



Department of Orthopaedics and Traumatology
Hospital Brandenburg
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www.klinikum-brandenburg.de



6th Advanced Course on Knee Surgery

January 31st – February 5th, 2016 Val d'Isère - France

www.kneecourse.com

Alignment of the extensor mechanism during surgery

C Courage, R. Becker

Faculty:

J. Barth - France
R. Becker - Germany
F. Benazzo - Italy
M. ...
M. ...
M. ...
G. Felmet - Germany
N. Graveleau - France
M. Hantes - Greece
P. ...
K. ...
J. ...
J. ...
JC. Monllau - Spain
P. Neyret - France
S. Parratte - France
R. Seil - Luxembourg
B. Sonnery Cottet - France
D. ...

Featuring with:

JN. Argenson - France
O. Courage - France
JL. Prudhon - France
D. Washer - US





Landmarks – frontal plane

44mm

Aductor tubercle

Medial Epicondyl

26-29mm

JOINT LINE



lateral Epicondyl

JOINT LINE

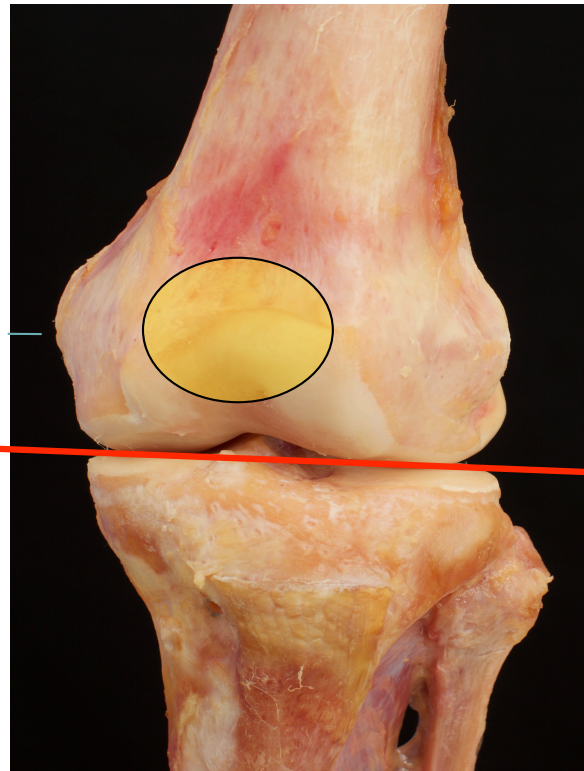
Fibula head

15mm



Joint line elevation

NATURAL JOINT LINE



PATELLOFEMORAL JOINT



FEMOROTIBIAL JOINT



Joint line elevation

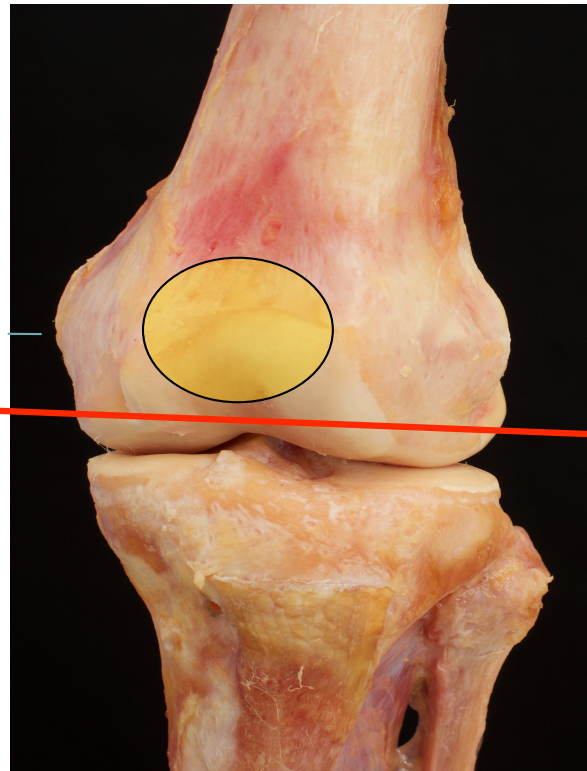
Ligament stretching

Femoral bone loss

JOINT LINE ELEVATION

Valgus knee

Revision surgery





Joint line elevation

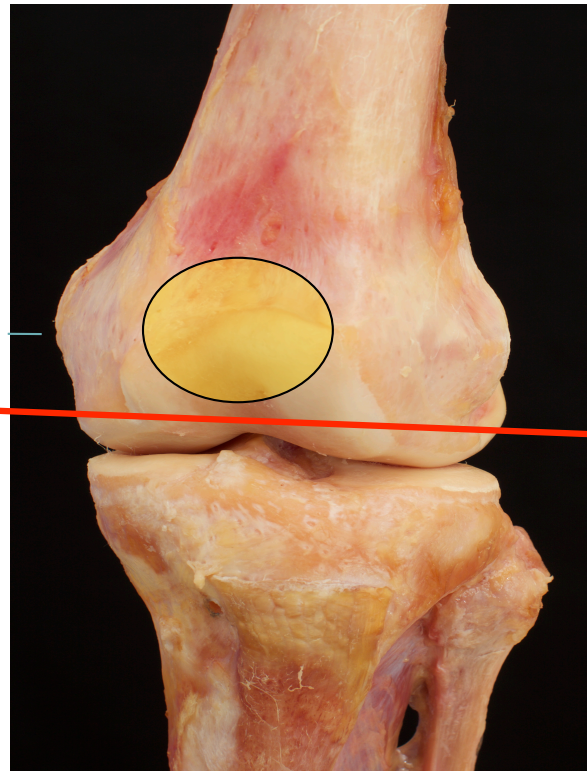
Ligament stretching

Femoral bone loss

JOINT LINE ELEVATION

Valgus knee

Revision surgery



Patella infera

Undersizing of the
femoral component

Alteration of the
Ligament tension
pattern

Mismatch between
flexion /extension
gap



Patella infera

Ligamentum patellae



Joint line





Patella infera

Ligamentum patellae



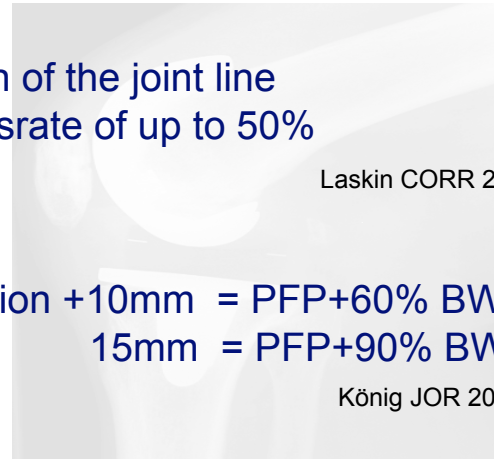
Joint line

Alteration of the joint line
Revisionsrate of up to 50%

Laskin CORR 2002

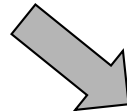
JL-Elevation +10mm = PFP+60% BW
15mm = PFP+90% BW

König JOR 2009

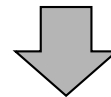




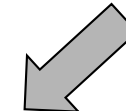
Coronal plane
(prox./distal.)



Transverse plane
(Component rotation)



Sagittal plane
(ant./post.)



Femoral
component



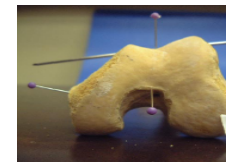
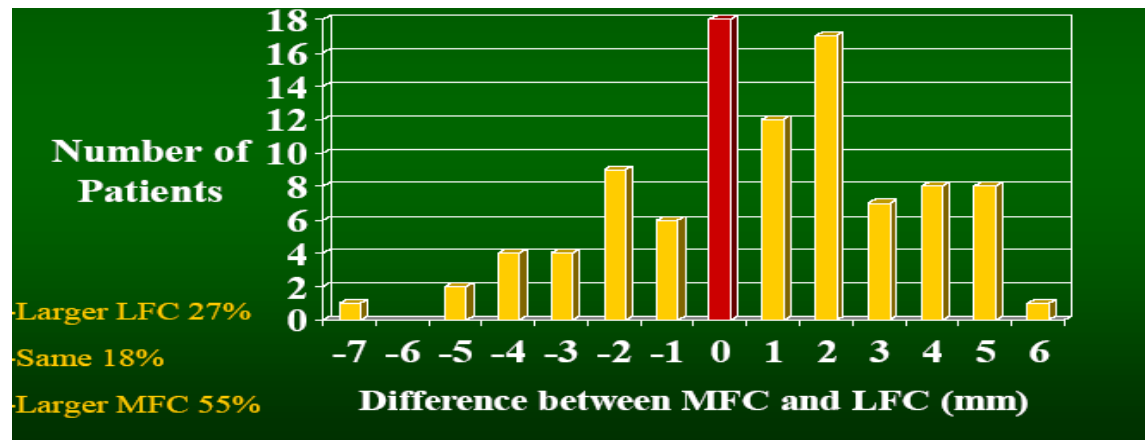
Femoropatella
Articulation



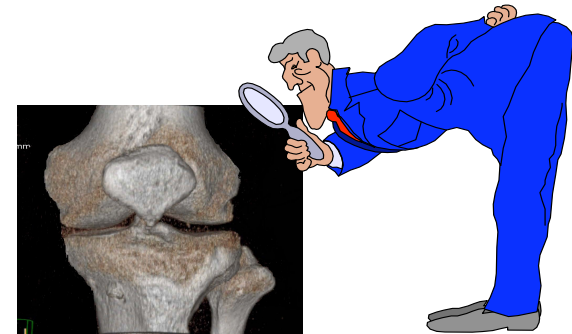
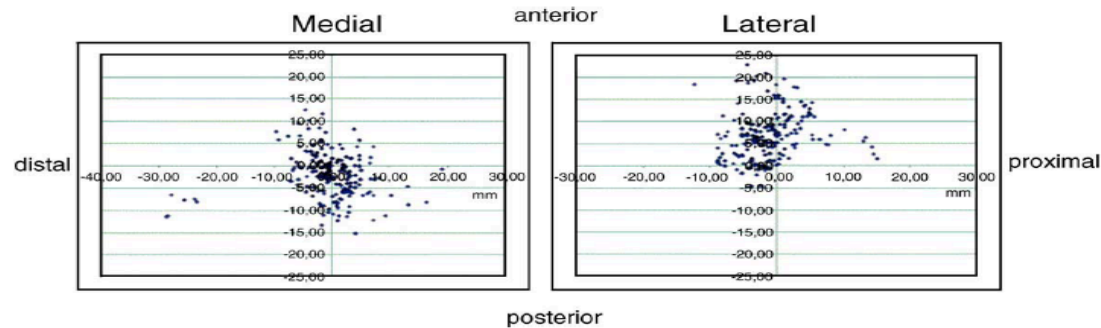
Patella
Ligament

Anatomical Variability

Risk of malrotation due to the variability of the antero-posterior dimension



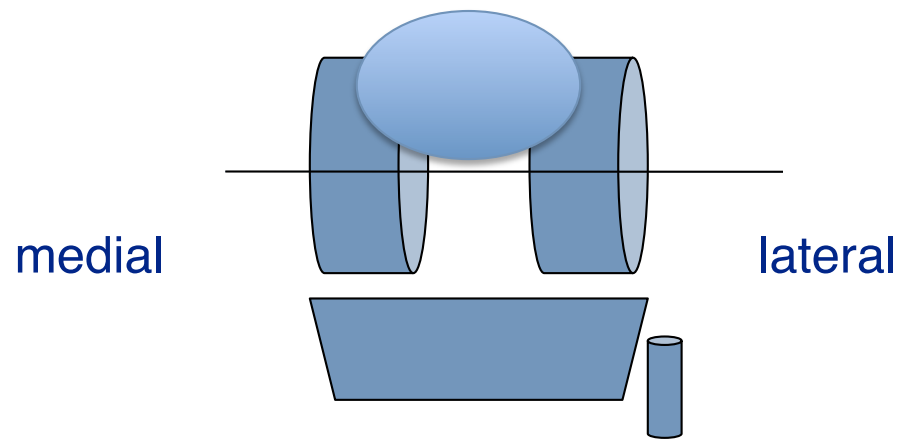
Reliability of the transepicondylar axis



- Variation of 15mm in the antero-posterior direction
- Variation of 19mm in the proximal-distal direction

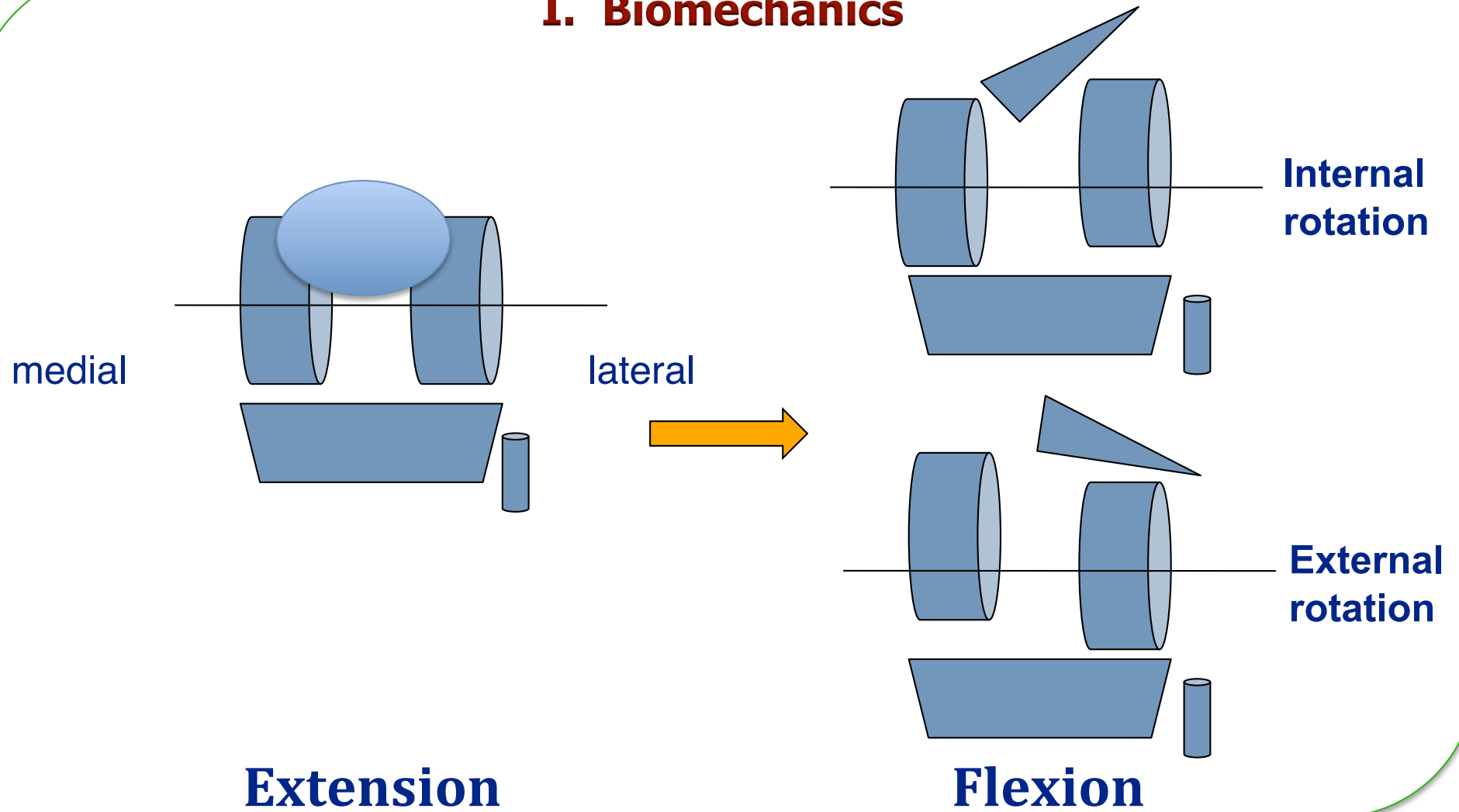
ROTATION
LEG ALIGNMENT

I. Biomechanics

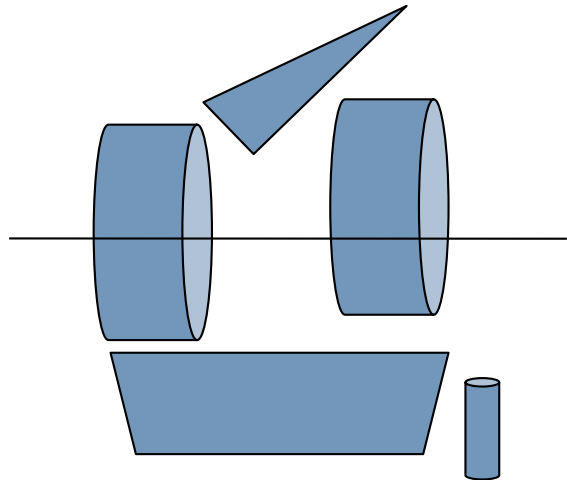


Extension

I. Biomechanics



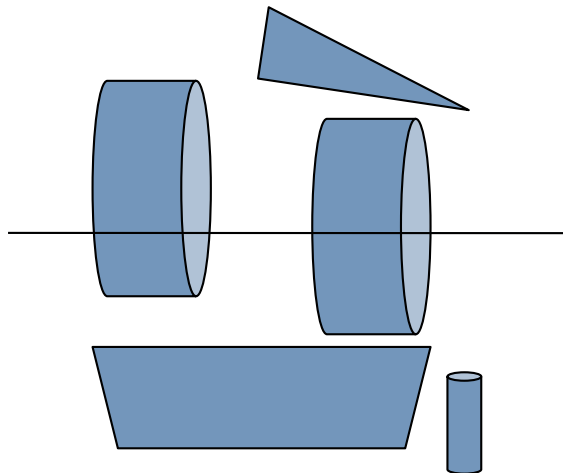
I. Biomechanics



Internal rotation

VARUSALIGNMENT in flexion
overloading of the medial compartment
flexion instability
Increased shear forces

Berger Clin Orthop 1993



External rotation

VALGUSALIGNMENT in flexion
1-4° lateral patella tracking and tilting
5-8° patella subluxation
7-17° patella dislocation

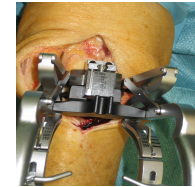
Hanada COOR 2007

Flexion

II. Surgical keypoints at the femur

1. Correct alignment between the mechanical and anatomical axis

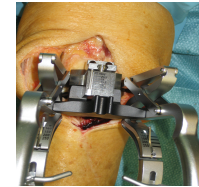
- Varus and valgus alignment
- Ligament balancing in extension



II. Surgical keypoints at the femur

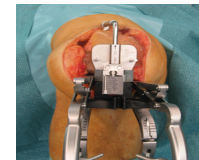
1. Correct alignment between the mechanical and anatomical axis

- Varus and valgus alignment
- Ligament balancing in extension



2. Correct rotation of the femoral component

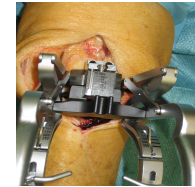
- Varus and valgus alignment in flexion
- Ligament balancing in flexion
- Patella tracking



II. Surgical keypoints at the femur

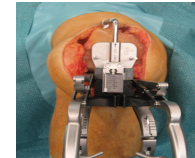
1. Correct alignment between the mechanical and anatomical axis

- Varus and valgus alignment
- Ligament balancing in extension



2. Correct rotation of the femoral component

- Varus and valgus alignment in flexion
- Ligament balancing in flexion
- Patella tracking



3. Correct femoral component placement in AP

- Flexion and extension gap
- Femoropatella mobility





Summary

- Patellofemoral tracking depends on femoral component placement in the frontal, sagittal and axial plane
- Alteration of the joint line causes patella alta or infera in increases the patellofemoral pressure
- Internal rotation of the femoral component may cause patella subluxation or luxation
- Anterior placement of the femoral component increases patellofemoral pressure and decreases the range of knee motion