

**PREDICTORS OF ROTATIONAL FAILURE IN PAEDIATRIC SUPRACONDYLAR HUMERAL FRACTURES**

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Lateral-entry wiring (LEW) for displaced supracondylar humeral fractures (SHFs) has been popularised internationally. BOAST guidance suggests either LEW or crossed wires; the latter has reported lower risk of loss of fracture reduction –we explore technical reasons why.

We reviewed 8 years of displaced SHFs in two regional centres. Injuries were grouped using the Gartland Classification, with posterolateral or posteromedial displacement assessment for Gartland 3 injuries. We identified any loss of fracture reduction, and reviewed intra-operative imaging to identify learning points that may contribute to early rotational displacement (ERD).

345 SHFs were included, between 2012 and 2020. Gartland 2 (n=117) injuries had a 3.42% risk. ERD. Gartland 3 crossed wirings (n=114) had a 6.14% risk of ERD, with those moving all being posterolaterally displaced. Gartland 3, posterolaterally displaced LEW (n=56) had a 35.7% risk of ERD. Gartland 3, posteromedially displaced LEW (n=58) had a 22.4% risk of ERD. All injuries with ERD except 3 had identifiable learning points, the commonest being non-divergence of wires, or wires not passing through both fracture fragments.

LEW requires divergent spread and bicolumnar fixation. Achieving a solid construct through this method appears more challenging than crossed wiring, with rates of ERD 3-5x higher. Low-volume surgeons should adhere to BOAST guidelines and choose a wiring construct that works best in their hands. They can also be reassured that should a loss of position occur, the risk of requirement for revision surgery is extremely low in our study (0.3%), and it is unlikely to affect long term outcomes.

**DOES CHANGE IN CORONAL PLANE ALIGNMENT OF THE KNEE CLASSIFICATION FOLLOWING TOTAL KNEE ARTHROPLASTY INFLUENCE PATIENT-REPORTED OUTCOMES AND SURVIVORSHIP? A REVIEW OF 1062 CASES WITH 10 YEARS FOLLOW-UP**

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Restoration of native Coronal Plane Alignment of the Knee (CPAK) phenotype is a strategy suggested to achieve better satisfaction. The aim of this study was to investigate the influence of changes in CPAK classification on patient-reported outcome measures (PROMs) and survivorship in a large cohort of manual mechanically aligned (MA) cemented TKAs.

A retrospective analysis of 1062 consecutive cemented TKAs using MA philosophy at a single institution. Pre- and post-operative hip-knee-ankle radiographs were classified using the CPAK classification. Oxford Knee Score (OKS) and patient satisfaction (4-point-Likert scale) were collected prospectively. Implant survival data was obtained from our national arthroplasty database. We compared the outcomes of patients who maintained or changed their CPAK classification following TKA. Satisfaction was analysed using chi-square test, and OKS was analysed using Mann-Whitney test.

Pre-operatively, most patients were CPAK type-I (38.8%). 85.5% of patients changed their CPAK type post-operatively, with CPAK type-V observed in 41.2% of these. Significantly better satisfaction (p=0.033) and OKS (p=0.021) were observed at one-year follow-up in patients who changed CPAK type, although the difference was below OKS minimally important clinical difference. There was no difference in satisfaction (p=0.73) and OKS (p=0.26) at one year between CPAK-V and non-V classifications. Post-operative CPAK type had no correlation with satisfaction and OKS. 12 TKAs (1.1%) were revised within 10 years (3 septic).

In this large cohort of MA-TKA, excellent survivorship was observed at 10 years, with no demonstrable difference in outcome related to the final CPAK phenotype or change in phenotype.

**EVALUATION OF THE ROLE OF THE ACUTE MEDICAL REGISTRAR IN ORTHOPAEDICS**

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This project hoped to evaluate a new role, encompassing an in-hours registrar physician being based on the orthopaedic wards for advice, patient reviews, and patient journey optimisation. This service aimed to provide input for all patients who required them outwith the already established ortho-geriatric service.

The success of this role was assessed through feedback questionnaires, as well as through the auditing of functional indicators such as the burden on the on-call orthopaedic registrar and other departments for advice from junior doctors, plus the number of medical emergencies.

The survey received a total of 42 responses from various staff roles. All respondents thought the role had improved patient care or the functioning of the department. Respondents thought the role primarily enhanced patient care and safety and led to increased support for junior doctors and nursing staff. Data showed a 44% reduction in medical emergency calls since the role began. Total calls outwith the department for medical support reduced by 100% in hours and 50% out of hours when analysed over 22 days. Over a 14 day period, calls to the on-call orthopaedic registrar also reduced by 100% in hours, with no significant difference out of hours.

This role has improved patient care and safety and allowed faster medical support with reduced impact on orthopaedic and general medical services. Feedback has been very positive from all staff. The major limitation is lack of 24 hour support. Next steps will include expanding the role, as well as introduction of framework for professional development.

**A SCOTTISH CENTRE'S EXPERIENCE OF RAPIDLY DESTRUCTIVE OSTEOARTHRITIS OF THE HIP IN THE SETTING OF A RESTRICTED ARTHROPLASTY SERVICE. DO DELAYS AFFECT OUTCOMES? WHAT CAN WE LEARN?**

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The Covid-19 pandemic restricted access to elective arthroplasty theatres. Consequently, there was a staggering rise in waiting times for patients awaiting total hip arthroplasty (THA). Concomitantly, rapidly destructive osteoarthritis (RDOA) incidence also increased.

Two cohorts of patients were reviewed: patients undergoing primary THA, pre-pandemic (December 2017-December 2018) and patients with RDOA (ascertained by dual consultant review of pre-operative radiographs) undergoing THA after the pandemic started (March 2020 – March 2022). There were 236 primary THA cases in the pre-pandemic cohort. Out of the 632 primary THA cases post-pandemic, 186 cases (29%) had RDOA. Within this RDOA cohort, the pre-operative mean OHS, EQ5D3L and EQVAS (12.7, 10.5 and 57.6 respectively) were all poorer than in the pre-pandemic population (18.3, 9.4 and 66.7 respectively) (p<0.05). There was no significant difference between the RDOA and pre-pandemic cohort in Patient Reported Outcome Measures (PROMS) at 12 months, perhaps due to their ceiling effect.

Within the RDOA cohort, 7 cases required acetabular augments, 1 of which also required femoral shortening. The rate of intra-operative fracture, dislocation, infection, return to theatre, and revision were 2.2%, 2.7%, 4.3%, 3.8% and 2.2% respectively, greater than those reported in the literature. No fractures nor dislocations occurred in robot assisted arthroplasties.

With ever increasing waiting lists, RDOA prevalence will continue to rise. Increased surgical challenges and potential use of additional implants generated by its presence excludes these patients from waiting list initiative pathways, potentiating the complexity of the operative procedure. Going forwards, the economic burden and training implications must be considered.

**THE FORTH VALLEY ACHILLES MANAGEMENT PROTOCOL FOR ACUTE ACHILLES TENDON RUPTURES: A PROSPECTIVE OBSERVATIONAL STUDY**

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This prospective study explores the outcomes of the Forth Valley Protocol (FVP) for the management of acute Achilles tendon ruptures. The protocol uses ultrasound as the primary mechanism to guide treatment.

All patients presenting with acute tendoachilles rupture over a three-year period were included. Patients under 18 years of age, chronic ruptures, or prior surgery to the Achilles tendon were excluded. Patients with a gap  $\leq 2$ cm had conservative management following an Early Rehabilitation Protocol (ERP) and  $>2$ cm underwent surgery (if an appropriate surgical candidate). Achilles Tendon Rupture Scores (ATRS) were obtained retrospectively. Fischer's exact test was used to determine statistical significance.

158 patients were included with a mean age of 53 (range 20-89). Ultrasound scans were obtained for 121 patients (76.5%), demonstrating a mean tendon gap of 1.61cm. 143 patients managed conservatively and 15 surgically. The overall re-rupture rate was 3.8% (n=6). All the re-ruptures occurred in patients treated conservatively, but this was not found to be statistically significant (n=6, P=1.0). The overall complication rate (excluding re-ruptures) was 1.9%. ATRS was comparable between both treatment modalities (P=0.382, 0.422), with a mean score of 86.6 in the conservative group and 81.4 in the surgical group.

The FVP demonstrates low re-rupture and complication rates in line with other published studies. Patients with gaps  $\leq 2.0$ cm on the ultrasound can be successfully treated conservatively with an ERP. This has potential benefits in terms improved patient outcomes, satisfaction, and preservation of resources.

**ACL RUPTURE DISGUISED AS PATELLAR INSTABILITY - A COMMON MISS**

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Patellar dislocation is a common presentation with a clear management pathway. Sometimes, however, what a patient experiences as the patella dislocating may, in fact, be ACL insufficiency.

We reviewed case notes and imaging of 315 consecutive ACL reconstructions, collecting data on the date and mechanism of injury, time to MRI, and reconstruction. We noted cases initially diagnosed as patellar dislocation.

25 of 315 (7.9%) patients were initially diagnosed with a patellar dislocation. Subsequently, however, MRI scans revealed no evidence of patellar dislocation and instead showed ACL rupture with pathognomonic pivot-shift bony oedema. The false patella dislocation group were 32% female and had an average age of 25; the rest of the group average age was 27.1 and there were a lower proportion of females; 21%. The false patella instability patients had a median waiting time of 412 days from injury to operation (range: 70-2445 days), compared to 392 days (range: 9 - 4212 days) for rest of the patients. 5 of the remaining 290 had MRIs showing patella oedema with medial patello-femoral ligament injury in addition to their ACL rupture.

From our literature search this is a new finding which shows that ACL rupture can present with symptoms suggestive of patellar dislocation. These findings raise the risk that there are a group of people who have been diagnosed with patellar instability who instead have ACL insufficiency and so are at risk of meniscal and chondral damage. Further research should analyse those diagnosed with patellar instability to quantify missed ACL injuries.

**THE NUMBER OF DISTAL RADIAL FRACTURES IN THE ELDERLY WILL INCREASE BY MORE THAN HALF BY 2040: PREDICTION MODELLING USING NATIONAL DATA**

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The aim was to predict the number and incidence of distal radius fractures in Scotland over the next two decades according to age group, categorised into under 65yrs (<65) and 65yrs and older (≥65), and estimate the potential increased operative burden.

The number of distal radius fractures in Scotland was isolated from the Global Burden of Disease database and this was used, in addition to historic population data and published population estimates, to create a multivariable model allowing incorporation of age group, sex and time. A Negative Binomial distribution was used to predict incidence in 2030 and 2040 and calculate projected number of fractures. A 20.4% operative intervention rate was assumed (local data).

In terms of number of fractures, there was a projected 61% rise in the ≥65 group with an overall increase of 2099 fractures per year from 3417 in 2020 (95% confidence interval (CI) 2960 – 3463) to 5516 in 2040 (95% CI 4155 – 5675). This was associated with 428 additional operative interventions per year for those ≥65yrs. The projected increase between 2020 and 2040 was similar in both sexes (60% in females, 63% in males), however the absolute increase in fracture number was higher in females. There was a 4% projected fall in the number of fractures in those <65.

Incidence of distal radius fractures is expected to considerably increase over the next two decades due to a projected increase in the number of fractures in the elderly. This has implications for associated morbidity and healthcare resource use.

**SIMULTANEOUS VERSUS STAGED TOTAL HIP ARTHROPLASTY FOLLOWING ACETABULAR FRACTURE FIXATION: A COMPARISON OF OUTCOMES**

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Acetabular fractures present a challenge. Anatomical reduction can be achieved by open reduction and internal fixation (ORIF). However, in elderly patients with complex fracture patterns and osteoporotic bone stock, "fix and replace" has become an option in the management of these injuries. This involves ORIF of the acetabulum to enable insertion of a press fit cup and subsequent cemented femoral stem at the index surgery.

A Retrospective analysis of all operatively managed acetabular fractures by a regional Pelvic and Acetabular Trauma service (01/01/2018-30/05/2023) STATA used for analysis. 34 patients undergoing "fix and replace" surgery. Of the 133 patients managed with ORIF, 21 subsequently required Total Hip Arthroplasty (THA). Mean follow up was 2.7 years versus 5.1. There was no statistical significance between the two groups with regards to BMI or sex. Mean age in the "fix and replace" group was 68 compared to 48 in the ORIF and subsequent THA group. This reached statistical significance between the two groups (p=0.001). ASA and Charlson Comorbidity Index (3 and 3 in "fix and replace" and 2 and 1.2 in ORIF to THA group) and Charlson Comorbidity Index both were statistically significantly different (p=0.006 and p=0.027, respectively). High energy mechanism of injury accounted for 56% of the "fix and replace" group compared to 48% in the ORIF to THA. 74% of "fix and replace" were associated fractures compared to 53% of ORIF to THA. Wait to surgery was 3 days for "fix and replace" while 186 days was the mean wait time from listing to THA for the ORIF to THA group. Complication rate was 41% versus 43% in the two groups. 14% in the ORIF to THA group developed PJI versus 6% in "fix and replace".

Fix and replace allows early mobilisation in frailer, elderly patients. Our results show fewer returns to theatre and less PJI in patients having arthroplasty as part of "fix and replace" than subsequent to Open reduction internal fixation.

### **THE X-RAY CALIBRATION PROJECT**

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Increasing the accuracy of information provided through X-Rays maximises pre-operative planning. Aim of this project is to determine the necessity of calibration probes that would improve the accuracy of pre-operative templating. This is a retrospective study involving leg length and pelvis X-Rays performed across the NHS Lanarkshire from 01/03/2023 until 31/04/2024.

A total of 87 leg length X-Rays were identified, 18 had a calibration probe present, ruler or sphere. Leg length was measured on each and the X-Rays were calibrated against the existing probe. In 66.7% of cases there was a major leg length discrepancy of over 2cm between the pre-calibrated and post-calibrated X-Rays. Pelvic X-Rays of 80 patients that underwent total hip replacement were reviewed. In 66 cases preoperative templating was saved on the electronic records. The sizes of the planned implants were compared to those inserted. An average of 1.94 discrepancy in the size of the acetabular implant was identified whilst in 30 cases the size of the femoral stem was incorrect by at least 1 size. Seventy seven pelvic X-Rays following hip hemiarthroplasty were also reviewed. The implant head was measured following 110% X-Ray magnification adjustment. This was only 91% accurate. It was identified that pelvic X-Ray magnification of 122% would provide the most accurate results.

X-Rays with no calibration probes provide inaccurate measurements leading to faulty preoperative planning. We recommend the implementation of a standardised practice involving the use of a calibration sphere when performing leg length and pelvis X-Rays.

### **A RETROSPECTIVE REVIEW OF LONG-TERM PATIENT REPORTED OUTCOME MEASURES COMPARING UNSTABLE ANKLE FRACTURES WITH AND WITHOUT A POSTERIOR MALLEOLUS FRACTURE**

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The aim of this study was to evaluate the long-term outcomes of patients who had sustained an unstable ankle fracture with a posterior malleolus fracture (PMF) and without (N-PMF).

Adult patients presenting to a single academic trauma centre in Edinburgh, UK, between 2009 and 2012 with an unstable ankle fracture requiring surgery were identified. The primary outcome measure was the Olerud Molander Ankle Score (OMAS). Secondary measures included Euroqol-5D-3L Index (Eq5D3L), Euroqol-5D-VAS and Manchester Oxford Foot Questionnaire (MOXFQ).

There were 304 patients in the study cohort. The mean age was 49.6 years (16.3–78.3) and 33% (n=100) male and 67% (n=204) female. Of these, 67% (n=204) had a PMF and 33% did not (n=100). No patient received a computed tomography (CT) scan pre-operatively. Only 10% of PMFs (22/204) were managed with internal fixation. At a mean of 13.8 years (11.3 – 15.3) the median OMAS score was 85 (Interquartile Range 60 - 100). There was no difference in OMAS between the N-PMF and PMF groups (85 [56.25 - 100] vs 85 [61.25 - 100]; p = 0.580). There was also no difference for MOXFQ (N-PMF 7 [0 – 36.75] vs PMF 8 [0-38.75]; p = 0.643), the EQ5D Index (N-PMF 0.8 [0.7 - 1] vs PMF 0.8 [0.7 - 1]; p = 0.720) and EQ5D VAS (N-PMF 80 [70 - 90] vs PMF 80 [60 - 90]; p = 0.224).

The presence of a PMF does not affect the long-term patient reported outcomes in patients with a surgically managed unstable ankle fracture.