

Apparativ and reproducible measurement of pathologic rotation in posterolateral and anterolateral instability of the knee with the „Knee Rotatiometer“ in CT-scan first experiences

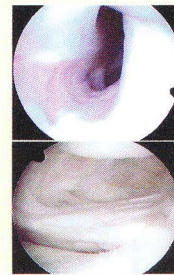
Pyschik Martin (1), Bartels Thomas (1), Hein Günter (1), Stock Carsten (2), Brehme Kay (3)

- (1) Sportklinik Halle, Center of Joint surgery, Halle 06108, Weidenplan 16-17, Germany
- (2) Martin-Luther-Universität Halle-Wittenberg, Department Diagnostic Radiology
- (3) Martin-Luther-Universität Halle-Wittenberg, Department Traumatology, Sport-traumatology and Arthroscopic Surgery



problem

- combined instability due to failed ACL/PCL surgery in case of a single reconstruction of ACL/PCL and arthrosis (*LaPrade*)
- postero-/antero-lateral instability is not only a surgical but a diagnostic challenge
- we have the clinical examination (assymetric test), X-ray with posterior stress, intraarticular finding and the personal experiences
- literature shows pathological external rotation between 6° and 21° in cadaver studies (*Sekiya, Pasque, Veltri, Wang*)
- we need an instrument for measure the pathologic external rotation for exact indication and control



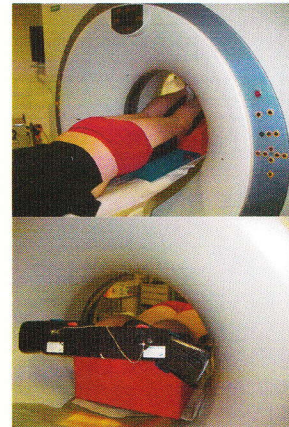
intact popliteus tendon and popliteofibular ligament



male, 28y,
4 years after PCL-surgery
without posterolateral
stabilisation,
lost popliteus tendon



- we developed an instrument for the measurement of external rotation in CT-scan
- the „rotatiometer“ is free of metal parts, made of carbon and polyethylen
- the method is based on the *Cooper-assymetric test*: belly position, 30° flexion in both knees
- upper legs, lower legs, ankles and feet are fixed
- the fixation modular and individual adjustable



- only chronic posttraumatic instabilities
- maximum painless external rotation until rotation in the hip in both sides, different torques are eliminated by this way
- achieved rotation will fixed and carry out CT-scan with and without rotational stress
- disruptive elements of soft tissue are eliminated by simultaneous examination of the healthy side
- determined slices through the femur epikondyles and posterior tibial head corticales
- modern CT-scan with low radiation, next „rotatiometer“ fit into MRI

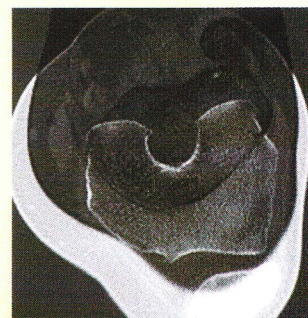


Posterlateral:

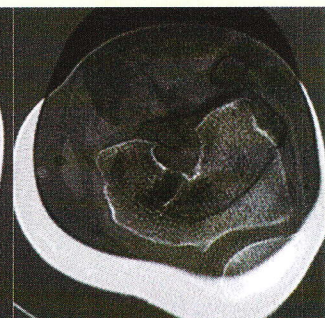
- Larson modified by Strobel
- minimal invasiv surgery
- gracilis other side

ACL: semitendinosus, quadruple, hybrid: plate, bonewedge femoral / downsized IF-screw, disc tibial, 10.00/14.00 femoral position via anteromedial portal

PCL: semitendinosus + gracilis, hybrid: plate, bonewedge femoral, IF-screw+ disc tibial



preop. 6° + fixed posterior drawer



postop. 1°

- 15 cases: 4 anterolateral, 4 anterolateral with failed ACL surgery in high noon position, 7 posterolateral
- we examined exclusive clinical evident instabilities for evaluation of the method
- increased external rotation from 6° to 10° in CT-scan, significant to the healthy side
- but the mechanic measured / clinical increased rotation was up to 32°
- we conclude that low increased rotation due to surgery
- anterolateral instability with insufficient ACL shows a increased internal rotation before (*Zantop*), the summary internal/external is important
- x-ray with posterior stress is essential

- literature shows cadaver studies, we can carry out an in-vivo-examination
- cadaver studies shows significant differences by complete cutting of the different structures for stabilization (ACL/PCL/LCL/Popliteus/PFL...), partial ruptures / insufficiencies are not examined
- the „knee rotatiometer“ shows significant changes but needs further development
- next studies will examine isolated ACL-and PCL-ruptures to differentiate monodirectional instabilities combined with 3-D-walk-analysis