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Osteotomy for patients with ACL rupture and Knee instability

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International Knee & Joint Centre

The London Knee Osteotomy Centre

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Outline

- Bone deformity and ligaments/instability
- Osteotomies for chronic lig. instability
- Timing / staging
- Where does the PT come into play ?
- Conclusion

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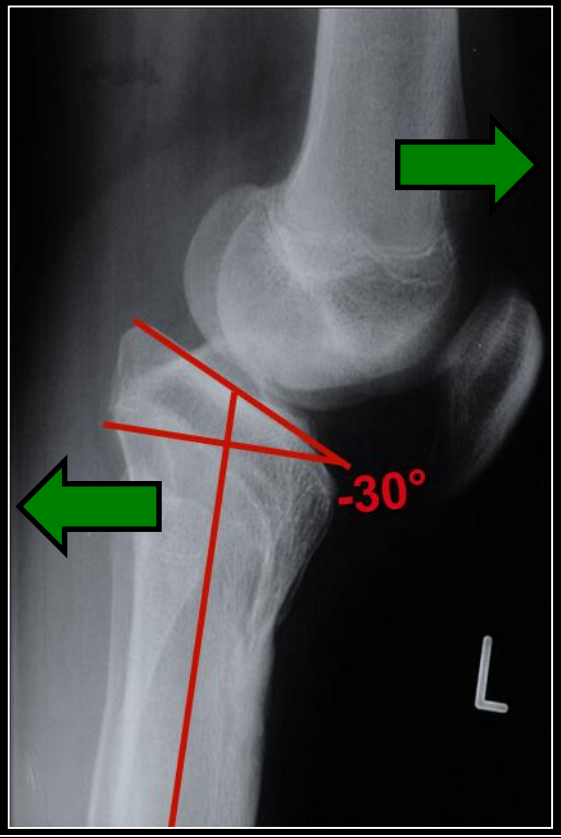
Posterior Sag



Recurvatum

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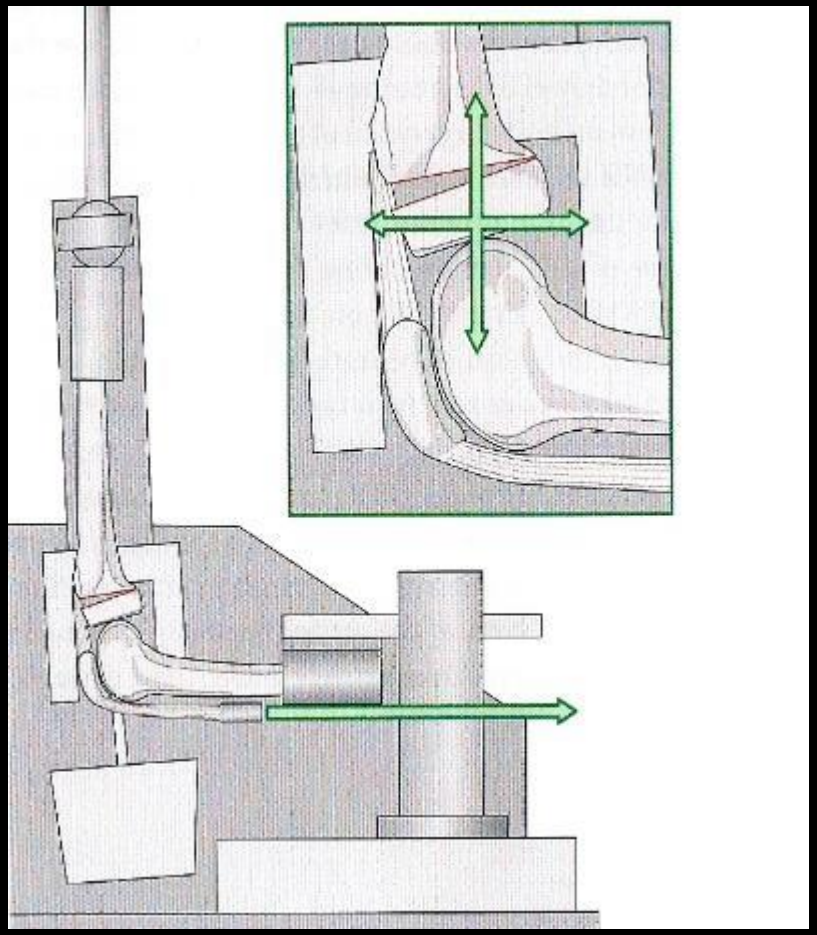
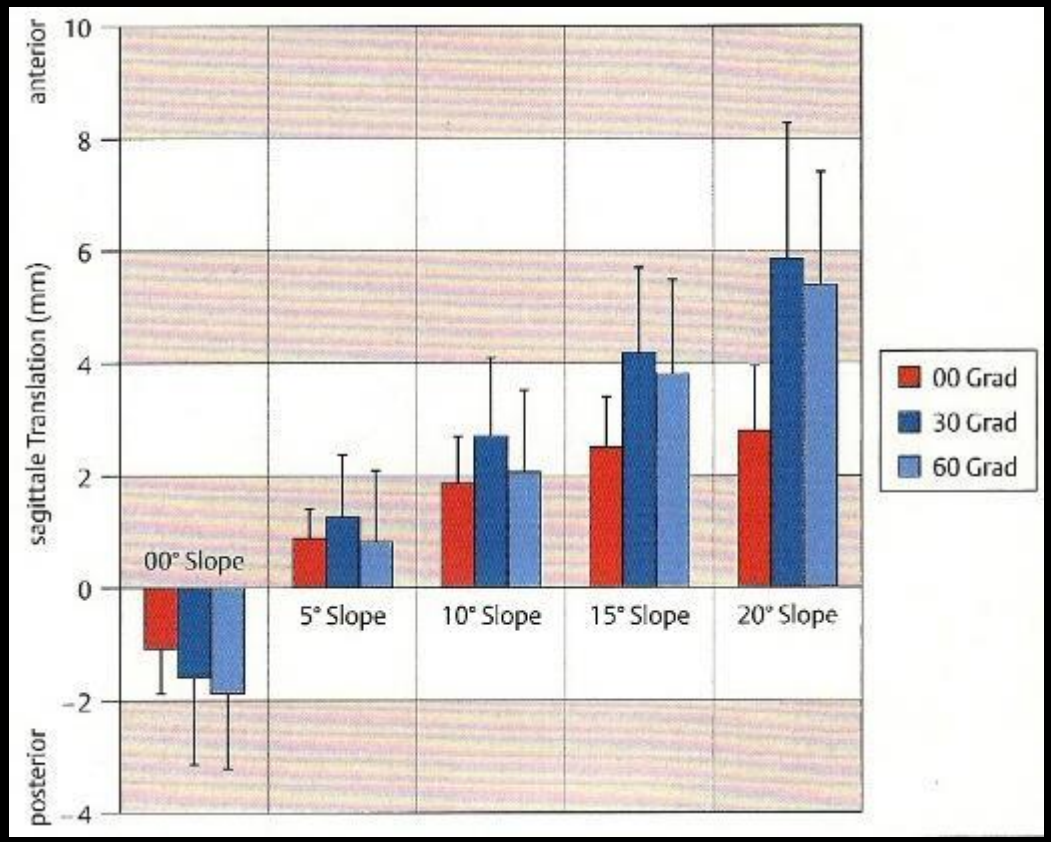
„... And now for something completely different“

Effects of Tibial Slope

Posterior Cruciate Ligament cut





Agneskirchner JD. Arch Orthop Trauma Surg 2004; 124(9): 575-84.

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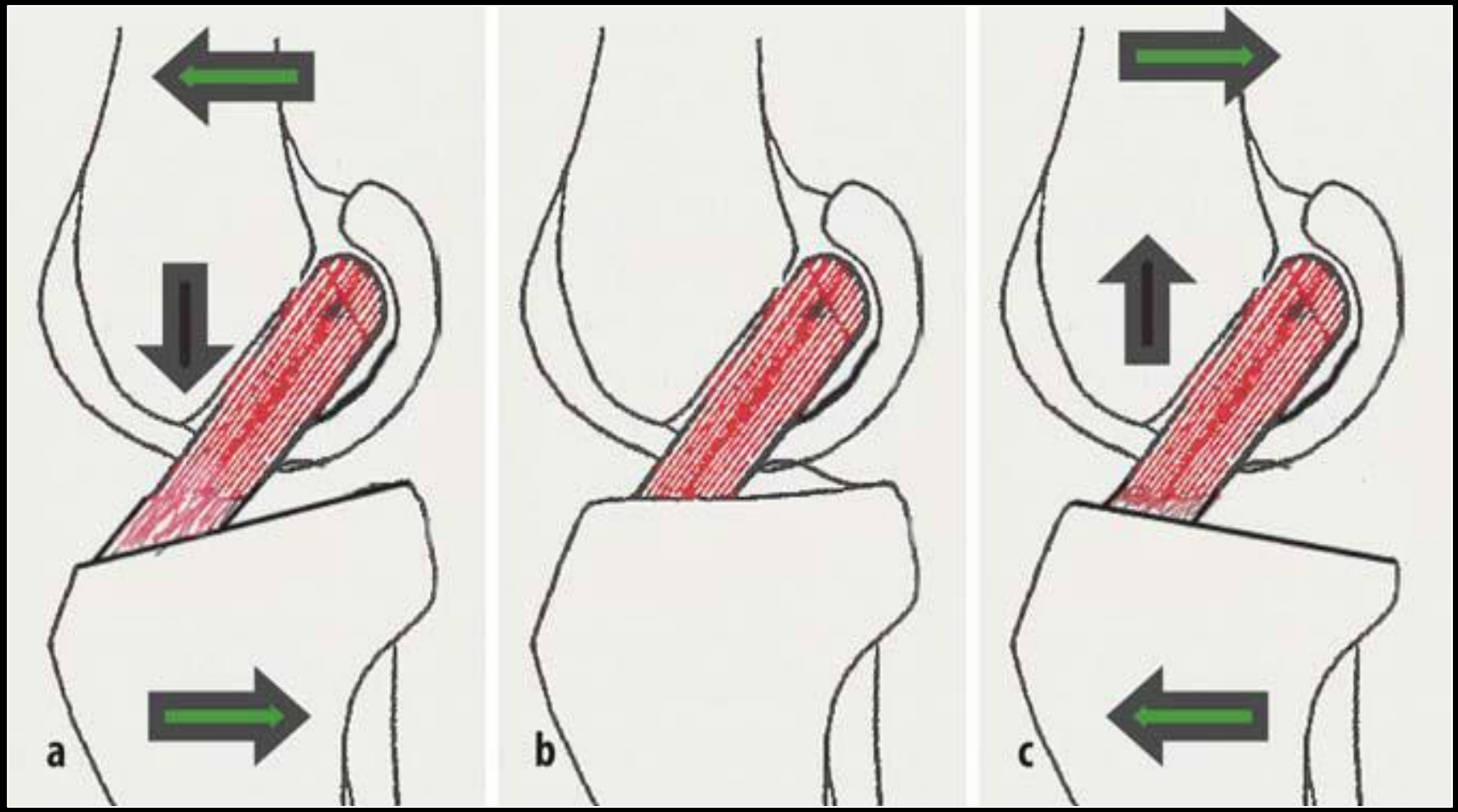
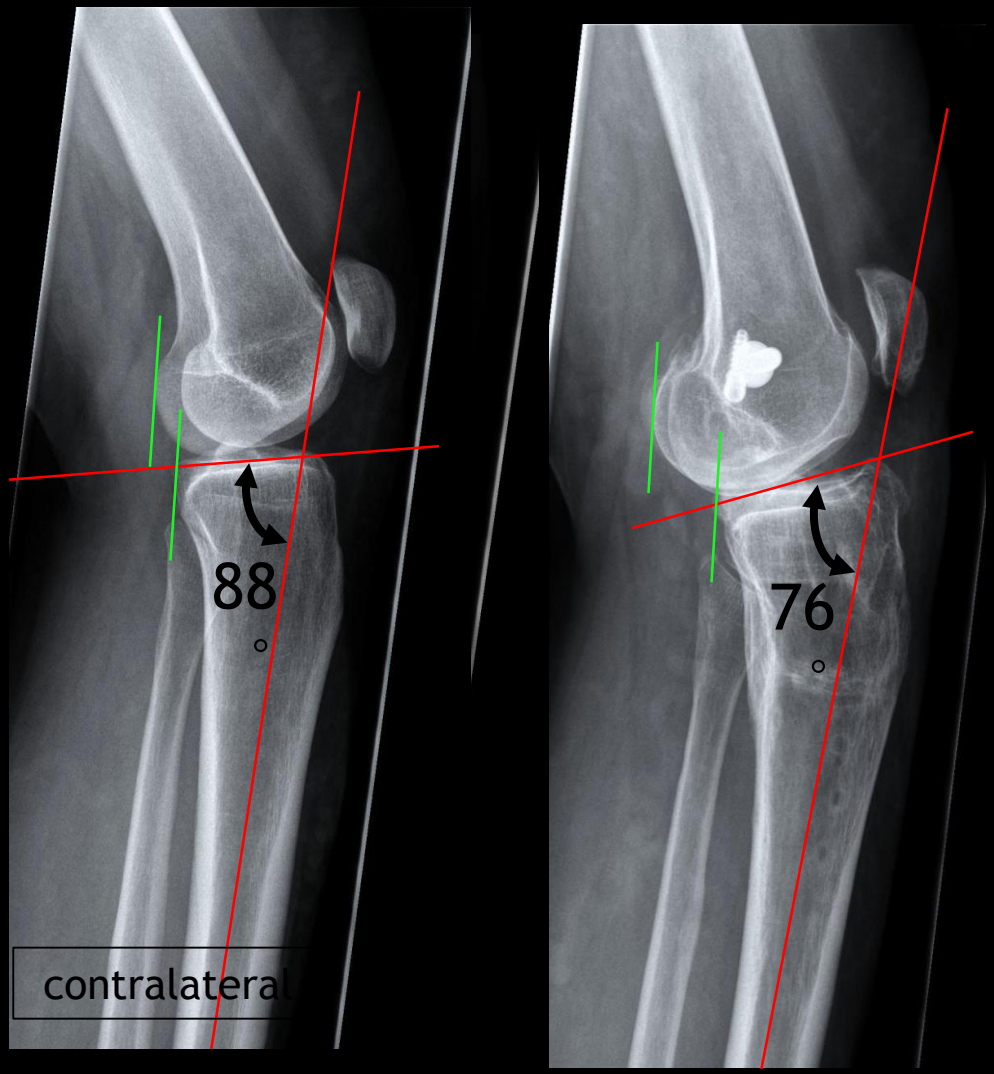
Effects of Tibial Slope



Imhoff A. Orthopäde 2004; 33:201–207

Effects of Tibial Slope



39 yr F
Previous HTO

3 failed ACL reconstr.

Courtesy of Ph. Lobenhoffer

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Literature

The Impact of Osseous Malalignment and Realignment Procedures in Knee Ligament Surgery

A Systematic Review of the Clinical Evidence

Thomas Tischer,*†‡ MD, Jochen Paul,†§ MD, Dietrich Pape,†‖ MD, Michael T. Hirschmann,†¶ MD, Andreas B. Imhoff,†# MD, Stefan Hinterwimmer,†** MD, and Matthias J. Feucht,††† MD

Tischer et al. Orthopaedic Journal of Sports Medicine 2017, Mar 27: 5 (3)

Morphologic Variation

Rheumatol Int. 2002 Aug;22(4):160-4. Epub 2002 Jul 3.

Analysis of limb alignment in the pathogenesis of osteoarthritis: a comparison of Saudi Arabian and Canadian cases.

Cooke TD[1], Harrison L, Khan B, Scudamore A, Chaudhary MA.

Saudi varus leg deformity

- Large varus deformities
- Femur and tibial varus combined
- Additional ligament laxity

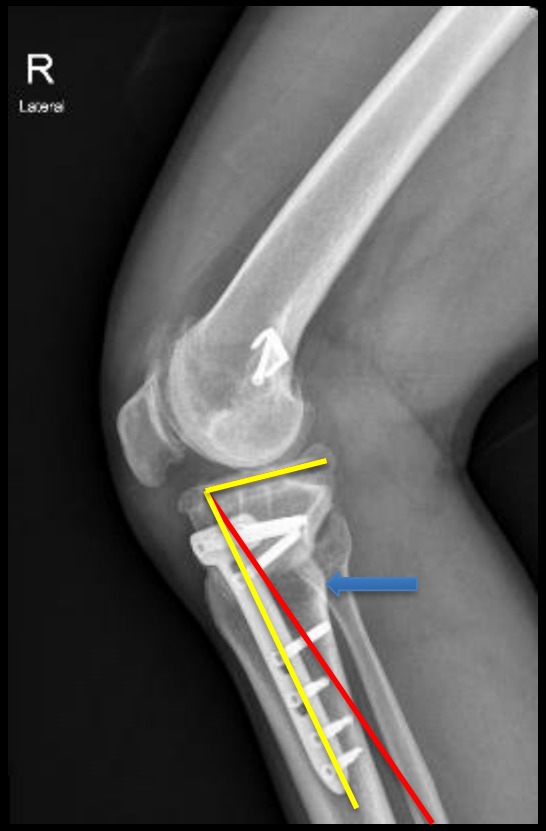
- High slope

- 6x more ACL ruptures as compared to USA

IKJC Abu Dhabi

Varus + slope correction

Failed ACL reconstruction medial OA



Open wedge valgization + extension HTO

No ACL Revision

IKJC Abu Dhabi

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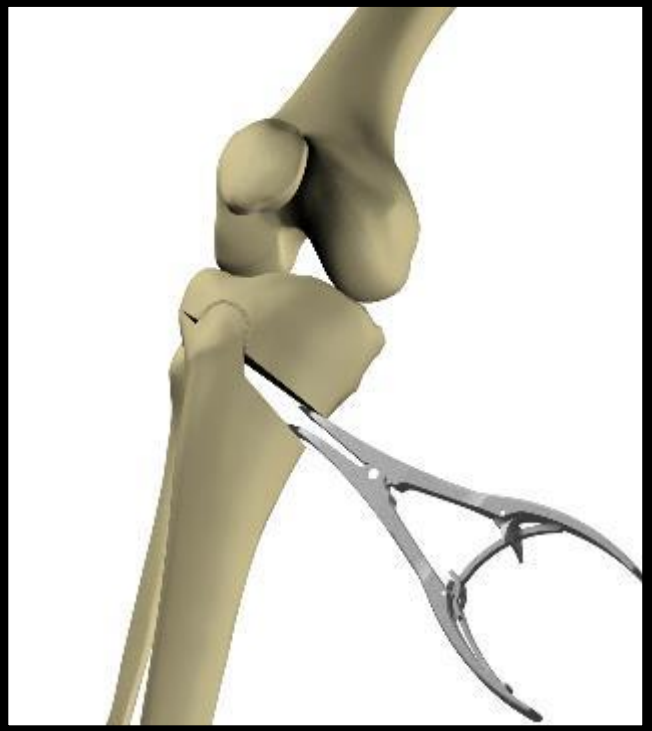
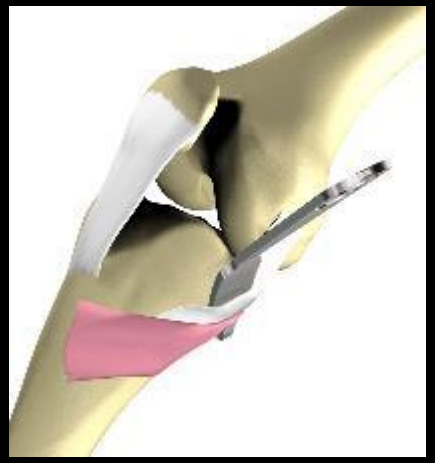
Osteotomy for MCL





OWHTO = release MCL

OWHTO without rel. MCL = retension MCL

Osteotomy for LCL

Fibula shortening
= LCL tensioning

Power of realignment

LCL “laxity”

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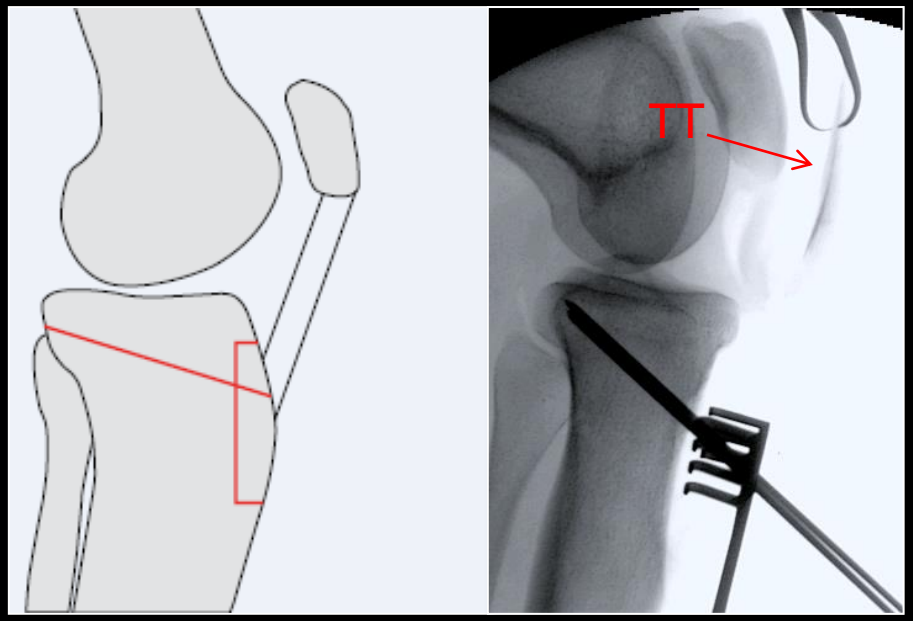
Power of realignment

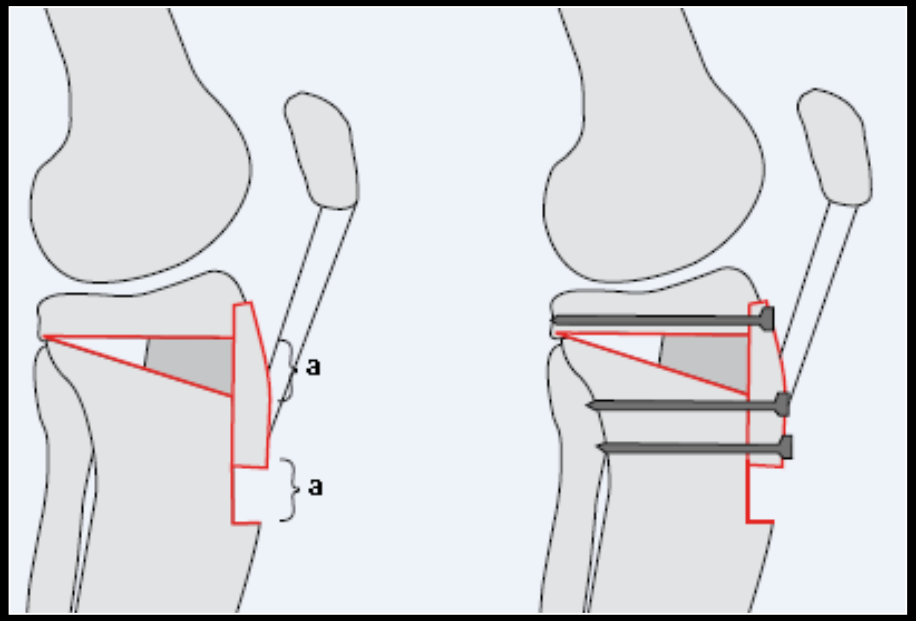
Re-alignment creates stability

Tibial external rotation deformity

Tibial exotorsion causing PF pain completely resolved 3 months after rotational HTO with now normal walking pattern.

Osteotomy for PCL – increase slope





“Biological plating”

Friedmann S. Arthroskopie 2008; 21: 30-38.
Bonin N. Orthopäde 2004; 33:193–200.

Balestro JC. Tech Knee Surg 2009;8: 126-135.
Neyret et al. Oper Tech Sports Med 2000; 8: 67-70.

Osteotomy for ACL– decrease slope

Osteotomy for PLC

Open wedge high tibial osteotomy

Arthur et al, 2007[4]	To assess the functional outcomes of patients with grade 3 posterolateral instability and varus malalignment treated with open-wedge HTO	• Prospective observation of 21 patients with chronic PLC deficiency and varus malalignment initially treated with open-wedge HTO • Isolated PLC deficiency was present in 7 patients, 6 patients had ACL and PLC deficiency, 6 patients had PLC and PCL deficiency, and 2 patients had PLC, PCL, and ACL deficiency	37 mo	• In 38% of patients, second-stage ligamentous reconstruction was not necessary • Isolated PLC injuries required second-stage ligamentous reconstruction in 33% of cases compared with 71% of multiligament knee injury cases • Low-velocity sports-related injuries required second-stage ligamentous reconstruction in 40% of cases compared with 78% of high-velocity motor vehicle injury cases

Arthur A, LaPrade RF, Agel J. Am J Sports Med. 2007;35:1844-1850

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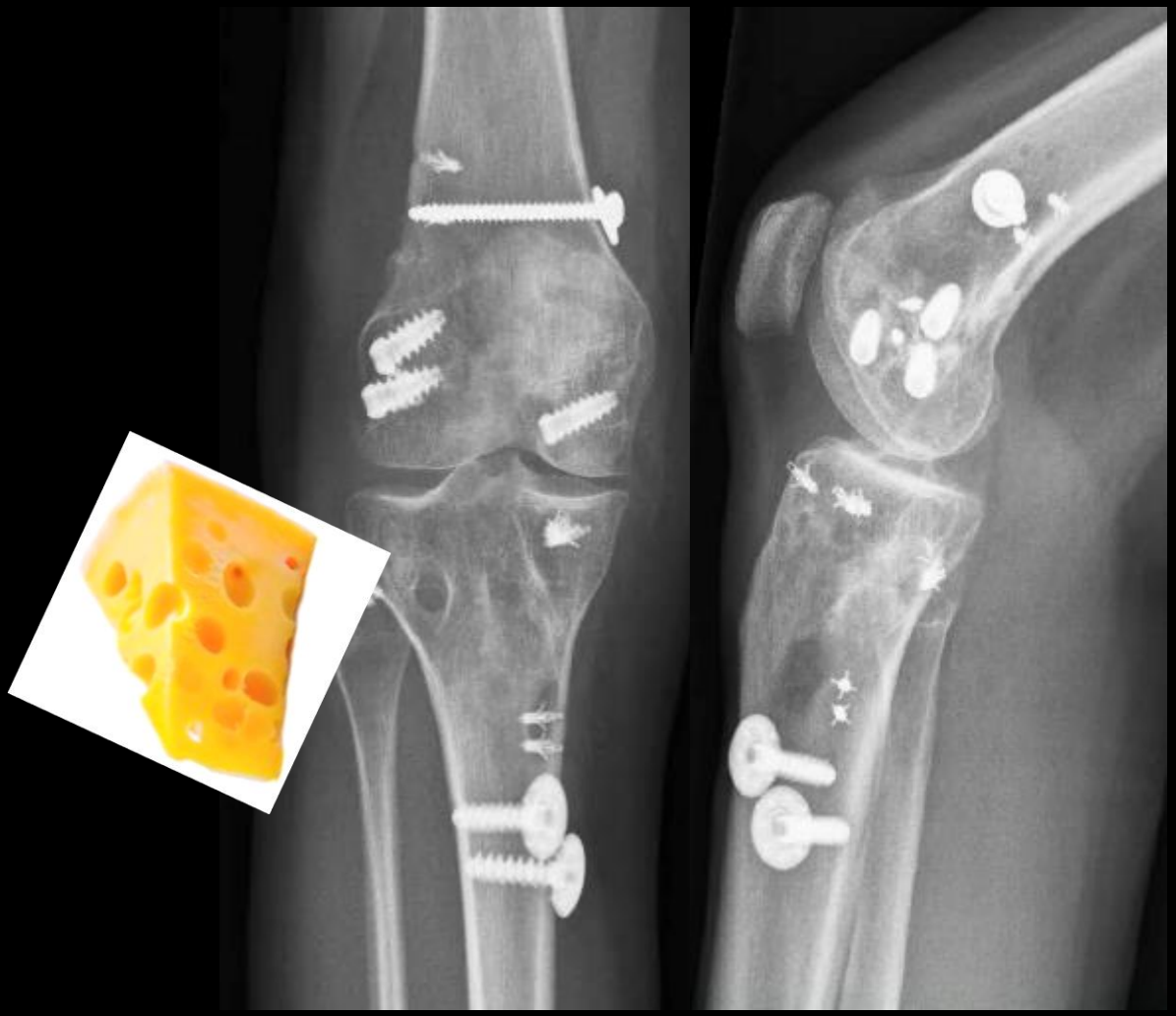
Timing staging of osteotomy



15 previous surgeries
multiligament injury

MCL, PCL, PLC, med meniscus#
-MCL repair, reconstr
-PCL, PCL revision
-PLC, PLC revisions (2 times)
Etc…

Osteotomy

Timing staging of osteotomy

Osteotomy first or combined with ligament reconstruction

Reichwein and Nebelung, 2007[48]	To assess the functional outcome of flexion HTO in patients with symptomatic hyperextension after failed PCL reconstruction	• Prospective evaluation of 7 patients with failed PCL reconstruction and symptomatic hyperextension treated with anterior open-wedge flexion HTO (combined with varization in 4 patients) • The mean PTS was altered from 4° preoperatively to 11.4° postoperatively, with a mean increase of 6.6°	20 mo	• Subjective and objective IKDC scores were improved postoperatively in all patients • Second-stage revision PCL reconstruction was performed on 3 patients but only marginally improved the results

Reichwein and Nebelung Unfallchirurg. 2007; 110:597-602. Am J Sports Med. 2007;35:1844-1850

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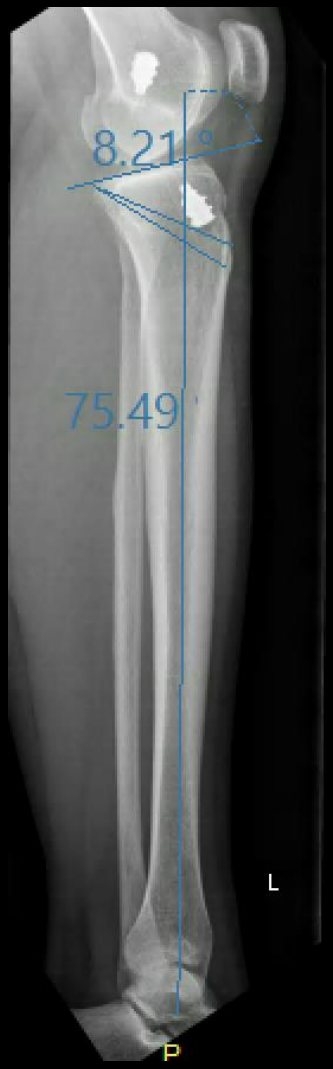
Where does the PT come into play ?

- Observe / diagnose deformities
- Notify / suggest in advance
- Instability may be caused by a bone deformity (BD)
- Failure of lig. Reconstruction caused by BD
- CHECK Laxity during rehabilitation
- Send patients back if progression of Rehab is abnormal / stability in not regained

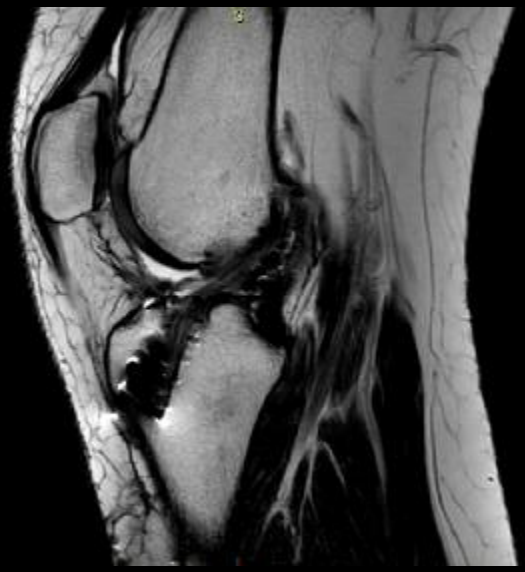
- Remember: the bone always wins

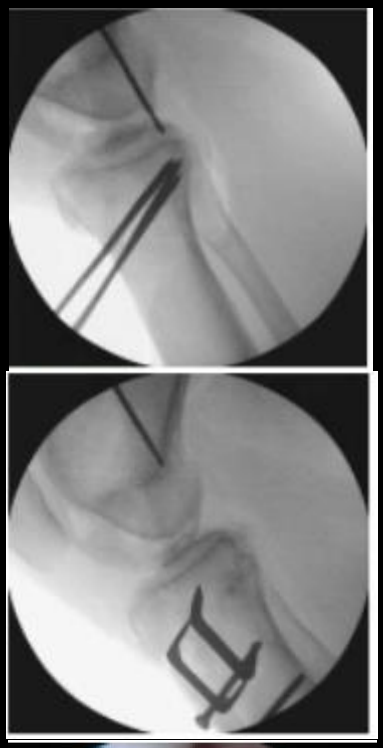
Where does the PT come into play ?

4/2018



4/2019





Anterior closing wedge + ACL rec.revision

Conclusions

- Key role of osteotomies in chronic (multi-)ligament injuries
- Effect of bone shape (change) is high
- Stage osteotomy first or combined
- Pay attention to bone deformities in (revision) ligament rec REHAB
- THE BONE ALWAYS WINS !