



CENTER OF ORTHOPAEDICS AND TRAUMATOLOGY
UNIVERSITY HOSPITAL BRANDENBURG / HAVEL



Ligament pathologies

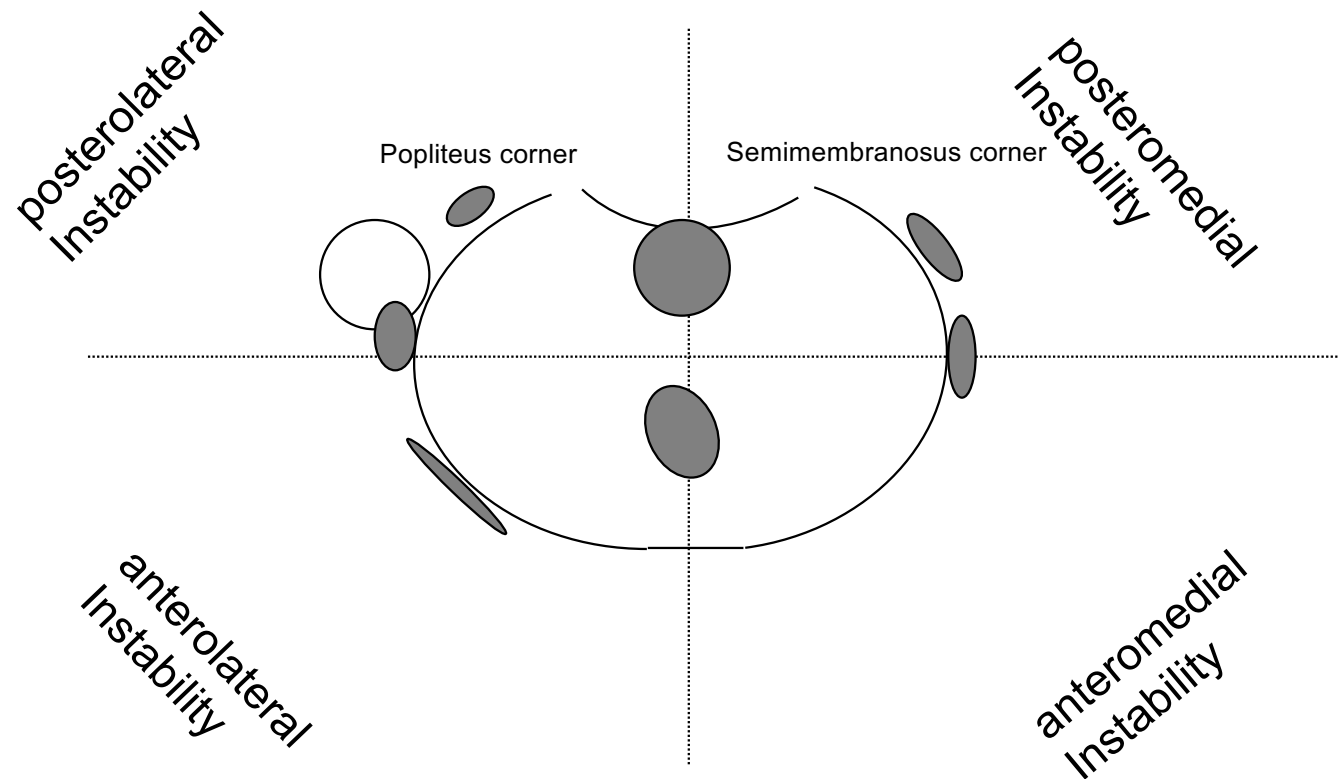
Posteromedial repair and reconstruction

ROLAND BECKER

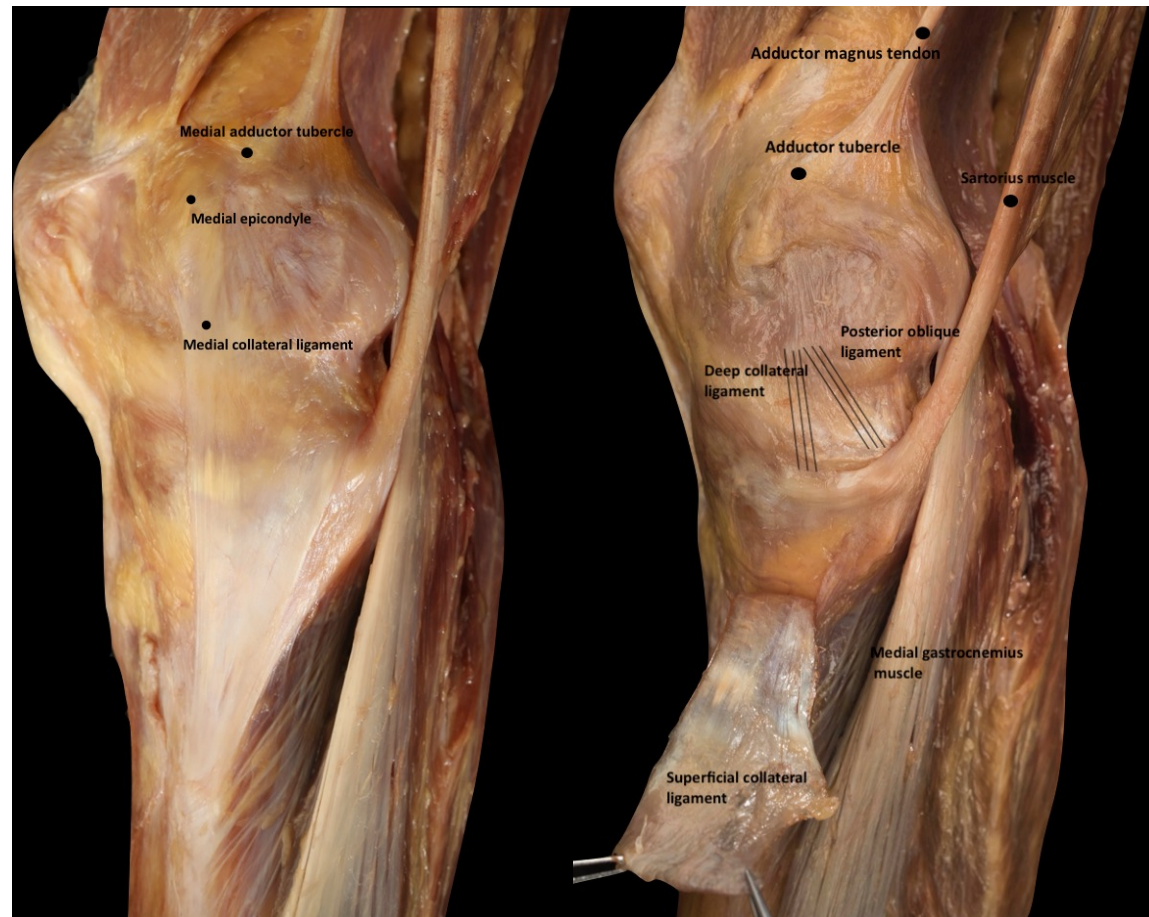


Anatomy of the knee

Isolated and combined instabilities



Anatomy of the medial aspect of the knee



1. **sMCL** superficial medial collateral ligament

- Primary stabilizer in Valgus between 0-90°
- Secondary stabilizer in IR and ER
- Proximal and distal insertion important

2. **POL** posterior oblique ligament

- Primary stabilizer for IR primarily in Extension
- Secondary stabilizer to valgus and ER

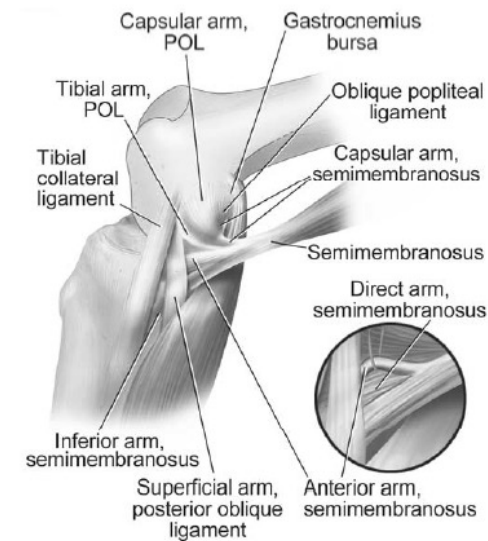
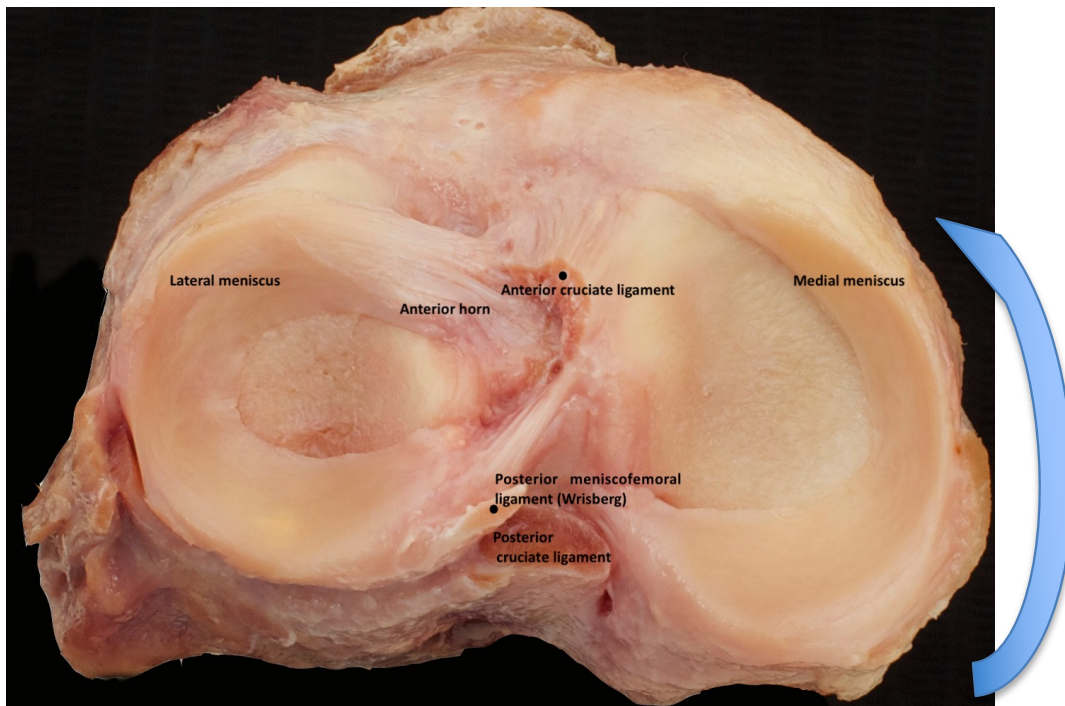
3. **dMCL** deep medial collateral ligament

- Secondary stabilizer to valgus in 60°
- Secondary stabilizer to IR
- Lowest load to failure and stiffness

ACL and MCL injury

Valgus-external rotation injury

- most common type of injury
- high incidence of MCL injury



Duncan et al., AJSM 1995; 23, Cimino et al., Arthroscopy 1994; 10

PMC injury patterns in knee dislocation

MCL injuries in 22/27 patients

- Superficial MCL in 17/27 patients (7 partial, 10 complete)
- Pol injured in 14/22 patients
- Semitendinosus and expansion in 14/22 patients
- Meniscotibial ligament on 11/22 patients.

The posteromedial corner of the knee: an international expert consensus statement on diagnosis, classification, treatment, and rehabilitation

Jorge Chahla¹  · Kyle N. Kunze² · Robert F. LaPrade³ · Alan Getgood⁴ · Moises Cohen⁵ · Pablo Gelber^{6,7} · Björn Barenius⁸ · Nicolas Pujol^{9,10} · Manual Leyes¹¹ · Ralph Akoto¹² · Brett Fritsch¹³ · Fabrizio Margheritini¹⁴ · Leho Rips¹⁵ · Jakub Kautzner¹⁶ · Victoria Duthon¹⁷ · Danilo Togninalli¹⁸ · Zanon Giacomo¹⁹ · Nicolas Graveleau²⁰ · Stefano Zaffagnini²¹ · Lars Engbretsen²² · Martin Lind²³ · Rodrigo Maestu²⁴ · Richard Von Bormann²⁵ · Charles Brown²⁶ · Silvio Villascusa²⁷ · Juan Carlos Monllau²⁸ · Gonzalo Ferrer²⁹ · Jacques Menetrey¹⁷ · Michael Hantes³⁰ · David Parker¹³ · Timothy Lording³¹ · Kristian Samuelsson^{32,33} · Andreas Weiler³⁴ · Soshi Uchida³⁵ · Karl Heinz Frosch^{36,37} · James Robinson^{26,38}

- Consensus based on the Delphi method
- 35 experts in the field of multiligament injuries
- 63 statements

The posteromedial corner of the knee: an international expert consensus statement on diagnosis, classification, treatment, and rehabilitation

Jorge Chahla¹  · Kyle N. Kunze² · Robert F. LaPrade³ · Alan Getgood⁴ · Moises Cohen⁵ · Pablo Gelber^{6,7} · Björn Barenius⁸ · Nicolas Pujol^{9,10} · Manual Leyes¹¹ · Ralph Akoto¹² · Brett Fritsch¹³ · Fabrizio Margheritini¹⁴ · Leho Rips¹⁵ · Jakub Kautzner¹⁶ · Victoria Duthon¹⁷ · Danilo Togninalli¹⁸ · Zanon Giacomo¹⁹ · Nicolas Graveleau²⁰ · Stefano Zaffagnini²¹ · Lars Engbretsen²² · Martin Lind²³ · Rodrigo Maestu²⁴ · Richard Von Bormann²⁵ · Charles Brown²⁶ · Silvio Villascusa²⁷ · Juan Carlos Monllau²⁸ · Gonzalo Ferrer²⁹ · Jacques Menetrey¹⁷ · Michael Hantes³⁰ · David Parker¹³ · Timothy Lording³¹ · Kristian Samuelsson^{32,33} · Andreas Weiler³⁴ · Soshi Uchida³⁵ · Karl Heinz Frosch^{36,37} · James Robinson^{26,38}

Statement	% Agreement	% Disagreement
Anatomy		
The key passive restraining structures of the Posteromedial Corner (PMC) of the Knee are the Superficial Medial Collateral Ligament (sMCL), the Deep Medial Collateral Ligament (dMCL) and the Posterior Oblique Ligament (POL)	100	0
The sMCL is the primary restraint to valgus rotation	100	0
Isolated rupture of the dMCL does not cause a clinically discernable increase in valgus laxity	82.9	17.1
The sMCL is the most important restraint to external tibial rotation on the medial side of the knee	100	0
The POL is an important restraint to internal tibial rotation in the extended knee	100	0
The semimembranosus is an important dynamic restraint	100	0

Classification by Houghston

Severity of injury

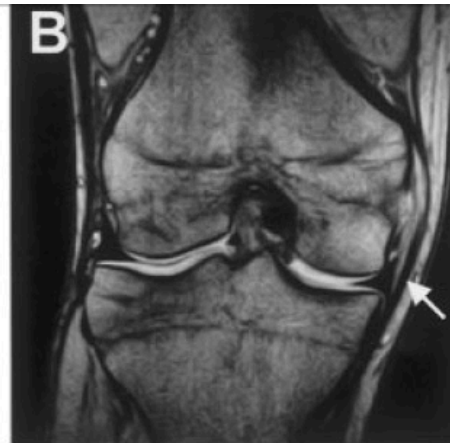
- Grade I Partial rupture of few fibers of the MCL, stable in 0° and 30° of knee flexion
- Grade II sMCL# / POL intact, stable in 0, **unstable in 30°** (gapping 1.2mm in 0°)
- Grade III sMCL# + POL #, **unstable in 0° and 30°** (gapping of 3.2mm in 0°)

Grading according to MRI

Grad I



Grad II



Grad III



Grad IV



Nakamura et al., AJSM 2003

Accuracy of MRI in acute knee injury

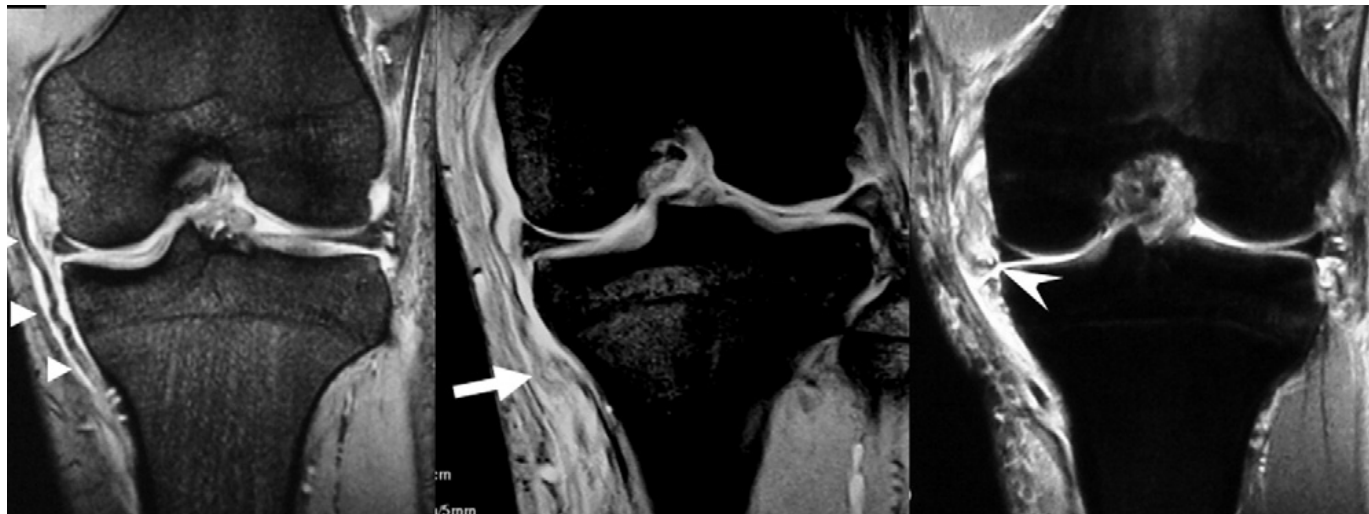
	Sensitivity	Specificity	PPV	NPV
Anterior cruciate ligament	90	94	77	98
Posterior cruciate ligament	100	100	100	100
Medial Meniscus	97	88	94	94
Lateral Meniscus	77	99	98	89

Fast Spin Echo without Fat Supression

	Sensitivity	Specificity	Accuracy
MCL	65.6	97.7	93.6
MM	94.1	81.3	90

Taketomi S The Knee 21 (2014) 1151-1155, Munshi M *Clinical Journal of sports Medicine* 10 (2000) 34-391

„Wave sign“ in valgus rotation grade III

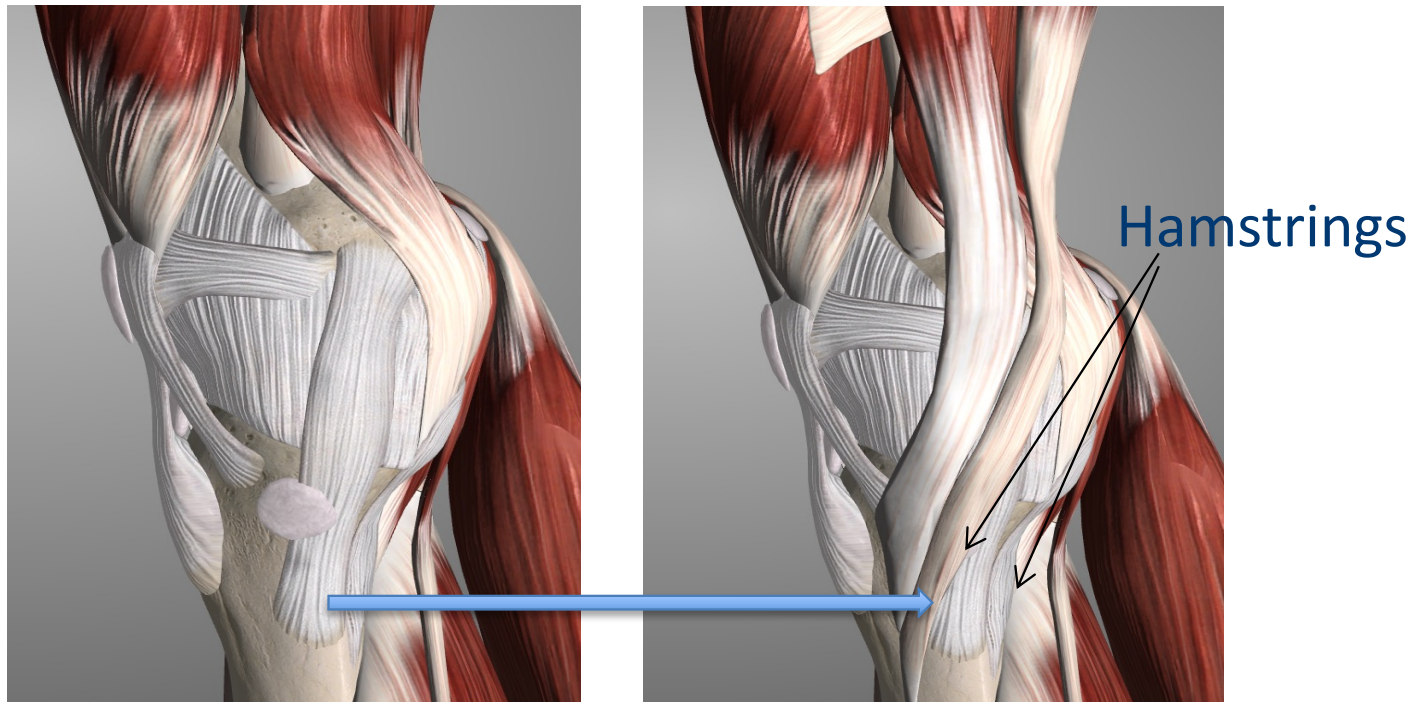


Waving of the
superficial layer

Waving of the
Distal end

Entrapment in the medial
compartment

Sterner lesion



Displacement of the MCL superficially to the Pes anserinus = “Sterner lesion” of the knee

Surgery

Diagnosis

The posteromedial corner of the knee: an international expert consensus statement on diagnosis, classification, treatment, and rehabilitation

- Valgus laxity with the knee in slight valgus (15-30°) indicates sMCL injury
- Pronounced valgus laxity in knee extension indicates combined injury sMCL, POL and ACL
- Dial test may indicate anteromedial rotatory laxity
- MRI compulsory
- Stress radiographies in chronic cases (after 6 weeks)
- Valgus stress radiographies helpful for assessment of conservative treatment

Surgery of acute MCL injury

- Large acute avulsion from the tibial site
- Acute bony avulsion from the tibial or femoral site

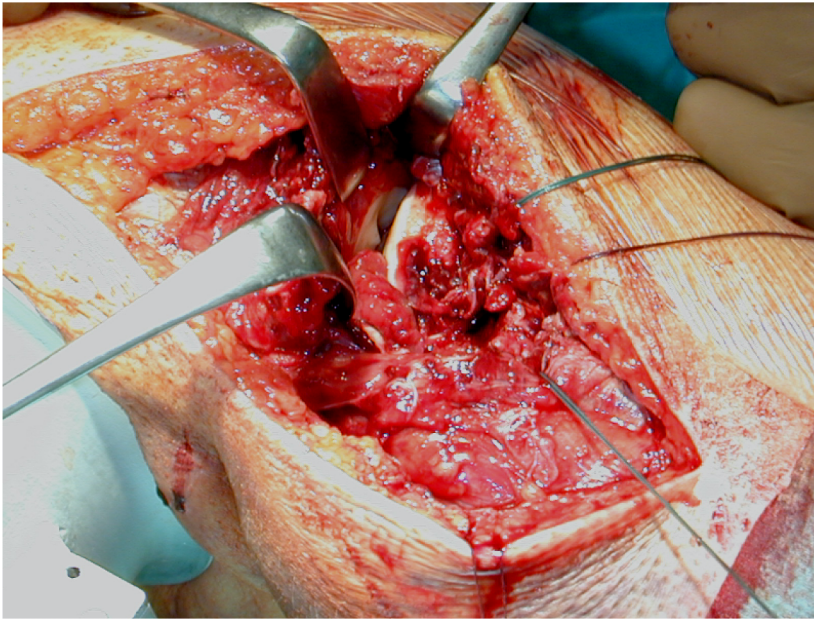


Surgery of acute MCL injury



Singel stage surgery recommended

Surgery of acute MCL injury



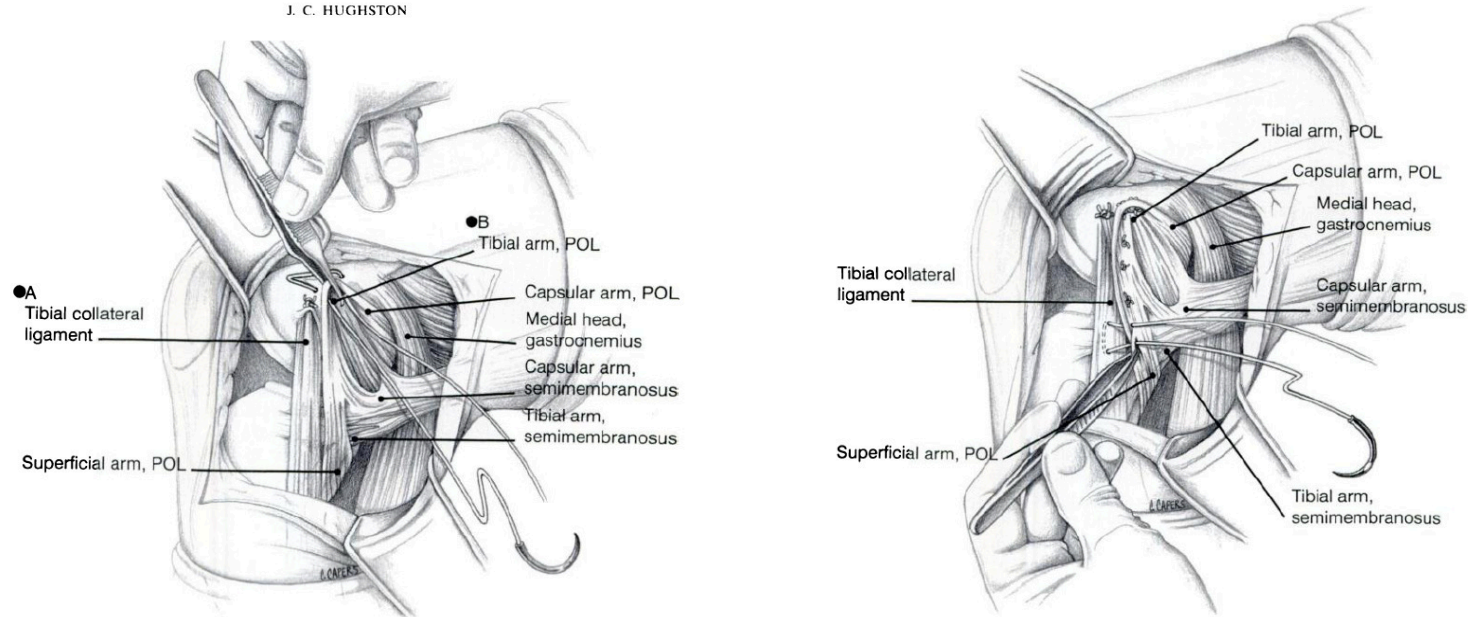
Courtesy S. Scheffler

In multiligament injuries primary repair with anchors

Surgery of acute MCL injury

Repair of the posterior oblique ligament by Hughston

J. C. HUGHSTON



Hughston et al., JBJS-Am, 1994

ACL Surgery

- MCL tear and grad III instability in 0° + 30° of flexion

Increased incidence of persistent medial instability
Risk of secondary instability after ACL reconstruction

Kannus et al., Clin Orthop 1988

- Grade III Injury of the superficial and deep MCL (MRI)

In combination with ACL rupture increased rate of both medial and anterior injury

Nakamura et al., AJSM 2003



SINGLE STAGE PROCEDURE IN ACL AND MCL INJURY

Graft selection

Significant more valgus instability when hamstrings are used for ACL reconstruction in MCL insufficient knees

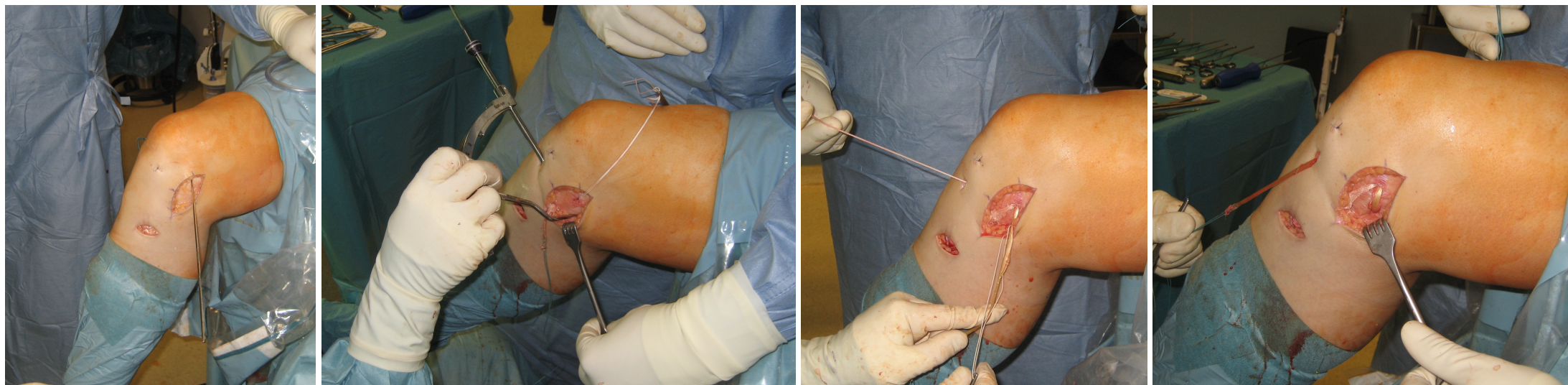
Cadaver testing of valgus rotation:

ACL - / MCL +	
ACL - / MCL -	-30% increase in valgus rotation
ACL recon. + ST/G-loading +	-restoration of valgus stability
ACL recon. - ST/G-loading -	-19% increase of valgus rotation



- Quadriceps tendon
- Patella tendon
- Allograft

Surgery of medial instability



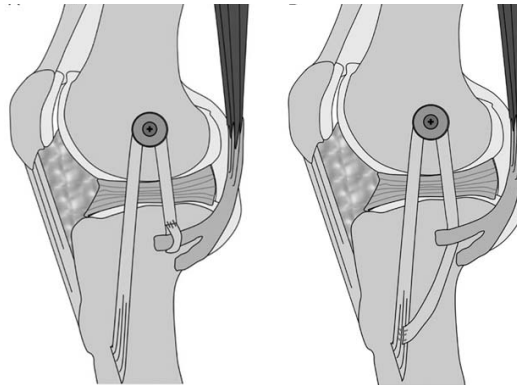
Reconstruction of both sMCL and POL using the semitendinosus tendon

Surgery of medial instability



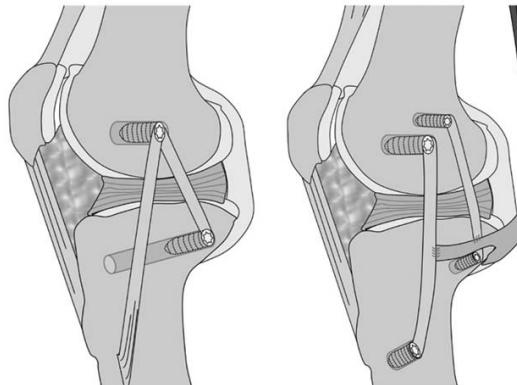
Technique by
Lonergan and Taylor

Technique by Kim



Stannard modified technique to Kim

Technique by Lind



Technique by Wijdicks

Classification by Houghston

Severity of injury

- **Grade I** Partial ruptur of few fibres of the MCL, stabile in 0° and 30° of knee flexion
- **Grade II** sMCL# / POL intact, stabile in 0, instabile in 30°
- **Grade III** sMCL# + POL #, instabile in 0° and 30°

Hughston, JBJS-Am 1976; Fetto et al., Clin Orthop 1978

Therapy

- **Grade I** Conservativ
- **Grade II** Conservativ, some times surgery in case of subjective instability
- **Grade III** Surgery

CAVE: COX-2 inhibitor delay MCL healing

Management – Consensus statement

Isolated PMC treatment

- Early, immediate range of motion up to 90° within a brace to prevent stiffness
 - Isolated, complete PMC ruptures at the femoral side or midsubstance more favorable for conservative treatment
 - Polyethylene tape re-enforcement (“internal bracing”) not recommended
- conservative
-
- Displaced tibial avulsion with laxity
 - Displaced femoral avulsion → acute refixation
 - Intra-articular entrapment → acute repair/reconstruction
 - MCL - Sternal lesion → repair or reconstruction
 - Internal bracing not recommended
- surgery

- Partial and complete PMC injuries + ACL rupture:
 1. ROM-brace for PMC
 2. ACL-reconstruction
- sMCL + ACL rupture: early repair or reconstruction and ACL reconstruction
- Isolated ACL reconstruction in case of side-to-side valgus laxity of <3mm
- PMC + ACL reconstruction in case of residual medial laxity following conservative treatment
- Internal bracing is not recommended
- PMC + PCL rupture treated with a dynamic PCL brace
- Three ligament injuries involving MCL best treated by early reconstruction of all ligaments

Management – Consensus statement

Reconstruction

- PMC reconstruction should address both valgus and rotational laxity
- Individual PMC structures should be reconstructed preserving the intact parts
- Chronic PMC laxity requires reconstruction of the MCL and POL
- Long leg full weight bearing radiographies are necessary to assess alignment
- Varisation osteotomy should be considered
- Ipsilateral hamstring graft or allograft is the graft of choice for reconstruction
- Synthetic grafts are not recommended



esska-congress2022.org

Science Opens the Mind

20TH ESSKA CONGRESS

27-29 APRIL 2022
PARIS, FRANCE

