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**FM120**

**Tubercle of the Greater Tuberosity. A suitable landmark for the posterior approach to the shoulder joint.**

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**Introduction:** Many surgical approaches to the posterior shoulder joint have been utilised. Deep dissection generally includes the development of the internervous plane between the infraspinatus and teres minor muscles (IS/TMI). Identifying this interval is crucial, as a dissection carried out more proximal leads to denervation of parts of the IS and a dissection further distal renders damage to structures in the quadrilateral and triangular space. To our knowledge, there are no reports detailing anatomical landmarks relative to the IS/TMI. Inspection of the anatomical insertion of the external rotators reveals a tubercle (T), corresponding to a punctum maximum, at the inferior dorsal border of the greater tuberosity, where the IS merges with the TMI. The purpose of this study was to determine (1) the anatomical and topographical relationship between T and IS/TMI and (2) to prove whether T could be used clinically as a guide during surgical approach to the posterior shoulder joint.

**Methods:** Twenty-five, formalin fixed, human cadaveric shoulders were dissected. The (IS/TMI), the inferior border of the glenoid (IBG), T and the humeral insertion of IS and TMI were identified. Structures evaluated and distances measured during dissection included (1) the distance from T to the IS/TMI, (2) the distance from T to the horizontal line through IBG and 3) the distance from IBG to the IS/TMI. Measurements were taken in humeral neutral rotation with the arm fully adducted.

**Results:** In all except one specimen the IS/TMI was located immediately proximal to T. The mean distance between T and IS/TMI was recorded 3.3mm (range -2 to 8, SD +/-2.4). The mean distance between the IBG to the IS/TMI was recorded 4.6 mm (range 0 to 10, SD +/- 3.3). In all shoulders T was found proximal to the IBG (mean distance 8.1 mm, range 4 to 15, SD +/- 3.1).

**Conclusion:** Detailed anatomical knowledge is imperative to avoid surgical complications during the approach to the posterior shoulder joint. Our study reveals that the interval IS/TMI constantly corresponds to a point a few millimetres proximal to T. As T is easily located by blunt dissection it is a suitable guide during surgery. In contrast to other landmarks T is independent of gender, body size and position of the shoulder joint as the T moves with the position of the humeral head.
A 3D classification of Glenoid Version and Humeral head Subluxation of Osteoarthritic Shoulders

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Introduction: Addressing glenoid bone wear and humeral subluxation is crucial for the treatment of osteoarthritic (OA) shoulders. Classifications of glenoid morphology are based on 2D analysis. As deformations may appear in all directions, glenoid wear and subluxation of the humeral head are systematically underestimated when out of plane. We developed a 3D objective method to measure the glenoid version, medialization and the subluxation of the humerus and defined a systematic classification.

Methods: 53 OA shoulders were analyzed using regular CT’s. A 3D geometric model and a coordinate system were defined using accurate bony landmarks. VERSION angle (Va) is the angle between the glenoid surface and the scapular axis. Va was divided in V1 when Va less 10deg, V2 when Va between 10 and 20deg, and V3 when Va more than 20deg. Version ORIENTATION (Vo) is the angle between the axial (horizontal) plane and the direction of the maximal glenoid deformation. Vo is identified posterior (P), postero-superior (PS), postero-inferior (PI) or anterior (A). Glenoid MEDIALIZATION (M) is the medio-lateral position of the glenoid center. EXCENTRICITY (E) is a measure of the humeral head subluxation relative to the scapular plane. OA shoulders were classified with V, O, M, E parameters.

Results: OA shoulders were 20.8% V1, 52.8% V2, and 26.4% V3. Some (27%) V1 shoulders were medialized, but none was eccentric. V2 shoulders were mainly P (39.3%) and PS (39.3%), but also PI (14.3%) and even A (7.1%). V2 shoulders were sometimes E (14.3%), or M (42.9%), but never M and E. V3 shoulders were essentially P (85.8%), with a few PI (7.1%) and PS (7.1%). V3 shoulders were sometimes (28.6%) E, sometimes (42.9%) E and M, but never only M.

Discussion: This study confirms that glenoid wear and humeral subluxation of OA shoulders occur not only in the axial (horizontal) plane. A 3D objective method allows measuring accurately the deformations. We propose a new classification of AO shoulder, based on 3D measures taking into account the version, orientation, medialization and excentricity (VOME). The better recognition of the glenoid morphology of OA shoulders should help to plan the surgery before TSA.
Conversion of Hemi- or Total- to Reverse Total Shoulder Arthroplasty:

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**Background:** After failed hemi- (HA) or total shoulder arthroplasty (TSA) conversion to a reverse total shoulder arthroplasty (RTSA) has shown to be a reliable option, as the more constrained prosthetic design allows to compensate for muscular imbalance and addresses the glenoid bone loss and erosion.

The aim of this study was to evaluate the clinical outcome and the complication and revision rate following conversion of HA or TSA to RTSA with or without humeral stem removal.

**Methods:** Between 2005 and 2011, 48 HA and 8 TSA were converted to an Anatomical reverse shoulder arthroplasty system (Zimmer, Winterthur, Switzerland). Mean age at conversion was 67 (range: 44-87) years and mean time between index surgery and conversion was 38 (range: 0-147) months. 11 patients had to be excluded leaving 45 patients (32 with and 13 without stem exchange) with a complete clinical and radiological follow up of at least 12 months.

**Results:** Mean blood loss (485 vs. 831 ml; p=0.001) and surgical time (118 vs. 176 minutes; p=0.0001) was significantly lower in patients without stem exchange.

We identified 13 intra- and 9 post-operative complications leading to 9 re-interventions (in 6 patients (14%)) in the 43 cases where the stem had to be exchanged compared to one intra- and 2 post-operative complications with one (8%) re-intervention in the 13 cases where the stem could be left in place.

The mean improvements of the relative and absolute Constant scores were 28 (range: -15-100) % and 21 (range: -11-64) points (p=0.0001). There were however, no significant differences between the groups with or without stem removal.

**Conclusion:** Conversion from HA or TSA to RTSA without stem removal reduces the length of surgery of almost one hour, and the intraoperative blood loss of about 350 ml. Furthermore it minimizes the risk of sustaining an intraoperative complication by the factor 5 and the risk of undergoing a conversion related revision by half.
Clinical and Radiographical Mid- and Long-term Evolution in the Throwing Shoulder 6.8 resp. 21 Years after Completion of a Professional Handball Career

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Introduction: The shoulders of overhead throwing athletes are highly stressed. Structural abnormalities are found in 93% of the throwing shoulders (TS) of professional handball players. What happens with respect to these pathological changes after completion of the professional handball career is not well known. Jost et al. examined the shoulders of thirty fully competitive professional handball players in 2005. In the here presented study, we were able to reevaluate 20 of these 30 players, which had terminated their career on average 6.8 years ago. None of them had received shoulder surgery. To compare these mid- with the long-term evolution of the pathological changes after completion of the professional handball career, we included also 17 former professional handball players, that terminated their career on average 21 years ago.

Methods: The Constant Score increased from 88.1 during their career to 97.3 at the 6.8 year follow-up (FU) and 96.7 at the 21 year FU. External rotation remained significantly increased in the TS when compared to the non-throwing shoulder (NTS) at the 6.8 year FU. The amount of subjects with abnormalities in the TS increased not significantly from 93% during the professional career to 95% at the 6.8 year FU and 100% at the 21 year FU. Interesting was the fact, that the players had significant more pathological changes in their TS (93%) compared to the NTS (85%) during their professional time, but there was no difference between the TS and NTS in both FU time points. Looking at the pathological changes in the supraspinatus tendon, we found a significant decrease in tendinopathies from the initial examination to the 6.8 y FU (9 vs. 3 shoulders) and a significant increase of the partial tears (8 to 14 shoulders). No full thickness tears were found in all three time-points.

Results: Osseous changes were recognized in 70% of the players during their career. This number decreased to 18% at the 21 year FU. Also the size of ganglions decreased significantly over time and the amount of postero-superior impingements decreased from 40% during the career to 5% at the 6.8 year and 0% at last FU.

Conclusion: This data suggests that overhead throwing athlestes have good to excellent clinical scores up to 21 years after finishing their career. Increased external rotation persists over time. Partial supraspinatus tendon tears do not progress to full thickness tears up to 21 years after termination of a professional handball career. Osseous changes and ganglions may “heal“ over time.
Glenoid erosion in patients with shoulder hemiarthroplasty: an analysis of 118 cases.

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Background: Glenoid erosion is an important and frequent, but poorly predictable finding after hemiarthroplasty of the shoulder. The purpose of this study was to analyse the degree of glenoid erosion after hemiarthroplasty of the shoulder and to determine predisposing preoperative factors for advanced glenoid erosion. Our hypothesis was that very horizontal positioning of the prosthetic head may result in a gouging mechanism against the glenoid and therefore promote excessive glenoid erosion.

Methods: We retrospectively reviewed radiological data and clinical charts of all patients that had hemiarthroplasty of the shoulder between 2002 and 2011 at our institution. Minimum followup was 12 months (only if massive erosion occurred earlier than one year postop, patient data were included in the analysis). 118 prostheses in 113 patients were included. Evaluation was performed by two independent observers. Glenoid erosion was graded as none (°0), mild (°1), moderate (°2) and severe (°3). Positions of the prosthetical components in relation to the bony architecture of the shoulder were analyzed over the course of follow up. Preoperative CT-scans were reviewed for condition of the glenoid. Clinical charts were reviewed for possibly predisposing factors such as rheumatoid arthritis and chondrocalcinosis.

Results: Mean FU was 31 months (range, 5 to 86 months). Erosion was absent in 31 (26%), mild in 30 (25%), moderate in 30 (25%) and severe in 27 (24%) of 118 shoulders. Out of 15 patients with a humeral head angle to the glenoid (in adduction) >50°, 13 developed moderate or severe erosion. However, these observations were not statistically significant. Preoperatively existing cystic alterations of the glenoid were found in 36 (31%) of 118 shoulders. 17 of these developed severe, 13 moderate glenoid erosion. Of 11 shoulders of patients with rheumatoid arthritis, 6 developed severe, 5 developed moderate glenoid erosion.

Conclusions: An angle of the humeral head to the glenoid above 50° degrees appears to be detrimental to the survival of the glenoid. However, also preoperatively existing cystic alterations of the glenoid as well as as rheumatoid arthritis seem to importantly predispose for glenoid erosion. In these subgroups of patients, total shoulder arthroplasty instead of hemiarthroplasty should be considered.
The Single Best and The Best Combination of Radiographic Projections to Detect Head Screw Perforations of the PHILOS Plate – A Cadaver Study

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Introduction: The PHILOS plate is a frequently used implant for open reduction and internal fixation of fractures of the proximal humerus. Head screw cut out is a common complication of the locking head screws due to rigid fixation combined with avascular necrosis, secondary displacement or the use of too long screws. Left untreated, severe destruction of the glenoid has been reported. The aim of the study was to identify reliable radiographic (rx) projections to detect screw cut outs.

Material and methods: The PHILOS plate was fixed to 6 proximal humeri of 3 whole-body human cadavers. The correct, subchondral head screw placement was controlled visually and by fluoroscopy. Six rx examinations were performed: anteroposterior (ap) in internal rotation (apIR); ap in neutral rotation (ap0); ap in 30° external rotation (apER); axial in 30° (ax30) and 60° (ax60) abduction in neutral rotation and the outlet view. Each head screw (n=9) was sequentially exchanged to perforate the humeral head with the tip and all six rx were repeated for each cut out. In a randomized and blinded first reading, two examiners independently decided whether cut out was present or not. In a second reading, the best combinations of two, three and four projections were examined again for cut out and identification of screw position. Inter-rater reliability was calculated and, in case of disagreement, a consensus reading was appended. Based on this sensitivity (sens) and specificity (spec) were assessed.

Results: All readings had substantial to excellent inter-rater agreement (kappa > 0.72). The best single projection was ax30 (sens 76%) and the worst was the outlet view (sens 17%). Standard combination of apIR/outlet reached a sens of 54% and 81% in combination with ax60. The best combination of two was: apER/ax30 (90% sens), of three: apIR/apER/ax30 (96% sens) and of four: apIR/ap0/apER/ax30 (100% sens and 100% spec even for screw position).

Conclusion: With the use of standard radiographs (ap/outlet), especially with the arm in internal rotation (e.g. in a sling), up to 46% of screw cut outs may be missed. The single best radiographic projection was an axial view with 30° abduction, which projected screw tips in the inferior humeral head hemisphere better than a standard axial view. To account for all cut outs and their correct screw position a combination of 4 projections was needed. These clinically feasible radiographs help to detect screw perforations of the PHILOS plate.
The critical shoulder angle: reproducibility of measurement using conventional radiographic and MR tomographic images

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Background: The critical shoulder angle (CSA) is a new radiographic parameter, which describes the lateral extension of the acromion in relationship to the glenohumeral joint line on a high quality true ap view of the shoulder. A CSA from $>35^\circ$ has been shown to be a risk factor for developing a rotator cuff (RC) pathology. Consequently an anterolateral acromioplasty has been recommended in patients requiring RC surgery. As it is challenging to obtain a true ap view of the shoulder without fluoroscopy and a MRI is available in the majority of patients undergoing RC surgery, we hypothesized that CSA can be reproducibly determined on MRI.

Method: 33 high quality true ap view of the shoulder and an corresponding MRI were selected. On the X-ray the CSA was determined according to Moor. On the MRI the CSA was measured on three consecutive coronal T1 images. The first image to be measured was defined with help of the scout axial view showing the anterolateral border of the acromion; the level to be considered was determined as the first anterior image representing the lateral border of the acromion and the glenoid simultaneously. The second and third level of measurement were performed on the two consecutive images posteriorly to the first one. Each record was evaluated three times by two attending orthopedic surgeons and one interne respectively.

Results: Both techniques showed excellent intra- und inter-observer reliability (intra ICC, inter ICC >0.9). The average CSA was 34.1° (SD +/- 3.6°) on X-ray, 35.2(SD +/- 3.9°) on MRI level 1, 36.6° (SD +/- 4.0°) on level 2 and 38.1° (SD +/- 4.0°) on level 3. Correlation between X-Ray CSA and MRI CSA was good (Pearson r>0.6) for all levels. The best correlation was measured at level 2 (Pearson r=0.689). However the absolute value of the critical shoulder angle differed significantly from X-ray compared to level 2 measurements (p>0.0001).

Conclusion: The CSA can be reproducibly determined on MR tomography and can offer an alternative technique of measurement when conventional X-ray is of poor quality or not available. Although correlation between X-ray and MRI measurements were found to be good, the absolute CSA value on X-ray cannot be directly compared to MRI. Correspondingly a clinical recommendation based on MRI can not be done yet. As MRI is obtained in a reliable standardized manner, further investigations should be considered to determine which CSA in MRI is clinically relevant.
Analysis of muscular properties after ACL reconstruction: comparison between BPTB versus pedunculated hamstring grafts – an analysis of 111 patients

Introduction: Main objective of ACL reconstruction is to re-establish kinematics and function of the injured knee. Several operative techniques have been described. A widely used technique is the bone-patellar tendon-bone grafts (BPTB). Due to less invasive technique and less anterior knee pain postoperatively, a trend towards hamstring grafts is noted in the last few years in our clinic. Clinical experience with hamstring grafts are positive. The aim of this cohort study is to assess objectively this perception and to compare both techniques regarding functional outcomes.

Material and Methods: Between 2007 and 2010 205 patients underwent primary ACL reconstruction by one single, experienced orthopaedic surgeon. Data of these patients were collected in a retrospective manner. Patients with previous surgery (ipsi- and contralateral knee), complex ligamentous reconstruction, contralateral knee problems and age > 50 years were excluded as well as meniscal suture and re-reconstructions.

145 patients meet inclusion criteria. 111 (77%) patient were accessible to follow-up (48 women, 63 men), thereby 43 BTB and 68 pedunculated hamstring grafts, with mean duration of follow-up of 45 months (range 24-71 months).

At follow-up, quadriceps and hamstring strength, power and acceleration were measured with a resistance device and accelerometer (Myotest®). Static and dynamic balance was measured with accelerometer. Differences between both groups were calculated considering side differences (operated versus non-operated side). Data were analyzed with linear regression methods adjusting for age and sex.

Results: Deficit between operated and non-operated side was statistically significant smaller in the BPTB group by 7.8 % (95% CI 3.3 to 12.3) for quadriceps movement velocity and by 9.7 % (95% CI 3.8 to 15.7) for quadriceps power as in the hamstring group. There was no difference in quadriceps strength (5.7% (95% CI -8.5 to 19.8) between both groups BPTB vs. hamstring. The data were adjusted for age and sex.

Absolute values (i.e. not comparing to non-operated side) showed no differences between the BPTB and hamstring group. For example, the difference in hamstring strength was 0.49 Nm (95% CI -1.64 to 0.649) in favor (but non-significant) of the BPTB, for quadriceps strength the difference was 0.08 Nm (95% CI -1.24 to 1.07).

There was no significant difference between both groups concerning dynamic balance (0.12 sec, 95% CI -0.19 to 0.42) and the KOOS (-0.93 points, 95% CI -2.7 to 0.83).
Conclusion: Interestingly we observed that patients operated with a BPTB showed significant less deficits (power and velocity) between operated and non-operated side compared with the hamstring group. Otherwise no significant differences in the different muscular tests could be objectified, especially no statistically significant weakness of the knee flexors in the hamstring group. Results of static and dynamic balance were comparable in both groups.
FM128 Physeal-sparing anterior cruciate ligament reconstruction in children – a retrospective analysis of 12 patients

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Introduction: Due to strenuous activities in sportive children, injuries of the anterior cruciate ligament (ACL) are increasing. In case of instability and/or additional meniscal tears it is generally accepted to reconstruct midsubstance ACL tears even in immature patients to prevent meniscal and chondral structure from secondary damage. Controversy regarding operating technique (physeal sparing vs. transphyseal) in young athletes with widely open physes remains unsolved. This study reclaims the results of a physeal-sparing ACL reconstruction technique in skeletally immature patients.

Methods: Between 2006 and 2010 12 patients (2 girls, 10 boys, age 10-13, Ø 11.6 years) underwent physeal-sparing primary ACL reconstruction (1 bilateral intervention) by one single, experienced orthopaedic surgeon. In two patients concomitant bucket handle tears were sutured, in one patient a partial medial meniscectomy was performed. Femoral and tibial tunnels were drilled entirely in the femoral and tibial epiphysis under image-intensifier control to prevent injury of the open physes.

Data of these patients were collected retrospectively. All patients were accessible to follow-up with a mean duration of follow-up of 59 months (range 39-80 months) and assessed by clinical examination (ROM, KT-1000) and radiological analysis (knee status and long leg radiographs). Functional status was assessed with use of Lysholm knee score, Tegner activity scale and IKDC-2000 questionnary.

Results: In 2 patients reoperation was necessary due to graft failure (one traumatic and one non-traumatic; 13 month and 49 month after primary operation). Two patients developed overlength of affected limb; one with 20 mm overlength and slight varus malalignment after re-physeal-sparing ACL reconstruction, the second developed arthrofibrosis and overlength of 12 mm. The former was treated by temporary epiphysodesis, the latter conservatively. No early closure of epiphyseal plate occurred.

One patient with intact but slightly elongated graft required meniscal suture 34 month after ACL reconstruction after traumatic medial meniscal lesion.

Instrumented arthrometer (KT-1000) testing showed significant side-difference compared with unaffected knee. IKDC subjective evaluation form score was in between 90 and 100.

Discussion: This study demonstrates that arthroscopic ACL reconstruction sparing the physes in immature children results in patient satisfaction and good clinical results although hyperstimulation of the physes with overgrowth and limb malalignment as well as graft failure in this highly active children remains a concern.
Clinical outcome of bone-patellar tendon-bone versus pedunculated hamstring grafts for ACL reconstruction – a retrospective analysis of 111 patients

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Introduction: The reconstruction of anterior cruciate ligament (ACL) is considered as a standard procedure in orthopaedic surgery. Several techniques have been described and different graft choices are possible.

Due to morbidity at the site of harvesting in BTB a trend towards hamstring-tendon grafts is noted in the last few years in our clinic.

Aim of this study is to compare clinical outcome after ACL reconstruction with BTB and pedunculated Hamstring-grafts by a two-incision technique.

Methods: Between 2007 and 2010 205 patients underwent primary ACL reconstruction by one single, experienced orthopaedic surgeon. Femoral and tibial tunnels were drilled in an outside-in two-incision technique guided by Phusis® drill-sleeves. BTB grafts were implanted upside-down and fixed articular sided by interference screws. In the hamstring group semitendinosus and gracilis tendons were harvested without detachment at the tibial insertion. The four stranded graft was implanted retrograd and fixed on both side with interference screws.

Data of these patients were collected in a retrospective manner. Patients with previous surgery (ipsi- and contralateral knee), complex ligamentous reconstruction, contralateral knee problems and age > 50 years were excluded as well as meniscal suture and re-reconstructions.

145 patients meet inclusion criteria. 111 (77%) patients were accessible to follow-up, thereby 43 BTB and 68 pedunculated hamstring grafts, with mean duration of follow-up of 45 months (range 24-71 months).

All patients were assessed by clinical examination (ROM, KT-1000) by one orthopaedic surgeon and radiological analysis was performed. Functional status was assessed with use of Lysholm knee score, Tegner activity scale, KOSS and IKDC-2000 questionnary.

Results: Overall revision rate was 12.5 % (19 of 152 patients). In 7 patients reoperation was necessary due to graft failure (5 patients BTB group, 2 patient hamstring group). Meniscal lesions (4 patients), lavage of hemarthros (2 patients) and cyclops formation (5 patients) were other indications for reoperation. One patient with cartilage lesion was treated by arthroscopic microfracturing. No septic arthritis occurred.

Anterior drawer measured by KT-1000 Arthrometer was 5.9 mm (range 2.0-12.5) and 4.1 mm in opposite knees (range 1.0-10.0), no difference was noted between the two groups.
IKDC subjective evaluation form score was 91 (range 69-100; 90.1 BTB group, 90.7 hamstring group).

**Discussion:** Acceptance after ACL-reconstruction in both groups (BTB vs. pedunculated Hamstring graft) is high with satisfying subjective results without significant differences in IKDC evaluation in both groups. Instrumented arthrometer testing in our patients showed no significant difference between BTB and soft-tissue grafts, contrary to previous reports.

No correlation between elevated anterior laxity after ACL-reconstruction (KT-1000 Δ > 3mm) and functional status was noted.
Evaluation of intra-ligamentary radiodensity marker after ACL reconstruction

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Introduction: The success rate of primary ACL reconstruction varies from 69% to 95%. Early clinical and radiographic diagnosis of failure or loosening can be difficult. The aim of the present study is to retrospectively evaluate the use of radiologically visible markers in the ACL, serving as a new potential diagnostic tool in early diagnosis of ACL graft rupture and insufficiency.

Methods: Twenty patients were included in the study. ACL reconstruction was performed with use of a hamstring autograft in hybrid fixation technique. During surgery the hamstring graft was marked with two radiodense sutures, one at the tibial and one at the femoral tunnel opening. X-rays were performed postoperatively, after 6 weeks and at 12 months. Additionally, at a minimum follow-up of 12-months measurement of ap-translation in 30° knee flexion by using a Rolimeter device and clinical examination with IKDC score was performed. Four marker distances were measured in antero-posterior as well as in lateral x-ray views and the positional change between the measurement times was calculated.

Results: In two measured distal anteroposterior distances statistically significant changes could be detected between 6 weeks and 12 months postoperatively in case of one MRI-documented ACL rerupture and in six patients with ACL elongation (p=0.04 and p=0.025). Significant relationships could be detected between the change from 6 weeks to 12 months of two measured distal distances on ap x-rays and clinical ACL insufficiency (p=0.021 and p=0.01). In lateral x-rays, changes of the marker distances were highly variable depending on the projection and did not correlate with clinical ACL insufficiency. One failure (extra-ligamentary marker migration) was seen 12 months postoperatively. Measurements of the marker distances on x-rays showed an excellent interobserver reliability (κ = 0.968).

Conclusion: The application of radiodense ACL graft markers seems to be a useful diagnostic tool for diagnosis of ACL graft rupture and insufficiency. However, several limitations such as reproducible radiologic imaging have to be addressed in further studies.
Landmarks of the normal adult human trochlea based on axial MRI measurements: A cross-sectional study

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Background: For deepening trochleoplasty, a procedure used worldwide to correct trochlear dysplasia, only few important surgical steps are described precisely. Important surgical landmarks, such as optimal cartilaginous trochlear depth and percentages of the new lateral and medial facet remain unanswered. This study therefore aims at describing normal trochlear geometry based on cartilaginous measurements in the general population.

Methods: We conducted a prospective cross-sectional study (January 2011 - August 2012) in adult patients (16-35 years) without trochlear dysplasia, who underwent magnetic resonance imaging (MRI). The main outcome was trochlear depth. The secondary outcome was the lateral / medial facet ratio. Measurements were made on the first cut from proximal with complete cartilage coverage. Measurements are reported as means and standard deviations with corresponding 95% confidence intervals. Differences between men and women were assessed. Inter- and intraobserver reliability were determined.

Results: 53 patients (69.8% men) were included. Mean age was 24.6 years (SD +5.5). Overall mean trochlear depth revealed as 4.0mm (95% CI 3.6 – 4.3). Values differed significantly by gender (p=0.0271) with a mean of 3.4mm (95% CI 3.0 – 3.8) for women and a mean of 4.2mm (95% CI 3.8 – 4.7) for men. The mean ratio between the lateral and medial facet was 1.71 (95% CI 1.62 – 1.80), the lateral facet contributing 62.6% (95% CI 61.3 – 63.8) and the medial facet contributing 37.4% (95% CI 36.2 – 38.7) to the total cartilage length. For the facet ratio there was no statistically significant gender difference (p=0.9363). Intra- and interobserver reliability was good with intraclass correlation coefficients of 0.88 – 0.93 for the trochlear depth and 0.75 – 0.91 for the facet ratio.

Conclusion: This study for the first time provides data on important landmarks for deepening trochleoplasty based on average MRI measurements in the general population. The results may prove helpful for the surgical procedure. Further evaluation of these landmarks by prospective performing deepening trochleoplasty will determine the value of the clinical implication.