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Paediatric Free Papers
10:30 – 12:00
Hall 11

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POOR EVERTOR MUSCLE ACTIVITY IS A PREDICTOR OF RECURRENCE IN IDIOPATHIC CLUBFOOT TREATED BY THE PONSETI METHOD: A PROSPECTIVE LONGITUDINAL STUDY WITH A 5-YEAR FOLLOW-UP

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Background: After successful primary correction of idiopathic clubfoot with the Ponseti method, recurrence has been reported to affect up to 40% of children. It is difficult to predict which feet are at risk of recurrence, despite numerous studies investigating risk factors. Post-corrective foot abduction bracing (FAB) is the gold standard of care in preventing recurrence, but even with excellent compliance, recurrences still occur. An increasing body of evidence points to a congenital neuromuscular imbalance constituting the deforming forces present in clubfoot. Poor evertor muscle activity has been cited specifically as a potential risk factor for recurrence. The aim of this study is to evaluate whether poor evertor muscle activity on clinical examination can predict recurrence in idiopathic clubfoot at five-year follow-up.

Methods: Data were collected prospectively on patients treated in our physiotherapy-led Ponseti service between 2010 and 2015. Sex, age, laterality, Pirani score, number of casts, brace compliance and evertor activity were recorded. Evertor muscle activity was assessed after primary correction in a semi-quantitative repeatable manner and scored as 0, 0.5 or 1 as previously described. Recurrence was defined as deterioration of any of the four components of the deformity following a previously complete correction.

Results: One hundred and four patients (172 feet) were included in the study, 76 were in the good evertor activity group (score 0) and 28 in the poor evertor activity group (score 0.5 or 1). The mean follow up was 62 months (range 41 - 71 months). Nineteen patients had recurrence (18.3%) and all were initially treated with repeat casting. Fourteen of these patients required additional surgery (13.5%). Recurrence was highly associated with poor evertor activity ($p< 0.01$).

Conclusions: Results at five years confirm that a semi-quantitative evertor muscle activity assessment can predict recurrence and should be implemented routinely in order to assist with tailoring patients' treatment strategies.

Disclosure: Nothing to disclose.

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PAEDIATRIC ORTHOPAEDIC TRAUMA PROVISION AT A DISTRICT GENERAL HOSPITAL

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Background: The BOTA/BONE Paediatric Orthopaedic Trauma Snapshot (POTS) was a national collaborative audit evaluating paediatric trauma care across 125 NHS hospitals. Initial conclusions from 770 cases collected over a period of seven days raised questions on whether there was a role for further centralisation of paediatric trauma services. In this study, we measured the performance of a medium-sized DGH over a 10 month period to determine whether this recommendation was justified.

Methods: All paediatric orthopaedic trauma requiring surgical intervention at a single-centre DGH from July 2016 to May 2017 was included in this study. Data analysed in each case included: waiting time for surgery, surgeon's grade, fracture classification and complications. The waiting time was measured via reproducible digital records to the nearest hour.

The surgeon's grade was the most senior surgeon present in theatre. Further comparative analysis against the original POTS findings were made on the following fracture categories: distal radius fractures (AO 23r), forearm fractures involving both radius and ulna (21/22/23) and supracondylar humerus fractures (13-M).

Results: One hundred and ninety-three cases were included in our study from a total of 201 identified (96% inclusion). The median wait for surgery was 19 hours (IQR 14 - 40), with 68% of operations performed within 24 hours of diagnosis. Overall 73% of cases were consultant-supervised, with our unit showing better consultant-led care in all POTS fracture subsets: distal radius 56% (vs POTS 20%), forearm radius/ulna 80% (26%) and supracondylar humerus 100% (48%). The majority of fractures were managed with closed reduction (61%). The complication rate was 4% (8/193).

Conclusions: Our study demonstrated that the waiting time for surgery at our institution was consistently short. The overall surgical care was satisfactory with better than national performance in consultant-led care and low rates of complications.

Implications: There was no evidence to recommend further centralisation of paediatric orthopaedic trauma services.

Disclosure: Nothing to disclose.

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DE-THREADED SCREW FIXATION OF SLIPPED CAPITAL FEMORAL EPIPHYSIS INCREASES GROWTH BUT DOES NOT IMPROVE REMODELLING: A LONG TERM PROSPECTIVE, CASE-CONTROLLED COHORT STUDY

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Background: The most common treatment for slipped capital femoral epiphysis worldwide is in-situ fixation with a standard screw. De-threaded screws aim to prevent slip progression without hindering residual growth of the proximal femur. Residual growth is important as it may promote remodelling of the deformity. We aimed to compare de-threaded screws with standard screws in the treatment of slipped capital femoral epiphysis for growth, remodelling and long-term outcomes.

Methods: Ethical approval was obtained for a prospective case-controlled cohort study. Six patients (nine hips) treated with de-threaded screws were compared with 16 patients (21 hips) treated with standard screws matched for age, skeletal maturity, gender and Southwick angle. Clinical records were reviewed for patient demographics, medical history and complications. Radiographs were reviewed for residual growth using seven variables and time to physeal closure. Growth velocity was calculated. Absence of CAM deformity signified complete remodelling. Clinical assessment was graded from excellent to poor and patient-reported outcomes were recorded.

Results: There was significantly more growth recorded in the de-threaded screw group in femoral neck length ($p = 0.003$), articular-lesser trochanter distance ($p = 0.028$), pin-joint ratio ($p = 0.006$) and pin-physis ratio ($p = 0.001$) after adjusting for covariates. The probability of a revision operation due to ongoing growth was also higher in this group (RR: 6.57, $p = 0.0008$). There was no difference in time to physeal closure, but growth velocity was significantly higher in the de-threaded group. The lower probability of CAM deformity in the de-threaded group was not significant. Functional and clinical results were not significantly different at 11.2 years follow-up.

Conclusions: De-threaded screws allow for significantly more growth than standard screws. However, no improvement in "remodelling" or long-term outcome was recorded in this group.

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Implications: Devices that allow ongoing growth are promoting resurging interest, but do not seem to correct the deformities they are designed to.

Disclosure: Nothing to disclose.

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COMBINED 2 CENTRE EXPERIENCE OVER 10 YEARS WITH SINGLE ENTRY TELESCOPIC RODDING FOR SEVERE OSTEOGENESIS IMPERFECTA

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Aims: The Fassier Duval (FD) rod is a third-generation telescopic implant for use in the growing skeleton. The thread-tip male rod enables single proximal entry. Since 2008 our 2 centres have been using FD rods for children with severe OI. Our hypothesis was that femoral and tibial implants have specific and characteristic modes of failure.

Methods: Twenty-six children with severe OI have undergone rodding of 61 lower limb long bones: 23 tibial, 38 femoral. Indications were recurrent fractures with progressive deformity. Age range and follow up are 3 - 13 and 1 - 10 years respectively. All the procedures were performed or supervised by a single surgeon in each centre.

Results: There were 38 complications: 21 femurs and 17 tibias. Twenty-five rods required revision surgery (16 femurs and nine tibias), revision rate was 40%. In the femur group, loss of proximal fixation predominated six cases with only three cases lost the distal fixation and one lost fixation both ends. There were three rod-rod interface fractures and four cases of coxa vara, one that developed after rodding and required correction and three were diagnosed before. There were three peri-prosthetic fractures that required rod removal and interval re-rodding. In the tibia group, almost all cases had lost their distal fixation, two had pulled out both proximally and distally that needed full revision. There were four rod-rod interface fractures, all requiring revisions. The 10-year survival rate was 59% for femoral rods and 62% for tibial rods.

Conclusions: The FD implants have generally functioned well and enabled us to avoid opening the ankle joint for tibial roddings. Femoral fixation in the greater trochanter remains problematic, particularly in younger children. In the tibia we have observed a common pattern of initial telescoping followed by distal thread pull-out in all cases followed beyond two years.

Disclosure: Nothing to disclose.

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SURGICAL TREATMENT OF PATHOLOGICAL DEVELOPMENTAL DYSPLASIA OF THE HIP (DDH): A 12 YEAR STUDY

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Aims: An assessment of the results of surgical intervention for pathological DDH.

Methods: A 12-year prospective longitudinal study of all new cases of pathological DDH treated surgically in the unit between 1st January 2004 and 31 December 2015. The Tönnis acetabular index was measured pre and post operatively. Pre-operatively the IHDI classification (international hip dysplasia institute) assessed the severity of the dysplasia/subluxation/dislocation. The avascular necrosis rate was measured by the Kalamachi /Mac Ewen method. There were strict inclusion and exclusion criteria and the analysis was retrospective.

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Results: Eighty-one hips in 72 patients, 12 male, 60 female. Thirty-six right hips, 45 left hips. The mean age at presentation was 11.8 months (95% CI, 9.12 to 14.48). Mean age at first operation was at 16.4 months (95% CI, 13.66 to 19.14). Forty-eight open reductions, 17 femoral osteotomies and 39 Pelvic osteotomies. Mean follow up was 47.6 months (95% CI, 41.8 to 53.4). Post-operatively 78/81 hips (96.3%) were graded with an acceptable Tönnis AI (< 2 SD of the mean). There were poor results in five hips with residual subluxation/ dislocation (6.2%). In 16 of the 81 hips (19.8%) there was evidence of AVN (14 K1, 1 K2 and 1 K3). Eighteen surgical cases were initially Ortolani or Barlow positive (17:1 female to male). Closed reduction failure rate was 7/31 (22.5%) and the open reduction re-dislocation rate was 6/48 (12.5%).

Discussion: Higher grades of hip pathology (IHDI) were associated with later age of diagnosis and are more likely to require: OR, PO and or FO. Early diagnosis or persistent Ortolani/Barlow positive cases may require complex surgery (OR, FO or PO). Fifty-eight percent of surgical cases were diagnosed at > 4 months, suggesting that DDH screening is not effective. Overall results comparable with the BSCOS standard.

Disclosure: Nothing to disclose.

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IS IT SAFE FOR RADIOGRAPHERS TO MEASURE MIGRATION PERCENTAGE IN CHILDREN WITH CEREBRAL PALSY?

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Background: The cerebral palsy integrated pathway (CPIP) programme relies on the measurement of Reimer's migration percentage to assess the risk of hip displacement for children with cerebral palsy. In order to facilitate the commissioning of the CPIP programme, we have piloted several innovations. This has included training our extended-role radiographers to calculate migration percentage. The aim of this study is to evaluate the reliability of the measurements by radiographers and to compare the results to the previous gold standard, a consultant orthopaedic surgeon in clinic.

Methods: A sample of 30 pelvic x-rays were selected from the local cerebral palsy database. A range of hip displacement was selected including some challenging borderline x-rays. All 10 reporting radiographers completed measurements using TraumaCAD which were repeated at a minimum of four weeks.

Results: The inter-rater reliability between radiographers was excellent with an intra-class correlation coefficient (ICC) of 0.940 (95% CI 0.916 - 0.960).The intra-rater reliability for radiographers was excellent with an ICC of 0.964 (95% CI 0.955 - 0.971). The overall accuracy is for radiographers compared to orthopaedic surgeon is excellent with an ICC of 0.951 (95% CI 0.937 - 0.964). The accuracy of the subsequent grouping is moderate with a Fleiss kappa of 0.768. This was mainly due to two cases that were both borderline.

Conclusions: It is safe for radiographers to calculate the migration percentage using semi-automated software for the surveillance of children with cerebral palsy. The reliability of radiographers has been demonstrated in previous studies including adult and paediatric trauma, but not in calculation of migration percentage for a CPIP programme. The use of radiographers has additional advantages. Radiographers have observed they are working harder to get the “perfect” x-ray so interpretation is easier. The admin time for a relatively expensive orthopaedic surgeon is reduced, further improving the efficiency of the local CPIP programme.

Disclosure: Nothing to disclose.

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PAEDIATRIC UPPER LIMB FRACTURE MANIPULATION IN THE CHILDREN'S EMERGENCY DEPARTMENT UNDER 70% NITROUS SEDATION: A SUCCESSFUL TREATMENT THAT PROVIDES COST SAVINGS

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Background: BSUH Children's emergency department (CED) guidelines were implemented in December 2016; allowing reduction of forearm and distal radius fractures in CED using 70% nitrous sedation. We wanted to assess the success rate of this treatment and analyse any cost savings. Trauma theatre time is a valuable resource and in previous studies has been calculated to cost £24.77/minute.

Methods: We analysed all wrist and forearm fractures presenting to CED from February to June 2017 and from February to June 2018. Fractures were identified using Bluespier databases and PACS. Demographics, treatment modality and timings were reviewed.

Results: One hundred and thirteen patients were identified with 115 fractures. Fifty-six percent were distal radius, 44% forearm fractures, 61% male, 39% female. Mean age 8.6yrs. Sixty-four (57%) patients were suitable for MUA under nitrous. Of those 36 (56%) were manipulated with nitrous in CED. Five (14%) of these patients required subsequent further treatment under general anaesthesia in the trauma theatre.

By performing manipulation in CED 31 procedures under general anaesthetic were avoided. With an average MUA taking 30 minutes this confers a cost saving of £743 per case. Therefore over our study period total savings amounted to £23,033.

Conclusions: Paediatric upper limb fracture manipulation in CED under 70% nitrous sedation is a successful treatment with low failure rates. This treatment also provides significant cost savings.

Disclosure: Nothing to disclose.

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THE PONSETI METHOD - WHO ARE WE FAILING?

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Background: The Ponseti method is the gold standard of treatment for congenital talipes equinovarus (CTEV) clubfoot, comprising serial casting +/- Achilles tenotomy to correct deformity, followed by regular wear of foot abduction orthosis (FAO) until the fifth year of life. Recurrence of deformity is acknowledged in up to 50% of patients, and is associated with poor FAO treatment compliance. We aimed to assess compliance and recurrence rates, and describe factors associated with these.

Methods: Patients treated at the Royal Manchester Children's Hospital for idiopathic CTEV were identified via a prospectively collected database. Pirani score at presentation, compliance with treatment, recurrence with need for tibialis anterior tendon transfer (TATT), reasons for non-compliance, and socioeconomic deprivation indices were analysed.

Results: A total of 215 patients (317 clubfeet) were treated over seven years (2004-2010). Patients with a mild clubfoot (Pirani score <4, n = 57) who were compliant with treatment had a TATT rate of 13%, compared to 41% in non-compliant patients. Patients with a severe clubfoot (Pirani score ≥4, n = 158) who were compliant with treatment had a TATT rate of 18%, compared to 68% in non-compliant patients. Poor compliance was associated with socioeconomic deprivation. Common reasons for poor compliance were child's refusal to wear FAO, and shared parental custody with differing views on the need for treatment.

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Conclusions: A small proportion of patients presenting with idiopathic CTEV will require TATT despite full compliance with FAO treatment, regardless of severity at presentation. Good FAO compliance can reduce the risk of recurrence in severe clubfoot to near that of mild clubfoot. Non-compliance with FAO treatment is associated with a significantly increased risk of recurrence. Identifying children at risk of poor compliance, and providing additional support to mitigate socioeconomic and family dynamic factors, is essential in improving treatment compliance and reducing risk of recurrence.

Disclosure: Nothing to disclose.

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MIDTERM OUTCOME OF REVERSE V OSTEOTOMY IN THE TREATMENT OF CUBITUS VARUS IN CHILDREN AND ADOLESCENT

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Aims: The aim of the study is to report the outcome of correction osteotomy for cubitus varus in children and adolescent.

Methods: Twenty-three patients with cubitus varus deformity underwent correction reverse V osteotomy as described by Yun et al through posterior triceps splitting approach. All osteotomies were stabilised using 2 crossed K-Wires. The average time since injury was 4.7 years and the mean age at operation is 11.9 (5 -15). The mean follow-up time was 5 years (5 -12 years). The outcomes were evaluated using the humeral-elbow-wrist (HEW) angles, lateral condyle prominence index (LPI) and Oppenheim's criteria.

Results: The mean Hew angles improved from -20 degrees (range: -15 to -28) pre-operatively to six degrees (range: 5 to 7) post-operatively (mean difference: 27 degrees; $p < 0.01$). The mean post-operative LPI was -0.80 (- 0.95% to + 6.58%). There was no early or late complication. There is no significant difference in the pre and post-op range of motion (mean: 0-130). Fourteen patients were graded as excellent and nine were good on the Oppenheim's criteria.

Conclusions: Correction of elbow cubitus varus with reverse V osteotomy and two cross K-wires is a mechanically stable and reproducible technique. Significant correction with optimal residual lateral condylar prominence can be achieved.

Disclosure: Nothing to disclose.

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THE SLIDING SCFE SCREW - IS IT SAFE AND DOES IT SLIDE?

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Purpose: The aim of this study was to assess whether the Free-Gliding (FG) Slipped Capital Femoral Epiphysis (SCFE) Screw prevents further slip and whether, in practice, it allows dynamisation and femoral growth.

Methods: All cases of FG SCFE screws used at Southampton Children's Hospital since its introduction in 2015 were reviewed as part of ongoing audit. All radiographs were assessed for grade of slip and distance of barrel dynamisation.

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Results: FG SCFE screws were used on 20 hips in 14 patients. Mean age was 11.05 years (range nine -14) with mean follow up of 1.5 years (range nine - 32 months). No hip showed worsening slip. Dynamisation occurred in 15 of 20 hips (75%) with a mean screw slide distance of 4.48mm (range 0 to 13.6). More dynamisation was observed in younger patients, with the screws in the nine to 11 age group sliding by more than in patients aged 12 - 14 years (mean dynamisation respectively 6.19 vs 1.63mm).

Conclusions: This study (the first of its kind in the United Kingdom), demonstrates the FG SCFE screw is effective in the primary goal of pinning in situ - preventing further slip. Dynamisation has been demonstrated, particularly in younger patients. Further analysis of femoral neck remodelling and PROMS attained from the BOSS Study will be used to understand the full clinical effectiveness.

Disclosure: Nothing to disclose.