

median quickDASH was 9.1 [0–25] points and OES 42 [34–48]. Median post-operative flexion was 145°, and extension was 0°. Post-operative flexion was restrained in seven patients and extension in eight patients; 59% of patients reached full ROM at final follow-up. **Conclusions:** R-LCL plication produces subjective satisfaction and positive clinical results in patients presenting with a symptomatic minor instability of the lateral elbow (SMILE) at 2-year median follow-up. A slight limitation in range of motion is a possible undesired consequence of this intervention.

## Hip

### FP02-809

#### Clinical impact of superior cleft sign and secondary cleft sign on long-standing groin pain athletes and relationship with pubic bone marrow oedema

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**Objectives:** Athletic groin pain has been reported to be derived from multiple pathologies rather than a single pathology. In image studies of Eustace et al. superior and secondary cleft signs (CSs) have been reported to be associated with the attachment microtearing of rectus abdominis-adductor longus and short adductor, respectively. However, clinical impact of CSs on athletes with groin pain remains unclear. The aims of this study were (1) to compare the time to return-to-sports between athletes with and without CSs on magnetic resonance imaging (MRI), and (2) to investigate the prevalence of pubic bone marrow oedema (BMO) among athletes with groin pain and its relation to CSs.

**Methods:** We retrospectively reviewed 390 consecutive athletes from 16 to 40 years old (343 males and 47 females, mean age 20 years old) who visited our clinic with groin pain without clear history of trauma between May 2013 and December 2016. Athletes diagnosed with groin pain after precise history taking and physical examination were routinely investigated with MRI. These athletes were classified into 3 groups according to the MRI findings: CSs alone group, CSs combined with other lesions group, and no CSs group (no CSs combined with other lesions or no significant findings in MRI). Other lesions include muscle injury, stress fracture, avulsion fracture, iliopsoas peritendinitis, hip joint labral injury, femoro-acetabular impingement and more. The time to return-to-play was compared among these 3 groups. In addition, the incidence of BMO in each group was investigated.

**Results:** 248 athletes were followed-up till return to sports. The mean follow-up period was 57.6 weeks. Based on MRI findings in these 248 athletes, CSs were observed in 68 athletes (27%). 12 athletes were classified as CSs alone group, 56 as CSs combined with other lesions group, and 180 as no CSs group. The time from the onset of pain to return-to-play was significantly longer in CSs alone group and CSs combined with other lesions group than no CSs group (57, 37, and 20 weeks, respectively,  $P < 0.01$ ). Similarly, the time from first visit to our clinic to return-to-play was significantly longer in CSs alone group and CSs combined with other lesions group than no CSs group (19, 17, 11 weeks, respectively,  $P < 0.05$ ). Based on MRI findings in 390 athletes, BMO were present in 41% (157 male, 1 female) and CSs were present in 48% of these athletes with BMO. In addition, BMO

were present in 76 % of athletes with CSs and 29 % of athletes without CSs ( $P < 0.01$ ).

**Conclusions:** CSs were observed in 27% of athletes with groin pain. Distinguishing CSs in groin pain athletes is important because athletes with CSs on MRI need more time for return-to-sports. Increased awareness of CSs is necessary, and clinicians should suspect CSs in the presence of BMO on MRI in patients with long-standing groin pain.

### FP02-1277

#### Influence of muscle fatty degeneration on functional outcomes after endoscopic gluteus medius repair

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**Objectives:** To report the early outcomes of endoscopic repair of partial and full thickness tears of the gluteus medius tendon and to determine whether the fatty degeneration had an influence on clinical results.

**Methods:** Between October 2012 and June 2014, data was prospectively collected and retrospectively reviewed for all patients undergoing endoscopic gluteus medius repair. Patients were assessed pre- and post-operatively using the modified Harris Hip Score, the Non-Arthritic Hip Score and Visual Analogic Scale for pain. Gluteus minimus and the 3 distinct parts of the Gluteus medius (Anterior, Middle and Posterior) were assigned a grade of fatty degeneration on preoperative magnetic resonance imaging scans.

**Results:** 22 hips (in 20 patients) were assessed with 31.7 months mean follow-up (range 24–47 months). No patient was lost to follow-up. The mean age at the time of surgery was 66 years (range 45–82 years). Of the 20 MRI assessed hips included in the study, fourteen hips (70%) had fatty degeneration of gluteus medius. Mean gluteus medius fatty degeneration index was 1.57 (range 0.33–3.33). Post-operative improvement was seen in mHHS (33.7 points v 80.2 points,  $P = .0001$ ), NAHS (47.7 points v 76.8 points,  $P = .0001$ ) and in the visual analog scale for pain (7.2 v 3.2,  $P < .05$ ). Increasing preoperative fatty degeneration index of the Gluteus medius correlated with decreased postoperative functional hip score values (regression coefficient, 0.5839;  $P < 0.0001$ ).

**Conclusions:** This study suggests that endoscopic surgical repair can be an effective treatment of gluteus medius tears in the short term. Fatty degeneration of gluteus medius and minimus has a negative impact on clinical outcomes of endoscopic gluteus medius repair.

### FP02-1296

#### Offset restoration in short and conventional stems using digital templating

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**Objectives:** Total hip arthroplasty (THA) improves quality of life by eliminating osteoarthritic pain. However, up to 22% of the patients still have some functional limitations in daily activities after THA, due to persisting pain and/or restricted hip function. A reason for this could be failure in restoring a patient's individual anatomy. Femoro-acetabular offset (FAO) plays an important role in anatomic restoration in THA, where loss of offset greater than 5 mm is associated with an altered gait and decreased functional outcome. Short

stems, with metadiaphyseal anchoring, follow the anatomical collum-caput-diaphyseal angle (CCD-angle) on the medial side of the calcar of the femur. This allows better offset restoration, as more variety is possible in placement of the hip stem. The purpose of this study was to assess whether restoration of the preoperative FAO differs between short and conventional stem by use of digital templating. Additionally, the association of the preoperative FAO and CCD-angle with the FAO restoration of both stems were investigated and reliability of the measurements was assessed.

**Methods:** A total of 100 standardised hip measurement X-rays were used for digital templating, from two ongoing cohorts with a short and conventional stem. Restoration of FAO was dichotomized into “restored” when equal or smaller than 5 mm from baseline value or “not restored” when  $> 5$  mm from baseline value. Differences between the two stems concerning the proportions of correct restoration of the FAO were analyzed by use of McNemar tests. To assess the association between CCD-angle and preoperative FAO with absolute offset restoration, multi-level analysis was performed by use of a linear mixed model to account for paired measurements. Through determination of the optimal point under the curve in ROC-analysis, bootstrapping of a thousand sets was performed to determine the optimal cutoff point of the preoperative FAO for restoration within the limits of 5 mm. Three observers participated for inter-observer reliability, with two observers measuring the X-rays twice for intra-observer reliability.

**Results:** The mean preoperative FAO was 79.7 mm (range 62.5–113 mm), with a mean CCD-angle of  $128.6^\circ$  (range  $114.5\text{--}145^\circ$ ). The conventional stem could only restore the offset in 72 of the cases, whereas the short stem restored the offset in all of the cases. CCD-angle was not a predictor, but the pre-operative FAO was. A cut-off point of 81.25 mm (95% CI of 80.75–84.75 mm) in pre-operative FAO was found where the conventional stem was unable to restore offset. The reliability of baseline measurements was excellent, with an intra-observer reliability of 0.99 for the preoperative FAO and 0.94 for the CCD-angle. Inter-observer reliability between the three observers in preoperative FAO was higher than 0.9, and for CCD-angle this was higher than 0.8.

**Conclusions:** Short stems with a curve following the medial calcar are superior to conventional stems in restoration in hips with a FAO of greater than 80.0 mm.