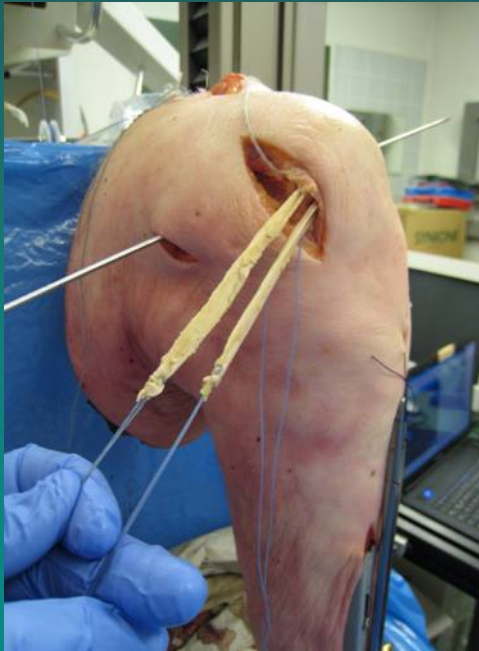




Biomechanical evaluation of MPFL Reconstructions: Differences in dynamic contact pressure between gracilis and fascia lata graft

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Conflict of interest/Funding

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- ***Incidence of patellar dislocation 78/100000***
- ***Re-dislocation rate of 15 - >50% after cons. treatment***

[Wylie and Burks Arthro Tech 2013, Stephen JOR 2013]

- ***Multiple causes of instability***

(valgus alignment, trochlear dysplasia, rotational malalignment, external tibial rotation, patella alta)

- **MPFL**

Main stabilizer against lateral displacement

[Wylie and Burks Arthro Tech 2013]

- **important static constraint to lateral subluxation and dislocation**

[Zaffagnini KSSTA 2013]

Reconstruction of the medial patellofemoral ligament

- ***Good to excellent clinical results***

[Lippacher AJSM 2014, Matic Arthroscopy 2014, Kang KSSTA 2014, Berruto KSSTA 2014, Wang Int Orthop 2013]

- ***100% return to sports***

[Lippacher AJSM 2014,]

- ***Low rate of re-dislocation***

[Kang KSSTA 2014, Berruto KSSTA 2014, Witonski Biomed Res 2013]

HOWEVER:

- ***Persistent instability rate of 10-12%***

[Lippacher AJSM 2014, Matic Arthroscopy 2014]

- ***complication rate 12 - 26%***

[Parikh AJSM 2013, Singhal Bone Joint J 2013, Shah AJSM 2012]

- Patellar fractures, recurrent instability, medial pain

- Stiffness/ loss of flexion - being one the most common

Therefore, anatomic reconstruction of the MPFL might not be able to restore knee kinematics compared to the nativ knee

Reconstruction of the medial patellofemoral ligament

- *Several graft options*

Semitendinosus / Gracilis tendon

Most frequently used graft [Kang KSSTA 2014]

*tubular graft, much stiffer and stronger than the native MPFL
[Zaffagnini KSSTA 2014]*

*– not closely reproducing functional behaviour of the
native MPFL*

- may result in different patellofemoral kinematics

Fascia lata

- might be a good alternative to the gracilis tendon

- Differences of patellofemoral kinematics in the intact, ruptured and reconstructed knee
- Comparison of changes in patellofemoral contact pressure of two different grafts for reconstruction of the medial patellofemoral ligament

- 16 human cadaver specimens
- custommade fixation device - allows for 0-90° of flexion
- A lateral arthrotomy was performed in order to fix a sensitive pressure film (Tekscan, Boston,MA) in the patellofemoral joint
- a constant pull of 50N was applied on the quadriceps tendon



- Patellofemoral contact pressure was assessed during a dynamic flexion movement from 15-30-45-60-75 and 90°

- A medial parapatellar incision , the MPFL was cut and measurements were repeated

- Reconstruction of the MPFL was performed with the gracilis tendon (Group I) or a fascia lata graft (Group II)

[Schöttle KSSTA 2010]



- Tunnel localisation was performed under fluoroscopic control in order to verify anatomic tunnel placement

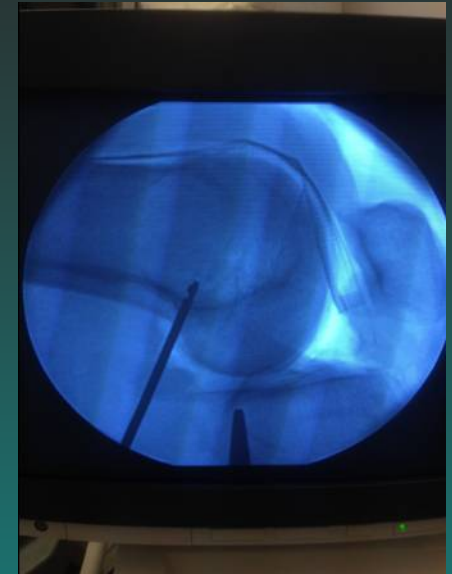
[Schöttle AJSM 2007]

- Grafts were fixed at 30° of flexion using two 4.75mm knotless anchors in the patella

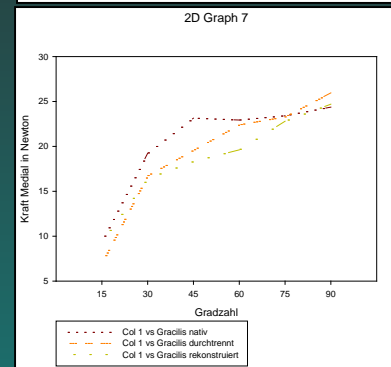
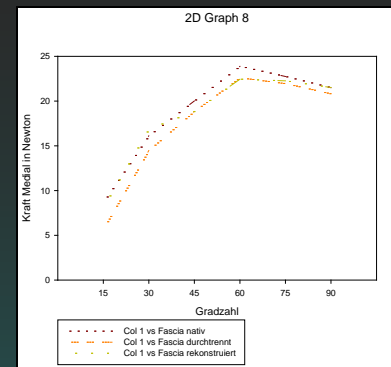
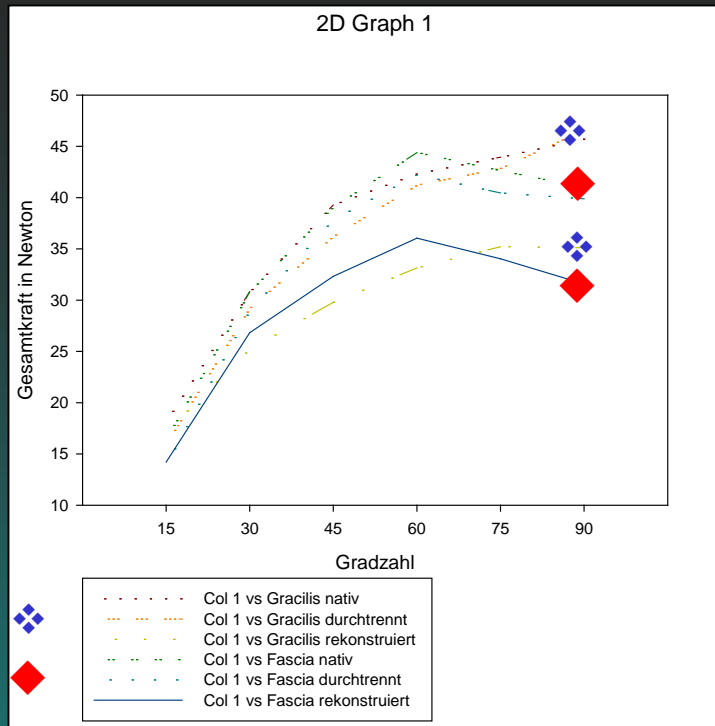
- Bio-Interference screw in the femur

[Schöttle KSSTA 2010]

Evaluation of patellofemoral pressure after MPFL reconstruction



- Incision of the medial patellofemoral ligament significantly reduced patellofemoral contact pressure at 15° , 30° and 45° compared to the intact knee ($p < .05$)
- No significant differences of patellofemoral pressure Between the tested grafts ($p < .05$)



Results

fascia lata

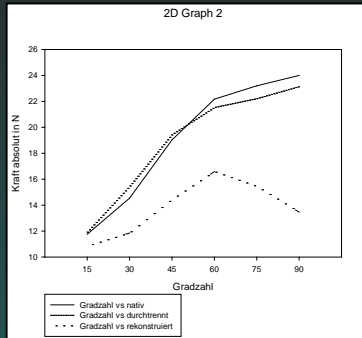
gracilis

- In the hamstring group, reconstruction of the MPFL closely restored patellofemoral contact pressure compared to the intact knee except of a significant reduced contact pressure at 45° of flexion ($p=.038$).
- In the fascia lata group, a significant reduction of patellofemoral contact pressure was observed after MPFL reconstruction at 45,60,75 and 90° ($p<.05$).

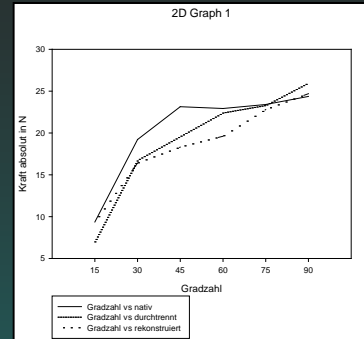
Gracilis Tendon

Results

lateral

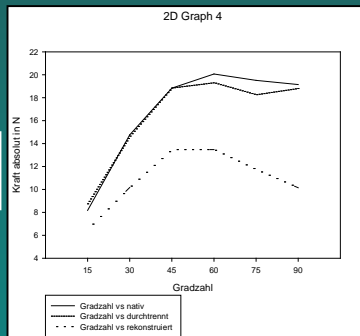


medial

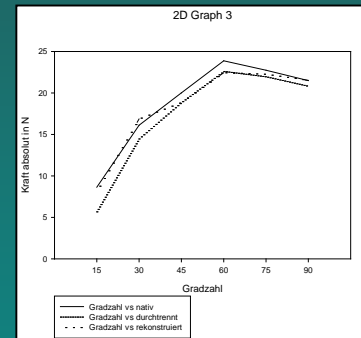


Fascia lata

lateral



medial



Although not significant, Different loading patterns in patellofemoral contact pressure were observed between the two groups.

- Incision of the MPFL significantly reduced patellofemoral contact pressure compared to the intact knee.
- No significant differences in patellofemoral contact pressure were seen between the tested grafts. Therefore, the fascia lata may be a viable graft alternative to the gracilis tendon.
- The type of graft may have a significant impact on patellofemoral kinematics after MPFL reconstruction as different loading patterns were observed between the tested grafts.
- However, anatomic reconstruction of the MPFL with either a gracilis or fascia lata graft was not able to fully restore knee kinematics compared to the intact knee as a remaining reduction in patellofemoral contact pressure was found during knee flexion.