

the femoral component alignment (varus, $>92^\circ$; neutral, $90^\circ \pm 2^\circ$; valgus, $<88^\circ$) and two groups for tibial component alignment (neutral, $90^\circ \pm 2^\circ$; varus, $<88^\circ$). These groups were compared with respect to clinical and functional outcomes using the International Knee Society Score (KSS) and the Western Ontario and McMaster University Osteoarthritis Index (WOMAC).

Results No revisions occurred in any of the groups at midterm follow-up. All patients had post-operative improvements in KSS. Knees with a HKA-angle in mild varus scored significantly better for the KSS and the WOMAC, compared with knees that were corrected to neutral and knees that were left in severe varus exceeding 6° . When component alignment was combined with leg alignment, a neutrally aligned tibial component with an HKA-angle in slight varus (3° – 6°) showed the best results. When component position was analysed independently of limb alignment, a significant better knee sub-score was found for the neutrally aligned tibial component and the neutrally aligned femoral component. The worst results were obtained with the combination of a varus aligned tibial and a varus aligned femoral component.

Discussion In patients with pre-operative varus osteo-arthritis of the knee, a slight under-correction of the alignment resulted in a better clinical outcome after TKA. This under-correction should be done carefully avoiding a combination of varus alignment of the femoral and tibial component greater than 2° .

Conclusions More than component alignment, the overall limb seems to be main determinant for clinical outcome after TKA.

Single or double-bundle medial patello-femoral ligament reconstruction

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Introduction Objective patellar instability has several causal factors and, consequently, different surgical techniques have been developed to solve them. In 98 % of patellar dislocations the medial patello-femoral ligament (MPFL) is torn. Consequently, MPFL reconstruction, isolated or in combination with other surgical gestures, is emerging as a fundamental technique in the treatment of patellar instability. In literature there are several techniques, different in the type of transplant used, in single or double bundle reconstruction, in the type of fixation. There is no a technique superior to the others. The aim of this study is to compare the short-term results of isolated single-bundle MPFL reconstruction with quadriceps tendon and double-bundle reconstruction with semi-tendinosus.

Methods Twenty-two patients with objective patellar instability, absence of patella alta, TA-GT <20 mm, no high-grade trochlear dysplasia (type B or D according to Dejour) were included in the study. All patients had isolated MPFL reconstruction: 11 with single bundle quadriceps tendon and 11 with double bundle semi-tendinosus. Clinical results were evaluated with IKDC, Kujala and Tegner score. Postoperatively, eight patients had a CT scan, so in this subgroup the change in patellar tilt was evaluated.

Results Mean follow-up was 34 months (24–50). No patient had further patellar dislocation. IKDC score increased from 46.8 to 80.8 in the single-bundle group and from 41.3 to 81.2 in the double-bundle group; the Kujala score changed from 54.0 to 93.3 and from 44.8 to 94.1, respectively. Tegner score increased from 3.0 to 4.0 in the single-bundle group and 2.6–4.1 in the double-bundle group. The bone patellar tilt changed from 29.9° (22° – 41°) to 11.5° (8° – 16°).

Discussion Both techniques, although different in the graft used and in its mechanical behaviour, showed excellent results at a short follow-up. Functional and instrumental evaluation showed no differences between the techniques used.

Conclusions Isolated MPFL reconstruction in patients with objective patellar instability without patella alta, high-grade dysplasia and pathological TT-TG is safe and effective regardless of the technique (single or double beam) or graft (quadriceps or semi-tendinosus) used.

Patello-femoral pain syndrome in water polo players

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Introduction Water polo is physically demanding sport, combining swimming, wrestling, and repetitive throwing. Vigorous training with numerous repetitions of kicks may result in overuse injuries. Leg work accounts for 40–55 % of the game, depending on the position of the players and game tactics. The athletes can swim up to four to five kilometres in 1 h game. For water polo players, knee problems can seriously interfere with training and competing. Twenty-five percent of players can have knee pain once during their competitive career. The majority (86 %) of water polo players have experienced knee pain once in their career and 47.2 % of them have had this problem at least one time every week.

Methods Eighteen athletes (4 men, 14 women, 10 bilateral knee) with anterior knee pain were evaluated clinically to investigate the relationship between athletic movement and patello-femoral pain. The mean age at the time of evaluation was 19 years (range between 14–22 years). External tibial torsion, Q angle, patellar mobility, pain during range of motion or in palpation of P–F joint were evaluated: Lysholm, Kujala and Knee Society Score were used. Players underwent 6 months of functional training to improve athletic movement.

Results There was a significant improvement of Lysholm, Kujala and Knee Society Score after correction of the athletic movements. After 6 months of training to improve the eggbeater kick the mean Knee Society Score significantly improved from 72 (range 63–79) to 94.6 (range 83–100) of ($p < 0.001$), while the mean Kujala score 68 (range 57–81) to 92 (range 87–100) ($p < 0.001$). The mean Lysholm improved from 76.2 (range 70–84), to 89 (range 81–100) ($p < 0.001$).

Discussion Although water polo athletes will not have often knee problems, knee pain may occur in competitive ones. Water polo players perform the “eggbeater” kick: the right leg rotates counter-clockwise while the left rotates clockwise. Essentially, the action is designed to “scull” the feet to produce forces to raise the body. During this athletic movement knee joint is forced in flexion, valgus forces and tibial external rotation. The result is an increase in shear forces on the patello-femoral joint and a subluxating vector on the patella. The rotation of the knee and compression on the medial aspect of the joint can cause degenerative changes on the patello-femoral joint.

Conclusions Pathogenesis of this syndrome is the consequence of altered athletic movement. The treatment of knee pain in water polo players is conservative and is based on the correction of the “eggbeater” kick’s technique to avoid overuse injury.

ARTHROSCOPY

How to avoid collision between PCL and MCL femoral tunnels during a simultaneous reconstruction

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Introduction The purpose of the present study was to assess the risk of femoral tunnel collisions between the medial collateral ligament (MCL) and the posterior cruciate ligament (PCL) tunnels during a simultaneous PCL and MCL reconstruction.

Methods Forth generation medium and large synthetic femur bones were used. On each femur, a MCL tunnel and a PCL tunnel were reamed. The MCL tunnel was drilled at 0°, 20° and 40° of axial and coronal angulations. The PCL femoral tunnel was reamed to simulate two different tunnel directions that could be obtained through an inside-out and outside-in technique. Tunnels were filled epoxy resin augmented with BaSO₄ and multidetector CT exams of the specimens were performed.

Results It was found a high rate of tunnel collision when the MCL femoral tunnel was reamed proximally and with an axial angulation of 20° and 40°. The rate of tunnel collision significantly decreased when the MCL tunnel was reamed proximally with an axial angulation of 0°. No differences were found between PCL tunnel directions in terms of tunnel collision.

Discussion This study provides new information regarding the risk of tunnel collision when a MCL reconstruction is performed in the setting of a concurrent PCL reconstruction. In order to minimize such potential complications the MCL tunnel should be drilled with a proximal angulation between 0° and 20° and 40°, limiting the axial angulation.

Conclusions The results of this study can help surgeons to better direct the femoral MCL tunnel in order to avoid a collision between femoral tunnels during a combined MCL and PCL reconstruction.

Arthroscopic treatment of meniscal tears with suture in children and adolescents

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Introduction Meniscal tears have been always treated with complete or partial meniscectomy, but in the last few years surgeons have paid attention to the consequences of this procedure. Today, in most cases surgeons do not remove meniscus, but they only regularized or suture it. Many studies have demonstrated that meniscal preservation protects articular cartilage from degenerative changes, and that this changes are directly connected to the amount of the removed meniscus. Based on this consideration it is very important to preserve meniscus, mainly in young patients, to avoid the beginning of osteoarthritis process.

Methods This retrospective study includes 11 patients, with a mean age at intervention of 11.7 years (range 7–16). Among them, eight presented lateral meniscus tears and three medial meniscus tears. In six cases the surgery was programmed for the treatment of discoid meniscus; in the other three cases patients underwent to ACL reconstruction and during the procedure the meniscal tears were sutured. Ten patients were treated with the out-in technique and one with the all-inside technique. At an average follow up of 18 months (range 16–32), clinical evaluation was made using IKDC, Lysholm and Tegner scale.

Results No adverse events or post-operative complications were reported. The technique has led to very satisfactory results, both subjective and objective (IKDC normal/nearly normal). All the patients returned to the pre-injury sport activity level accordingly to

the type of sport. In consideration of the young age of the patients no radiological post-operative examination was performed.

Discussion This results allow to consider crucial the preservation of the anatomy of the knee in pre-adolescent and adolescent patients to obtain satisfactory medium-long term results. However surgeon must be aware that the meniscal suture could expose these patients to a higher risk of failure in the first months from treatment and to a longer and more difficult post-operative recovery in consideration of their young age.

Conclusions Our results show that this technique is very satisfactory in the medium term in this class of patients. For this reason, we believe that this treatment should be preferred in all cases, including the border-line ones, rather than the partial meniscectomy.

Anatomic anterior cruciate ligament reconstruction: transtibial technique (TT) versus translateral technique (OUT-IN)

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Introduction The location of femoral tunnel in anterior cruciate ligament (ACL) reconstruction is crucial to obtain high clinical results and better return to pre-injury level. Restoration of anatomic femoral ACL footprint should be the aim of the operation but not all the techniques used allow to reach these area. The purpose of our study is to compare accuracy of transtibial technique (TT) versus translateral technique (OUT-IN) to restore ACL anatomic femoral footprint.

Methods We prospectively followed 40 ACL reconstructions with femoral tunnel performed through two different techniques: TT (20) and OUT-IN (20). Clinical evaluation was done using IKDC and KOOS score and radiographic analysis with specific 3D-CT scans. Tunnel coordinates were calculated using Bernard-Hertel quadrant method to define the insertion point of ACL. Tunnel length was measured as distance between the centre of entry point and the exit point. Tunnel inclination was determined as the angle between longitudinal axis of the tunnel and knee joint line in frontal plane.

Results Excellent clinical results were reached in both groups with comparable IKDC and KOOS scores. The mean distances of the femoral tunnel centre location parallel to the Blumensaat line were $31.1 \pm 2.5\%$ in OUT-IN and $39.4 \pm 1.9\%$ in TT, measured from the posterior border of the medial wall of the lateral condyle [normal value (NV) = 27.3%]. While the mean distances perpendicular to the Blumensaat line were $30.2 \pm 2.7\%$ in OUT-IN and $10.5 \pm 1.5\%$ in TT, measured from the roof of the intercondylar notch (NV = 34.35%). The mean femoral tunnel inclination was 33.9° in OUT-IN and 59.9° in TT. The tibial tunnel position and length were similar in both techniques.

Discussion Many reports described the limitations of TT technique to restore ACL anatomic femoral footprint. The TT frequently produces a vertical nonanatomic femoral tunnel because of constraints in the direction of the tibial tunnel. According to literature we demonstrated that better restoration of ACL anatomic femoral footprint is possible with OUT-IN technique compared to TT technique.

Conclusions OUT-IN technique is more accurate to restore ACL anatomic femoral footprint than TT technique. Moreover OUT-IN technique determines a shorter and less vertical femoral tunnel compared to TT technique.