

ABSTRACTS OF SOCIETIES

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Proximal Femoral Geometry and Hip Fractures in South Australia and North Lanarkshire: A Multi-centre Comparative Radiological Study

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Background: The geometry of the proximal femur has been identified as one of the risk factors for hip fracture. Research has also suggested that depending on the geometry of the proximal femur the fracture type may also be different. **Aims:** To identify if proximal geometry and hip fractures are related in two populations, Scotland (Monklands General Hospital) and Australia (Flinders Medical Centre). **Methods:** We retrospectively compared the length and width of the femoral necks in 200 hip fractures, 100 patients in the Australian group and 100 patients in the Scottish group. 50 intracapsular and 50 intertrochanteric fractures were included in each group. All measurements were made from standardised anteroposterior radiographs. We attempted to correlate the length and width of the femoral neck with the fracture type. **Results:** The results for the both populations show that a patient suffering from an intracapsular fracture is significantly more likely to have a longer femoral neck than one suffering an intertrochanteric fracture ($P < 0.0001$). The femoral neck was also narrower in the intracapsular group, this was significant in Scottish population ($P < 0.03$), but not in the Australian population ($P = 0.067$). The populations were matched for age and sex, with the majority of fractures sustained by women. We also found that men had longer, wider femoral necks ($P < 0.0001$) compared to the female group. **Discussion:** Overall, we found that different types of hip fracture were significantly linked to femoral geometry. As femoral neck lengths are increasing, the number of intracapsular fractures sustained should also increase over the coming years. This will have implications on the management of future patients and NHS resources.

Paget's Sarcoma in Scotland

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Background: Malignant change in established Paget's disease is uncommon. The object of this study was to evaluate the clinico-pathological features and outcome of patient's with Paget's sarcoma in Scotland. **Methods:** A retrospective review was performed using data collected by the Scottish Bone Tumour Registry on patients diagnosed with Paget's sarcoma between 1960 and 2006. Information about tumour location, age of diagnosis, gender, lung metastasis, and survival was analysed. Histological slides were reviewed again and the diagnosis of Paget's sarcoma confirmed. The overall survival was calculated using Kaplan-Meier survival curves. Regression analysis was used to show the trend in incidence.

Results: 78 patients had malignant change in pre-existing Paget's disease. 60 had osteosarcoma and 18 had malignant fibrous histiocytoma. The average age of diagnosis of Paget's osteosarcoma was 67.8 years with a male to female ratio of 2:1. 27% of cases were within the pelvis. Median survival was 6 months. 30% had lung metastasis at presentation. Since 1960 there has been a clear and steady decrease in the number of Paget's sarcoma seen at the Scottish Bone Tumour Registry. **Conclusion:** We present the clinico-pathological features and outcome of patients with Paget's sarcoma in Scotland between 1960 and 2006. Pelvic disease and metastasis at presentation reflected the poor outcome in this group of patients. The reason for the apparent decrease in Paget's sarcoma in Scotland over the past 46 years is unclear. However, it may well be a reflection of the decrease in incidence and severity of Paget's disease seen elsewhere in the world.

Posterolateral Spinal Fusion Using Apapore – A Radiographic Assessment

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Background: Posterolateral spinal fusion is a commonly performed procedure for degenerative conditions of the back. Despite advances in surgical technique and methods, pseudoarthrosis remains a significant problem. Though autogenous iliac crest bone graft is considered the gold standard in such procedures, it is associated with high donor site morbidity. This has led to the increasing use of bone graft substitutes. **Aim:** The purpose of this study is to assess the use of a phase pure synthetic hydroxyapatite mixed with bone marrow aspirate in postero-lateral spinal fusion. **Methods:** 60 consecutive patients who underwent bilateral posterolateral spinal fusion between October 2002 and February 2006 were selected for the study. The sides were randomised to Synthetic Phase pure Hydroxyapatite (Apapore) mixed with bone marrow alone on one side and Apapore with bone marrow (50%) and autologous bone (50%) on the other. Apapore with 70% macro-porosity (Apapore 70) was used in the first 30 patients and Apapore with 80% macro-porosity (Apapore 80) in the next 30. Plain antero-posterior and lateral x-rays were done in the immediate post-operative period and at three, six, 12 and 24 months. Two independent observers assessed the Antero-posterior films using a new classification system. Spine was considered fused when either or both sides showed good evidence of bone formation between the graft particles and graft and transverse process. **Results: Apapore 70:** Of the 30 patients only 28 completed two year follow up. In addition two patients' x-rays were lost. Twenty three of the remaining 26 patients (88.46%) showed evidence of fusion as documented by both the observers. Good evidence of bone formation was noted as early as six months on the side where Apapore was used with bone marrow with 88.46% (23 of 26) achieving fusion at two years as against 44.00% (11 of 25) on the opposite side. The inter-observer agreement was good (mean 85.0%) with kappa score of 0.748. **Apapore 80:** Eighteen of the 30 patients have now completed two year follow up. X-rays were not available for one of them. Evidence of fusion on either or both sides was noted in 13 of the 17 patients (76.47%) at two year follow up. There was no significant difference between the two sides. Fusion was noted as early as three months with evidence of consolidation in two cases. **Conclusions:** Synthetic phase pure hydroxyapatite allows for rapid bone incorporation and has a high radiological fusion rate even when used mixed with

bone marrow alone. Apapore 80 appears to allow more rapid incorporation and earlier consolidation compared to Apapore 70. Full two year follow up of Apapore 80 patients will in future allow for more accurate comparisons.

Visual Estimation of Joint Angles at the Elbow

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Background: Joint angle measurement is helpful in evaluating patients with joint pathologies as well as assessing their response to treatment. In a busy clinical environment, these measurements are commonly performed by visual estimation. We aimed to determine the accuracy of visually estimating joint angles of a large joint (the elbow). In addition to accuracy of joint angle measurement, we also aimed to assess whether experience improved visual estimates and whether a difference in limb circumference influenced the accuracy of estimation.

Method: 116 subjects - 28 Consultants, 29 Registrars, 12 Experienced Senior House Officers (SHO3s), 24 Senior House Officers (SHO1s) and 23 physiotherapists were shown a series of 21 digital images of two arms (one fat arm, one thin arm) in varying predefined degrees of elbow flexion. The subjects were asked individually on two separate occasions (interval between 1-5 weeks) to estimate the angle of flexion of the elbow to the nearest 5°. These estimations were compared with goniometer measurements for each image. **Results: 1)** From 116 subjects assessed, no individual was able to estimate all angles to within 5°. In addition, only 68% of all angles were estimated accurately (to the nearest 5°). **2)** Consultants and registrars were significantly better at estimating joint angles compared to SHO1s and physiotherapists ($p < 0.001$). They were also more accurate than SHO3s, however, this did not reach statistical significance ($p = 0.071$). **3)** When measuring angles to the nearest 10°, visual estimation of joint angles was more accurately performed on a thin arm compared to a fat arm ($p = 0.007$). **Conclusion:** This study highlights the inaccuracies of visual estimation of joint angles. With increasing clinical experience, accuracy of joint angle estimation improves, however, goniometer measurement remains the gold standard. We would recommend that when joint angle measurement is used for evaluating patient progress, repeated measurements should be performed by senior orthopaedic surgeons, but preferably with the use of a goniometer. In addition, junior orthopaedic staff would benefit from regular use of a goniometer to determine joint angles more accurately.

24 Hour Infusion Femoral and Sciatic Nerve Block following Total Knee Arthroplasty (TKA)

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Background: Total knee arthroplasty can produce severe post-operative pain. Adequate pain control enables early mobilisation and physiotherapy. Single-shot and 72 hour continuous infusion nerve blocks have been described as being effective in controlling post-operative pain in these patients. The concerns being a short duration of action in single-shot and prolonged motor block in continuous infusion blocks, which can prevent early mobilisation. Our aim was to prospectively compare pain scores and early functional outcome in TKA patients treated with

and without 24 hour infusion femoral and sciatic nerve blocks.

Methods: 60 patients undergoing primary total knee arthroplasty were divided into two groups. Group A (30 patients) received femoral and sciatic nerve blocks which comprised 20mls of 0.25% Bupivacaine bolus injection followed by a 24 hour infusion of 0.1% Bupivacaine at 5mls per hour. Group B (30 patients) received post-operative patient controlled opiate analgesia. Both groups had the same post-operative mobilization and physiotherapy regime. Outcome measures were pain scores (Visual analogue scale - 0 to 10), Range of Movement and Oxford Knee Scores. Pain scores were measured twice daily from the evening of surgery until discharge. Range of movement was measured once daily from the first post-operative day until discharge and again at three months. Oxford knee scores were measured pre-operatively and at three months. Duration of admission and opiate usage were also compared. **Results:** All patients were mobilised on the first post-operative day. Mean pain scores were significantly lower in Group A on the evening of surgery until the third post-operative day (p : OP < 0.0001, D1 < 0.0001, D2 = 0.002, D3 = 0.006). Range of movement was significantly better in Group A on the first, second and fifth post-operative days and at three months (p : D1 = 0.002, D2 = 0.009, D5 = 0.04, 3M = 0.01). Group A used less opiates during their admission. There was no difference in Oxford knee scores at three months or duration of admission. There were no infective or thrombo-embolic complications in either group. **Conclusion:** 24 hour continuous infusion combined femoral and sciatic nerve blocks provide safe, more effective post-operative analgesia and, in this study, improvement in early range of motion when compared with patient controlled analgesia. This study supports the use of this method in this group of patients.

Tibial Internal Rotation is a Major Cause of Pain After Total Knee Replacement (TKR)

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Aim: The aim of this study was to determine if rotational malalignment was associated with pain after total knee replacement and the incidence of rotational alignment errors in a cohort of TKRs with unexplained pain. **Methods:** Rotational alignments of the femoral and tibial components of 39 fixed bearing knee replacements with unexplained knee pain were measured using CT scanning. These values were compared to those of a control group of 26 painless knee replacements. **Results:** Tibial component rotation was highly variable particularly in the *painful* group. In contrast rotational alignments of the femoral components were much less variable. The tibial components in the *painful* group were on average implanted in 4.1° of internal rotation in the *painful* group compared to 2.2° of external rotation in the *painless* group ($p = 0.024$). 15 tibial components (40%) in the *painful* group were more than 10° internally rotated compared to none in the *painless* group ($p < 0.001$). Additionally internal rotational mismatch of the tibia compared to the femur of more than 11° was seen in 14 (35.9%) of the *painful* TKRs compared to none in the *painless* group ($p < 0.001$). External rotational mismatch of the tibial component was seen in eight TKRs (20.5%) in the *painful* group and in six TKRs (23.1%) in the *painless* control group. **Conclusions:** Tibial component internal rotation is a major cause of pain after TKR with an incidence of 40% tibial internal rotation of over 10° in our study group. Internal rotational mismatch of the tibial component of more than 11° also appears to be associated with

pain after TKR. In contrast tibial component external rotation and femoral component malrotation did not appear to be associated with pain after TKR.

Non Weight Bearing X-Rays Of The Knee For Osteoarthritis. A Waste Of Time And Money

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Background: Patients with osteoarthritis of the knee reviewed by the general practitioners (GPs), are usually referred for further management to the orthopaedic surgeon. It was our observation that patients were usually referred with supine knee X-rays. This meant weight-bearing films were repeated at the clinic. **Methods:** We sent out questionnaires to GPs inquiring whether they asked for X-rays of the knee prior to patient referral and whether they asked for weight bearing films. We also reviewed the policy in one NHS trust and one teaching hospital with regard to GPs asking for weight bearing films. The time patients spent waiting at the X-rays department was noted. Finally we inquired about the cost of a knee X-ray. **Results:** A total number of 65 questionnaires were sent and the response was 44 i.e. 67%. 80% of the GPs asked for non weight bearing X-rays prior to referral. Only 5% asked for weight bearing films. The radiology departments of hospitals in one NHS trust and the teaching hospital did not accept weight bearing requests from GPs. The time taken for a patient to get an X ray in the department was at least 30 minutes and the cost of X rays of the knee was £51. With an average of two patients with osteoarthritis of the knee per clinic, the cumulative waiting time for repeated X-rays was 1 hr per clinic, 5 hrs per week and 240 hrs per year. With an average of two X rays per clinic the cumulative cost was £102 per clinic, £510 per week and £24480 per year. **Discussion:** Non weight bearing X-rays of the knee do not add any value in making or confirming a diagnosis of osteoarthritis yet they are costly both in terms of time and money. Weight bearing films were repeated for patients with these X-rays. The cumulative cost in terms of time can be better used to review other patients and therefore reduce the waiting time before surgeons can see referrals. The other issue is the cumulative cost which can be put to better use in the trust. The time wasted by the patients who have repeated X-rays was not considered, but is also of importance. **Conclusion:** Patients with osteoarthritis of the knee should have weight bearing films from the initial onset. This will save time for the patient and the surgeon and will save the hospital money.

Haemorrhage in the Sheath of Extensor Pollicis Longus Tendon after Distal Radius Fracture: Implications for Pathogenesis of Tendon Rupture?

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Incidence of rupture of the Extensor Pollicis Longus (EPL) tendon following distal radius fracture has been reported as between 0.07-3%. Several theories have been postulated for the pathogenesis including attrition of the tendon, direct injury and ischaemic events. It has been documented that this complication often arises in undisplaced or minimally displaced fractures. Dorsal exposure of the distal radius has been made in 44 patients with fracture of the distal radius. 38 fractures were plated and six had non-bridging external fixators. It has been

observed that in the majority of cases haematoma was present in the third dorsal tendon compartment but not in the second or fourth compartments. This appeared to be due to the thinner periosteal floor of the third compartment which allows extension of the fracture line into it. A cadaveric study was therefore carried out to determine the thickness of the periosteum of the floors of the second, third and fourth dorsal compartments. This demonstrated that the third dorsal compartment containing EPL has the thinnest floor. We suggest that the presence of haematoma and related pressure effects may explain why rupture of the EPL but not other extensor tendons occurs after fracture of the distal radius.

A Comparison of Mechanical Jig and Computer Navigated Total Hip Resurfacing

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Background: With the advent of the advancement of manufacturing technologies hip resurfacing (HR) has become a serious option for a younger patient with osteoarthritis of the hip. The operation is technically demanding and correct placement of the femoral component is the critical step. We hypothesised that with computer navigation we can improve the placement of the femoral component and restore the biomechanics of the hip joint compared to currently available mechanical jigs. **Methods:** We compared the radiological results and operation time in eight patients undergoing computer navigated hip resurfacings (cnHR) to 30 patients undergoing mechanical jig hip resurfacings (jigHR). **Results:** Our results showed the average angle of the central pin in the femoral neck in the jigHR group was 141 degrees on the AP radiographs (range 131 to 154 degrees) and six degrees anteversion (range zero to eight degrees) on the lateral radiographs compared with 135 degrees (range 134 to 138 degrees) and five degrees (range three to eight degrees) in the cnHR group. The position of the central pin in the neck immediately below the head was off-centre in the jigHR group on average by 4mm in both AP and lateral radiographs and never more than 2mm in the cnHR group in either view. Offset was increased on average 5mm in the jigHR group and decreased on average by 3mm in the cnHR group. The average operation time was 107 minutes in the jigHR group and 110 minutes in the cnHR group. **Conclusions:** We conclude that despite our relatively small sample group we have showed computer navigation gives consistent optimum positioning of the femoral component and improves the biomechanics of the hip. This was without increasing operating time.

Is Weekend Physiotherapy Cost Effective in Elective Orthopaedics?

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Background: Patients, following joint replacement, require a multidisciplinary team input to maximise their rehabilitation and speed recovery resulting in a timely discharge back to the community. Invaluable to this is post-operative physiotherapy. Currently a physiotherapy service is provided to our patients during the five-day working week only. Consequently patients operated on at the end of the working week do not have the full benefit of our physiotherapy service with an inevitable two-day gap over the weekend. We believe that weekend physiotherapy is

cost effective by accelerating both patient rehabilitation and as a consequence facilitating an earlier hospital discharge. **Aim:** To prove that basic weekend physiotherapy reduces both in-patient time and hospital costs. **Methods:** We prospectively collected data from our units' total hip (THR= 478) & total knee (TKR=322) replacements over a 14-month period. During this period a pilot study of four months was run (September - December 2006/15 weekends) where basic physiotherapy, for a three-hour session per day, was provided by a technical instructor (physiotherapy assistant) over the weekend. Within that four-month pilot period 77 THR (16.10%) & 61 TKR (18.94%) received weekend physiotherapy input. The day of operation was noted and data regarding patient progression from bed to sticks to discharge were collected for our hip replacements (THRs) along with straight leg raise (SLR), 90° bend, to sticks, to discharge for our total knee replacements (TKRs). **Results:** We compared same day of the week (& same consultant team) both with and without the weekend input of the pilot programme. Both TKRs and THRs showed improvement with earlier discharges and physiotherapy outcomes. Patient length of stay was reduced with THRs between 0.62-1.1 days, with TKRs showing a reduction of 0.27- 0.7 over an episode of care. Physiotherapy milestones were achieved earlier with SLR at 0.17-0.6 days and 90° flexion achieved & maintained between 0.52- 2.1 days. Independent mobility (progression to sticks) was achieved earlier (THRs 0.1- 1.13 / TKRs 0.3- 1.1 days), reducing the amount of nursing care required during their stay. **Discussion:** Cost of physiotherapy per session (half day) as overtime is £100 this equates to £10,400 per annum required for physiotherapy cover over the weekend. An extra day in hospital costs £400, extrapolating from our results (£114,320 over 10 months) this would equate to £137,184 per annum. **Conclusion:** It is our view that physiotherapy continuing over the weekend, improved the overall standard of care in our post-arthroplasty patients, thus enabling a speedier recovery and earlier discharge, which may also lead to more beds free for both trauma and elective admissions.

Anterior Knee Pain and the Role of Patellar Denervation in Total Knee Arthroplasty: a Histopathological Study

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Background: The role of patellar resurfacing during total knee arthroplasty is controversial. The aim of this study was to analyse the results in our series of uncemented total knee replacements without resurfacing of the patella and to demonstrate the histopathological basis to the patellar denervation procedure performed at total knee arthroplasty. **Methods:** One hundred and twenty nine patients underwent uncemented total knee arthroplasty between 1997 and 2005. In all patients patella was not resurfaced at the time of index procedure. Particular attention was paid to remove all osteophytes around the patella, debriding the patella and performing a peripatellar synovectomy and circumpatellar cautery denervation. In 11 cases the circumpatellar synovium was used for histopathological examination. For the purpose of analysis, the tissue was marked with sutures to identify the superior pole and the mid lateral point of the patella. The tissue was divided into four zones namely superolateral, superomedial, inferolateral and inferomedial quadrants for the purpose of measuring the density of nerve endings. The tissue was fixed in neutral buffered formalin. Four blocks were selected

from each resection specimen, one from each quadrant. The blocks were processed using conventional techniques and sections were cut for immunohistochemistry. Immunohistochemistry was performed on all of the sections using antisera specific for S100 protein (Dako) and an automated Dako Immunostainer, using standard techniques. Each section was examined with an Olympus BX40 microscope. Neural tissue was identified by a combination of its morphology and reactivity with S100. This was quantified by counting the number of nerve fibres and expressing the result as nerve fibres per 10 high-power fields. At least 20 fields were examined for each section. **Results:** The average nerve ending per 10 high power fields was 13 in the superolateral and superomedial quadrants, seven in inferomedial and 12 in inferolateral quadrant. Out of the 129 knees which underwent this procedure, two knees (1.5%) had to undergo patellar resurfacing for anterior knee pain after the index procedure. **Conclusion:** In conclusion, the incidence of anterior knee pain necessitating secondary patellar resurfacing was low in our series. There is relatively higher concentration of nerve endings in the peripatellar synovium superomedial and superolateral quadrants. We believe that peripatellar synovial excision coupled with circumpatellar cautery denervation does help in reducing the incidence of anterior knee pain although only a prospective randomised controlled trial can establish this fact conclusively.

The Lapidus Procedure for the Management of Hallux Valgus: a Double Edged Weapon?

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Background: The Lapidus procedure is a fusion operation of the 1st tarso-metatarsal joint for the treatment of moderate to severe hallux valgus in association with first ray hypermobility. Although this procedure has been shown to produce excellent correction of the deformity, it is also reported to be associated with complications such as prolonged healing and non-union. **Methods:** In this retrospective study, we report our experience with this procedure, performed at Glasgow Royal Infirmary during the period November 2001 to October 2006. The aim of the study was to determine the effectiveness of this procedure in correcting the hallux valgus deformity and record the incidence of complications. **Results:** 24 Lapidus procedures were performed on 21 patients, all of whom were female; three patients underwent bilateral procedures. The average age was 50.9 years. Six patients (29%) were smokers and one patient had diabetes. Seven feet (29%) had been operated on previously for hallux valgus. 12 patients (57.14%) were happy with the outcome. Seven patients (33.33%) expressed dissatisfaction. X-Ray measurements showed that the Hallux valgus angle had improved from a pre-operative mean value of 44.3° to 15° post-operatively with an average reduction of 29.4°. The inter-metatarsal angle between 1st and 2nd metatarsals had improved from 13.4° to 8.1° with an average reduction of 5.2°. 75% of the patients had some form of complication. There were a total of seven (29%) non-unions, of which three were smokers (50% of smokers). **Conclusion:** This study demonstrates that although excellent anatomical correction of the hallux valgus deformity can be achieved with the Lapidus procedure, 75% of the patients had some form of complications and only half of them were satisfied with the results. We believe that the role of this operation in Hallux valgus corrective surgery requires further evaluation.