




National Center for Health Statistics, 1998

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Meniscus Injuries: When not to operate?




- Dx: Osteoarthritis
- Complaint: Pain
- MRI findings:
 - Synovitis/Effusion
 - Meniscus tear
 - ACL: tear/ cyst/ thickening
 - Chondral defects
 - Chondromalacia
 - Baker's cyst

⇒ These are typical signs of Osteoarthritis that you will not change by operating on it!!!!

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WHY DO I SAY THAT:

- Moseley et al NEJM 2002:
 - 165 patients randomized trial
 - Sham (needle) versus meniscectomy in OA patients
 - No difference between groups at 2 years
- Kirkeley et al NEJM 2008:
 - 160 patients randomized trial
 - PT and meniscal debridement vs. PT alone in OA patients
 - PT and debridement had better results for first 3 months, not thereafter
- Katz et al NEJM 2013:
 - 356 patients randomized trial
 - Meniscectomy and standard rehab versus PT alone
 - No differences at any time point but a 30% cross-over on non-op group

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Epidemiology

- Review of 6,039 meniscal tears from 17 medical centers

Classification of tear types:	
complex	30%
peripheral	26%
flap	21%
horizontal cleavage	12%
radial	9.3%
discoid	<1%

Poehling et al. Clin Sports Med 1990

CASE STUDY #1

HPI:

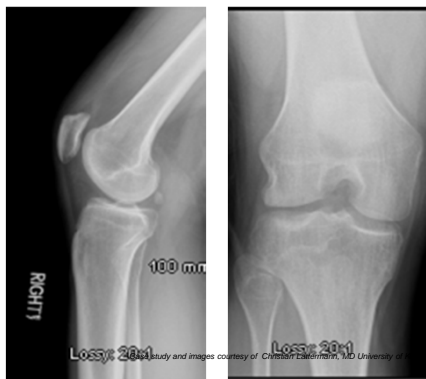
- o19y old college football running back
- oNCAA Div 1AA
- oHit during game, able to continue on with pain"walked it off"

Exam Findings:

- oEffusion
- oLateral joint line tenderness, pain with valgus stress
- oLigaments: Lachman, V/V Posterior drawer normal
- oMinimal mechanical clicking during ROM
- oROM:0/0/120

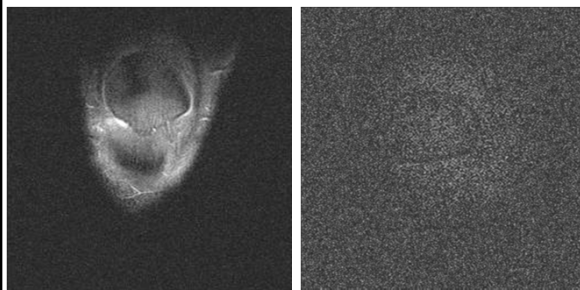
Case study and images courtesy of Christian Lattermann, MD University of Kentucky, Lexington KY.

X-RAY:



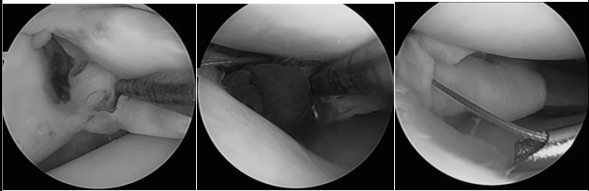
Case study and images courtesy of Christian Lattermann, MD University of Kentucky, Lexington KY.

MRI:




Case study and images courtesy of Christian Lattermann, MD University of Kentucky, Lexington KY.

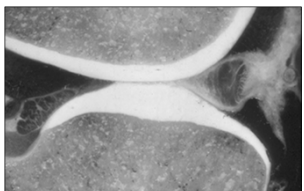
MENISCUS REPAIR



The "soft shell taco" repair:

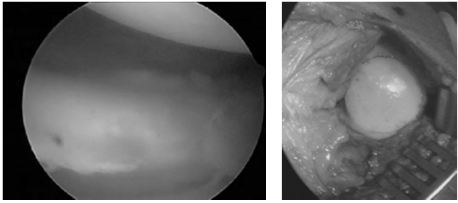


Lateral Meniscectomy
generally worse prognosis





	Fairbanks changes (%)
Bonneux et al. 8 yr f/u in athletes	93
Scheller et al. 12 yr f/u	78


**WATCH OUT FOR RAPID PROGRESSION
OF CHONDRAL DAMAGE FOLLOWING
LATERAL MENISCECTOMY**



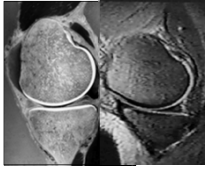
Alford et al. Arthroscopy 2005

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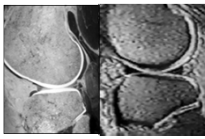


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Medial Meniscus

- large tibial plateau
- concave




Lateral Meniscus

- shorter tibial plateau
- convex







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Functions of the meniscus?

- o Decrease in contact pressures (shock absorber) 
- o Stability (chock block) 
- o Lubrication 

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Contact Pressure:

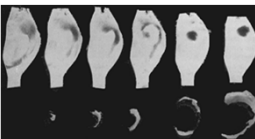
Meniscal tears: The effect of meniscectomy and of repair on intraarticular contact areas and stress in the human knee



A preliminary report*

MARK E. SARATZ, MD, FREDIE H. FUL, MD, AND RICHARD MENGATO, MD


From the Department of Orthopaedic Surgery, University of Pittsburgh, Pittsburgh, Pennsylvania. *

Meniscectomy	Contact Area	Stress
Partial (inner 1/3)	↓ 10%	↑ 65%
Total	75% ↓	↑ 235%

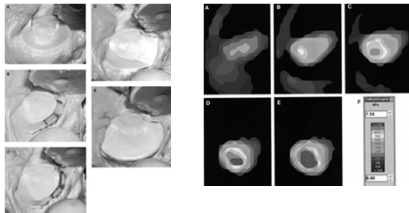


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TIBIOFEMORAL CONTACT MECHANICS AFTER SERIAL MEDIAL MENISCECTOMIES




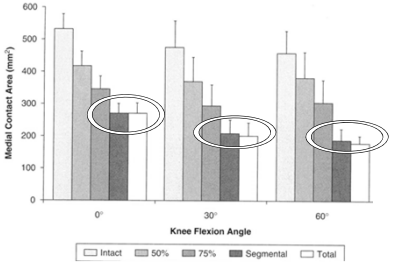
Lee et al, AJSM 34(8) 2006

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Knee Flexion Angle	Intact	50%	75%	Segmental	Total
0°	550	420	350	280	250
30°	480	380	320	250	220
60°	450	380	300	220	180

- Segmental meniscectomy (loss of hoop tension) equivalent to total meniscectomy
- Peripheral meniscus provides greater contribution to decreasing mean contact stresses than central portion

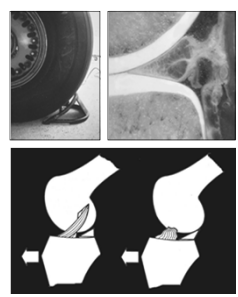
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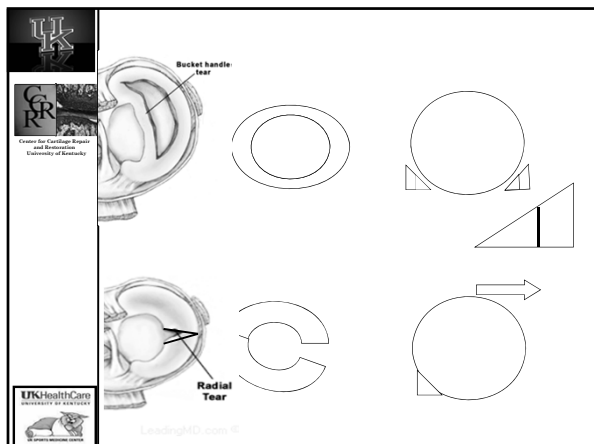
STABILIZING FUNCTION: MEDIAL MENISCUS ONLY



16.6mm 22.3 mm
(5.7 mm increase)

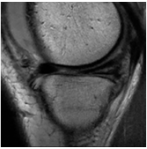
Levy, JBJS 1982

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TREATMENT

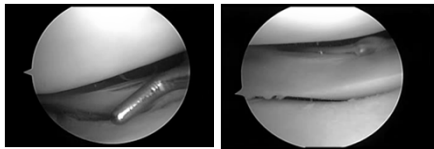
- Non-OP treatment
 - First line treatment for degenerative tears without mechanical symptoms
 - Stable LMT / ACL tear
 - stable horizontal tears
- Meniscectomy vs repair
 - Repair if possible
 - Don't repair degenerative tissue in older pts



UK, CR, UKHealthCare logos are present on the left side.

LONG-TERM EVALUATION OF LATERAL MENISCUS TEARS LEFT IN SITU AT THE TIME OF ACL RECONSTRUCTION

- Of 332 patients, only 8 (2.4%) required subsequent surgery for the lateral meniscus.



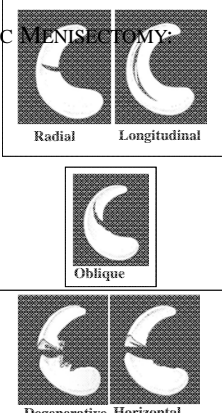
Shelbourne, Arthroscopy 2004

Evid:3 21

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REPAIRABILITY OF TEARS
GOALS OF ARTHROSCOPIC MENISCECTOMY:

- o Repairable =>
- o Maybe repairable =>
- o Non-repairable =>



The diagrams show four types of meniscus tears: Radial (a straight line across the width), Longitudinal (a line following the length), Oblique (a diagonal line), and Degenerative Horizontal (a horizontal line at the top or bottom of the meniscus).

CASE STUDY #2

HPI:

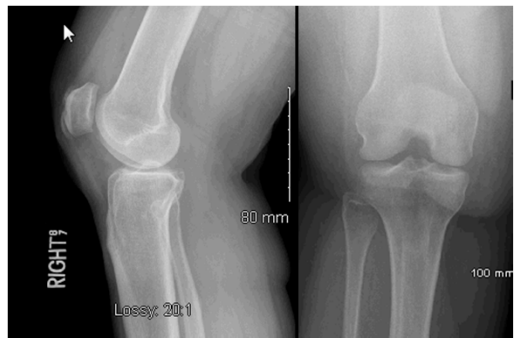
- o 55 year old male,
- o Sudden onset of medial sided knee pain
- o Some swelling but predominantly clicking, feeling of instability

Exam Findings:

- o Small Effusion
- o Medial joint line tenderness, palpable click
- o Ligaments: Lachman, V/V Posterior drawer normal
- o ROM: 0/2/130

Case study and images courtesy of Christian Lattermann, MD University of Kentucky, Lexington KY.

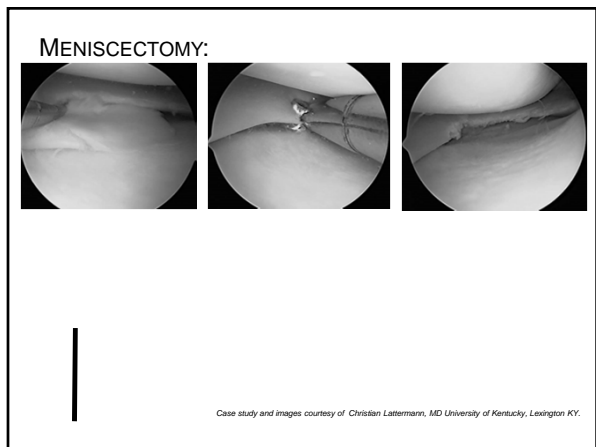
X-RAY:



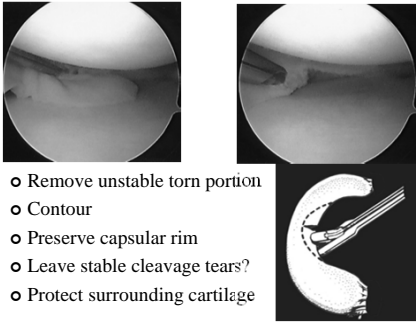
The X-ray shows the right knee joint. A white arrow points to a small, dark, wedge-shaped area on the medial side of the joint, indicating a meniscal tear. Scale bars of 80 mm and 100 mm are visible. The text 'RIGHT' and 'Lossy, 2011' are also present.

Case study and images courtesy of Christian Lattermann, MD University of Kentucky, Lexington KY.





GOALS OF ARTHROSCOPIC MENISCECTOMY:

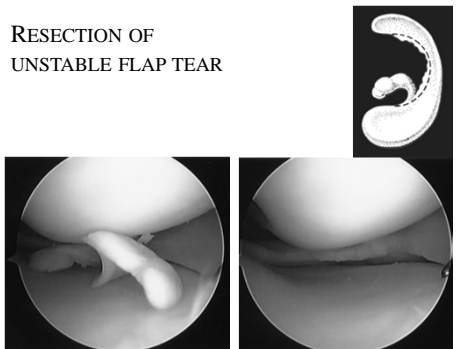


- o Remove unstable torn portion
- o Contour
- o Preserve capsular rim
- o Leave stable cleavage tears?
- o Protect surrounding cartilage

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RESECTION OF UNSTABLE FLAP TEAR

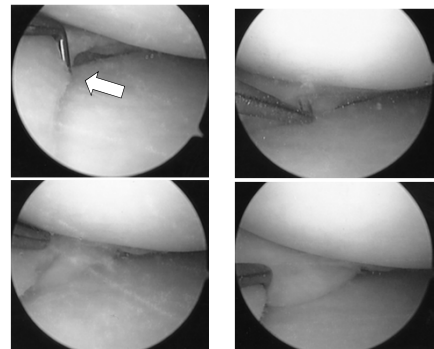


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LOOK FOR THE MISSING FLAP



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ARTHROSCOPIC PARTIAL AND TOTAL MENISCECTOMY:



	<u>Fairbanks Changes</u>
Partial	33%
Total	72%*
(p<0.05)	

* 14% symptomatic with ADL's

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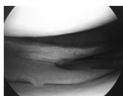
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**Andersson-Molina.
Arthroscopy 2002**



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LONG-TERM RESULTS OF MENISCUS REPAIR AND MENISCECTOMY: 13 YEARS F/U

- At 7 yrs joint space reduction more common after meniscectomy
- By 13 yrs No difference (only successful repairs compared to mx)



Rockborn et al. Knee Surg Sports Tr Arth. 2000

Evid:4





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MENISCAL REPAIR COMPARED WITH MENISCECTOMY FOR BUCKET-HANDLE MEDIAL MENISCAL TEARS IN ANTERIOR CRUCIATE LIGAMENT-RECONSTRUCTED KNEES.


- 6-8 yr / f/u
- Outcomes of repair were not superior to partial removal.
- Repaired degenerative tears had significantly lower subjective scores than those with non-degenerative tears.

Shelbourne KD Am J Sports Med. 2003+2004

Evid:3



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PARTIAL (RIM PRESERVATION) VS. SUBTOTAL MENISCECTOMY


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Outcome of Arthroscopic Meniscectomy: Pt' s under 23 years of age

- o 13 yr f/u

	<u>Radiographic Changes</u>
Subtotal	87%
Partial	48%

Rockborn et al. Acta Orthop Scand 1995

Evid:4

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RIM PRESERVATION IN DEGENERATIVE TEARS

Subtotal meniscectomy (rim resection) for a degenerative tear scored significantly worse on the knee-specific outcomes than individuals who had rim preservation for the same type of tear.

Englund et al. Rheumatology. 2001 Jun;40(6)




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MENISCAL RIM PRESERVATION IS HIGHLY RECOMMENDED

- o Higuchi et al. Clin Orthop Relat Res. 2000
- o Chatain et al. Knee Surg Sports Traumatol Arthrosc. 2001






COMPARATIVE STUDY OF MEDIAL VS LATERAL MENISCECTOMY ON STABLE KNEES: 10-YEAR MINIMUM F/U

IKDC (Gr 1or2)	Degenerative changes with normal other side	
Med	86%	22%
Lat	79%	38%

- Better prognosis: intact rim, vertical tears, no chondrosis

Chatain et al. Arthroscopy 2003

Evid: 4








LONG-TERM RESULTS OF A-SCOPIC PARTIAL MEDIAL MENISCECTOMY IN AN OTHERWISE NORMAL KNEE

- 72 knees, age > 40, Minimum 15 yr f/u
- All posterior horn, stable rim preserved

Chondrosis (Outerbridge)	Post-op G/E
0-2	95%
3-4	44%

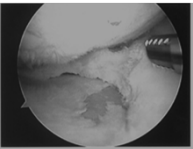
Patel DV. AAOS 2006

CARTILAGE STATUS PROGNOSTIC OF OUTCOMES

- Katz et al.; Osteoarthritis Cartilage. 2006 May;14(5)
- Asik et al.; Knee Surg Sports Traumatol Arthrosc. 2003 Mar;11(2)
- Higuchi et al. Clin Orthop Relat Res. 2000
- Patel DV et al. AAOS 2006

Very Poor prognosis →



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DOES AGE EFFECT OUTCOME?
 ARTHROSCOPIC PARTIAL
 MENISCECTOMY IN PATIENTS OVER 70
 YEARS OF AGE

Outerbridge	Satisfactory Outcome
0-2	80%
3-4	69%

55% increase with OA

o Degenerative changes effect outcome more than age

Crevoisier et al. Arthroscopy. 2001

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DOES GENDER EFFECT OUTCOME?

GENDER

Masculine Feminine

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LATE RESULTS AFTER ARTHROSCOPIC
 PARTIAL MEDIAL MENISCECTOMY.

- o Maximum chondral damage
 - Outerbridge Gr II < 1cm, 7 yr f/u
- o Excellent clinical results in 96%
- o Still had degenerative progression in 33%

Worse in women (p0.05)

Kruger-Franke et al. Knee Surg Sports Traumatol Arthrosc. 1999

ACL TEAR WITH PARTIAL MENISCECTOMY

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KOOS Subscale	KOOS Score
Pain	~80
Symptoms	~80
ADL	~90
Sport/Rec	~60
QOL	~55
Lysholm	~80

Lohmander et al. AJSM 2007:

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FACTORS PREDICTING FUNCTIONAL & RADIOGRAPHIC OUTCOMES AFTER ARTHROSCOPIC PARTIAL MENISCECTOMY

- Increased chondral damage (OA)
- Greater size of meniscal resection
- Degenerative type tear
- Lateral tears
- Valgus alignment
- Female gender
- Higher BMI
- Worse pre-op functional status (SF-36)
- Workman's compensation

Meredith et al, Arthroscopy 2005

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