### BOA 2006 Glasgow

#### Abstracts submitted

<table>
<thead>
<tr>
<th>Topic</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip Surgery</td>
<td>12</td>
</tr>
<tr>
<td>Knee surgery</td>
<td>2</td>
</tr>
<tr>
<td>Trauma</td>
<td>9</td>
</tr>
<tr>
<td>Foot &amp; Ankle Surgery</td>
<td>0</td>
</tr>
<tr>
<td>Elbow and Shoulder Surgery</td>
<td>3</td>
</tr>
<tr>
<td>Children’s Orthopaedics</td>
<td>3</td>
</tr>
<tr>
<td>Spinal Surgery</td>
<td>1</td>
</tr>
<tr>
<td>Hand Surgery</td>
<td>1</td>
</tr>
<tr>
<td>Limb Reconstruction</td>
<td>2</td>
</tr>
<tr>
<td>Sports Trauma</td>
<td>3</td>
</tr>
<tr>
<td>Tumours</td>
<td>0</td>
</tr>
<tr>
<td>Research</td>
<td>7</td>
</tr>
<tr>
<td>Audit &amp; Management</td>
<td>2</td>
</tr>
<tr>
<td>General Orthopaedics</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>47</strong></td>
</tr>
</tbody>
</table>

**Notes:**

1. Only the ‘working’ author is currently shown for each abstract, we shall add the full authors to those that are accepted.
2. These 47 abstracts were edited and submitted through our academic office in CSRI, have been acknowledged, and correspondence will come back to that office: We’ll let authors know as soon as we hear news.
3. To our knowledge, three more abstracts were submitted separately (attached), one by Richard Cherry and two by Ram Vallamshetla that were based on work done in Birmingham.
Arthroscopic surgical technique and early results
D Griffin [Warwick Orthopaedics]

Background: Cam-type femoro-acetabular impingement (FAI) is increasingly recognised as a cause of mechanical hip symptoms in young adults. It is likely that it is a cause of early hip degeneration. Ganz et al have developed a therapeutic procedure involving trochanteric flip osteotomy and dislocation of the hip, and have reported good results. We have developed an arthroscopic osteochondroplasty to reshape the proximal femur and relieve impingement.

Methods: Fifty patients who presented with mechanical hip symptoms and had demonstrable cam-type FAI on radially-reconstructed MR arthrography, were treated by arthroscopic osteochondroplasty. Ten patients had a postoperative CT; from these images flexion and internal rotation range was tested in a virtual reality (VR) model to determine adequacy of resection. All patients were followed up for a minimum of one year, and post-operative Non-Arthritic Hip Scores (NAHS, maximum possible score 100) compared with pre-operative NAHS.

Results: Mean operating time was 110 minutes. 31 patients were discharged on the day of surgery, the remainder on the following day. There were no complications. All patients were asked to be partially weight-bearing with crutches for four weeks but most returned to work within two weeks. The VR models showed satisfactory resection, although there was clear evidence of improved precision with practice. Symptoms improved in all but two patients, with mean NAHS improving from 54 preoperatively to 87 at one year. The two patients who did not improve, were both found to have unexpectedly extensive acetabular articular cartilage damage.

Conclusion: Arthroscopic femoral reshaping to relieve FAI is feasible, safe and reliable. However it is technically difficult and time-consuming. The results are comparable to open dislocation and debridement, but the arthroscopic procedure avoids the prolonged disability and the complications associated with trochanteric flip osteotomy.

The management of periprosthetic femoral fractures using Cannulok revision femoral prosthesis
S Karthikeyan [Warwick Orthopaedics]

Background: Periprosthetic femoral fractures associated with a loose femoral component and severely deficient or comminuted bone results in highly demanding revision surgery. We present a series of such patients who were treated with the Cannulok Revision Prosthesis (Orthodynamics, Christchurch, Dorset). This is a cannulated, modular titanium revision prosthesis with distal locking comparable to an intramedullary nail. It is available in both HA coated and cemented options.

Method: Eleven patients with a loose femoral component and severe osteolysis of the proximal femur (Vancouver classification B3) were treated with a Cannulok revision. All of the patients had undergone a minimum of two previous hip operations. All the patients were treated with a HA coated stem. Five patients also had their cup revised. They were mobilised partial weight bearing until radiological signs of callus formation.

Results: The minimum follow up time is 36 months, mean 51 months. One patient died of unrelated causes. All of the remaining ten patients went on to bony union; seven patients had good outcome at last follow-up with minimal or no pain. However, three patients needed a further revision because of distal locking screwbreakage and pain. Since the fracture had united in all of these patients a standard cemented revision was possible in each case.

Conclusions: The Cannulok revision femoral prosthesis gives distal fixation allowing early weight-bearing. The modular design of the implant facilitates reconstruction in the face of extensive proximal bone loss. In our experience it is useful system for type B3 fractures, although subsidence of the implant is a problem in few patients.
this group of patients. However, there is still considerable debate about what is pathological and what is a normal variant.

Method and results: We report five patients in our last 200 hip arthroscopies (2.5%) in whom we incidentally found a small crater-like lesion in the acetabular articular cartilage (see illustrations). The lesions were circular, approximately 3mm in diameter, and had a well defined, heaped up circumferential margin. All were located about a third of the way along a line between the anterior and superior thirds of the acetabular articular cartilage, closer to the cotyloid fossa than the acetabular rim. Each contained a soft round lump of yellowish material. There were no signs of inflammation. All the lesions were biopsied and sent for histopathological examination. The lump was indistinguishable from normal hyaline articular cartilage.

Conclusion: This "lesion" appears to lie on a perceptible line previously described as the stellate crease (Villar et al). We believe that it is a normal variant, probably acquired during development of the acetabulum. Hip arthroscopists should be aware that it is not pathological. Further studies are needed to determine the true prevalence of this variant, and whether it is entirely benign or associated with other pathology.

Abstract: 1265
Abstract category: Hip Surgery
Paper 5 minutes
Also willing to present as a poster

Femoral blood flow during hip resurfacing: a comparison of two approaches using laser doppler flow measurement
Y Kwong [Warwick Orthopaedics]

Introduction: Two major complications of hip resurfacing arthroplasty are avascular necrosis of the femoral head and femoral neck fracture. Both are thought to be precipitated by disruption of the blood supply to the femoral head and neck during the approach to the hip joint. Ganz et al have described their technique of approaching the hip joint using a "trochanteric flip" ostectomy. This has the theoretical advantage of preserving the medial femoral circumflex artery to the femoral head. The aim of this study was to compare the intra-operative femoral head blood flow during the Ganz flip ostectomy to the blood flow during a posterior approach for resurfacing arthroplasty of the hip.

Methods: The intra-operative measurements of blood flow were performed using a DRT laser Doppler flowmeter with a 20 mW laser and a fibreoptic probe. The probe was introduced into the lateral femoral cortex and threaded into the femoral head under image intensifier control. Measurements were recorded before the approach to the hip was performed, after the approach was performed but before the head was dislocated, and after the head was dislocated.

Results: Our initial results indicate that there is on average a 50% drop in the blood flow to the femoral head after a posterior approach to the hip joint. In contrast, the trochanteric flip ostectomy produces a much smaller fall of around 18%. We have used these results to inform a sample size calculation, and are currently recruiting further patients to achieve a total of 42 in order to confirm a statistically significant effect.

Conclusion: The Ganz trochanteric flip ostectomy appears to produce less damage to the blood supply to the femoral head during resurfacing arthroplasty than the posterior approach. This study will inform surgeons in deciding on their preference for a routine approach for hip resurfacing.

Abstract: 1269
Abstract category: Hip Surgery
Paper 5 minutes
Not willing to present as a poster

The outcome of revision surgery for failed hip resurfacing
S Krikler [Warwick Orthopaedics]

Background: Hip resurfacing is being performed in increasing numbers and by more surgeons. As this operation tends to be used in younger, more active individuals, we anticipate a growing number of patients requiring re-operation. One theoretical advantage of hip resurfacing is the preservation of bone, but does hip resurfacing lead to an easier revision operation if failure occurs?

Methods: We have reviewed both the mode of failure and the clinical outcome of revision surgery for failed hip resurfacing in 22 patients. The reasons for failure include 9 acetabular loosenings, 5 neck fractures, 3 head collapses, 2 cup malpositions, 2 head loosensings and 1 deep infection. Where the cup failed, a new cup was inserted and the resurfacing head was usually retained. When the femur failed, the cup was retained and a stemmed large head femur inserted. We compared the duration of the operation to a matched series of revision total hip replacements.

Results: None of the failed hip resurfacing required complex reconstructive procedures, all being managed with standard implants. The mean duration of the resurfacing revision operations was 1 hour and 24mins (90-160). This was significantly shorter than the mean duration for revision of primary total hip replacements; 3 hours and 12mins (90-310). Only one patient in the failed resurfacing group required repeat surgery for aseptic loosening of a cemented stem.

Conclusion: This series would suggest that revision of failed hip resurfacing is less complex and less time consuming than revision of a primary total hip replacement. In fact, the duration of surgery is more in keeping with a primary total hip replacement.

Abstract: 1272
Abstract category: Hip Surgery
Poster
Also willing to present as a poster

Hip injection without an image intensifier - new technique
A Lakdawala [Warwick Orthopaedics]

Introduction: Hip injections are usually performed under image-intensifier guidance to ensure that the injection is delivered into the joint space. However, the use of radiography increases the duration of the surgery and also exposes the patient to a small dose of radiation. A technique of performing such injections without using image-intensification is described.

Method: Each patient was positioned supine on the table. A safe entry point for injecting the hip was located using the tip of the greater trochanter and the femoral arterial pulse as landmarks (see illustration). A long needle was then inserted into the hip joint without image guidance. For the purposes of the study, the position of the needle was then checked on an image intensifier.

Results: We report the results of this technique in 14 patients. All injections were either therapeutic or for diagnostic purposes. The needle was positioned correctly in the hip joint at the first attempt in all 14 patients. There were no adverse effects using this technique.

Conclusion: This technique is safe, reliable, easy, requires no image-intensifier and hence no radiation to the patient.

Abstract: 1274
Abstract category: Hip Surgery
Paper 5 minutes
Also willing to present as a poster

Post-operative radiographs of total hip replacements: Are we all seeing the same thing?
G Myers [Warwick Orthopaedics]
Background: Many surgeons routinely perform post-operative radiographs following total hip replacement to assess performance and highlight areas of concern. Previous studies have suggested that these radiographs are uncomfortable for patients and may delay discharge. Proponents would argue that they facilitate the early detection of "at-risk" hips as well as providing useful feedback about component position. So how useful is this investigation?

Method: We asked eight consultant orthopaedic surgeons with a practice in hip arthroplasty to assess a series of radiographs of patients who had undergone an uneventful Charnley arthroplasty. We then asked the same group of surgeons to review a series of radiographs of patients who had undergone the same procedure by the same operating surgeon but where the hip had dislocated. The surgeons were blind to the results of the arthroplasty. Inter and intra-observer agreement was measured for analysis of implant position and the estimated risk of dislocation.

Results: Overall agreement was only moderate (kappa = 0.41-0.60). The highest level of agreement was found for version of the cup followed by medialization, with the worst agreement demonstrated for cup inclination.

Conclusion: Even experienced orthopaedic surgeons have difficulty in interpreting post-operative radiographs of total hip replacements. The surgeons were not reliably able to predict those hips which were to dislocate. This raises further questions about the necessity to produce routine post-operative radiographs for patients post hip arthroplasty.

---

Abstract: 1278
Abstract category: Hip Surgery
Paper 5 minutes
Not willing to present as a poster

Metal on metal hip resurfacing in inflammatory arthritis
P Dalton [Warwick Orthopaedics]

Introduction: The young arthritic patient is considered an appropriate patient group for metal-on-metal hip resurfacing because of its favorable wear pattern. Inflammatory arthritis often affects younger patients but there has been a reluctance to perform hip resurfacing within this patient group. One of the concerns about hip resurfacing in patients with inflammatory arthritis is the risk of neck fracture due to possible associated osteoporosis. The published studies to date, have included only five patients with inflammatory arthritis. The aim of this paper is therefore to report the early results of a series of patients with inflammatory arthritis who underwent a metal on metal hip resurfacing.

Methods: A posterior approach to the hip was performed in all cases. Fifteen patients were entered into the study with 20 hips being resurfaced. The mean age was 43.1 years with a range from 24 to 59 years. The study group included 7 males to which 2 had bilateral resurfacings. Two patients in the group had Juvenile chronic arthritis and one inflammatory arthritis secondary to Crohns disease. The remainder of the patients suffered from rheumatoid arthritis. The follow up period for the group ranged from 1 to 7 years with a mean follow up of 3.5 years.

Results: The survival of the resurfaced hips within the group to date has been 100%. There are no pending revisions within this group. There have been no neck fractures and no other complications reported within the group. There has been one death from unrelated causes within the group. None of the remaining patients have been lost to follow up. The mean Harris hip score recorded at there most recent clinical follow up was 82.

Conclusions: The early results of this study suggest that patients with inflammatory arthritis can safely undergo metal on metal hip resurfacing.

---

Abstract: 1279
Abstract category: Hip Surgery
Paper 5 minutes
Also willing to present as a poster

Comparison of cup sizes in uncemented and resurfacing arthroplasty
U Prakash [Warwick Orthopaedics]

Background: Hip resurfacing preserves bone stock on the femoral head. Some authors believe that this is at the expense of sacrificing more bone on the acetabulum and they point out two main reasons for this. Since resurfacing tends to be used in younger and more active individuals a larger head to neck ratio seems desirable in order to provide a better range of movement before impingement. In addition, the acetabular component has to be a minimum of 5 mm thick to prevent deformation on implantation and the subsequent compromise in the congruency of the bearings.

Method: We report the average size of the acetabular components of 220 Cormet resurfacings and 199 Pinnacle cups implanted in our department over a period of 18 months. From these sizes we estimated the mean acetabular bone loss for each procedure.

Results: The mean cup size was 53.7 mm for Cormet and 54.1 mm for Pinnacle i.e. the acetabular component of the resurfacing was smaller than the equivalent uncemented total hip replacement.

Conclusions: These figures show that resurfacing arthroplasty does not necessarily lead to greater acetabular bone loss than a total hip replacement. In our practice, we concentrate upon preserving acetabular bone rather than establishing a large head to neck ratio. In spite of this approach, the occurrence of impingement and dislocation among our patients seems to be as rare as in other comparable series.

---

Abstract: 1784
Abstract category: Hip Surgery
Paper 5 minutes
Also willing to present as a poster

Total cost of an HA-coated cementless stem is not significantly greater than a cemented implant in total hip replacement
Y Kulikov [Warwick Orthopaedics]

Introduction: There is a strong drive towards cost-effectiveness of surgical treatment, especially high volume procedures such as primary hip replacement. We investigated the contention that cementless implants are prohibitively expensive for routine use.

Methods: The senior author normally uses the cementless Corail stem in younger patients and the cemented Exeter stem in older patients. We analysed his most recent 50 Corail and 50 Exeter stem primary total hip replacements.

Results: Patient demographics in the two groups were similar, apart from age: average age was 66 years in the Corail group compared to 76 years in the Exeter group. After accounting for the time taken to insert cemented and cementless acetabular components in both groups, we found that it takes 20 minutes more on average to insert a cemented Exeter stem than a Corail cementless stem. For our hospital, the marginal cost of implanting the Exeter stem, including the implant, pulse-lavage, cement, restrictor, cement mixing system and extra theatre time was £826 compared to £881 for a Corail stem.

Conclusion: This study suggests that routine use of a cementless femoral stem for total hip replacement in patients of all ages would incur only a small increased cost. The reduced use of theatre time (one hour on a typical three hip replacement all day operating list) would release useful theatre capacity for the performance of additional operations. This will be especially attractive under a Payment-by-Results regime.
A new system of outcome measurement for treatment of sports-related and mechanical hip symptoms
D Griffin [Warwick Orthopaedics]

Introduction: Multiple scoring systems are available to evaluate arthritic hip pain and to assess outcome after arthroplasty. These scores focus on evaluating hip pain and function in elderly patients with degenerative joint disease. They are not specific for sports-related or mechanical hip symptoms in young people, or sensitive to change after new treatments such as arthroscopic hip surgery.

Methods: We systematically reviewed the literature since 1980, searching for systems used to measure severity of symptoms and outcome of treatment in these patients. We collected reports of performance of these systems. We then used the best of them to collect symptom scores from 100 patients, and measured the agreement of systems. We performed an item reduction process to identify the question items most associated with overall scores.

Results: Systematic review yielded 4 scoring systems which have been used to evaluate sports-related or mechanical hip symptoms: the Non-arthritic Hip Score (NIHS), Hip Outcome Score (HOS), Hip disability and Osteoarthritis Outcome Score (HOOS) and a modified Harris Hip Score (mHHS). All scores are self-administered and symptom related, requiring no physical examination. All but the mHHS have some evidence of reliability and validity. There is a great deal of overlap among the variables selected by the authors and agreement between the various scoring systems is surprisingly good. Most of the variability of all of the systems could be captured with ten simple questions.

Conclusion: We have developed a simple set of ten questions which capture outcome information as well as existing more complex systems. This will be useful is assessing outcome after new treatments such as hip arthroscopy in young active people.
Trauma

Abstract: 856
Abstract category: Trauma
Paper 5 minutes
Not willing to present as a poster

The treatment of delayed fracture union with shockwaves; a randomised trial
M Costa [Warwick Orthopaedics]

Background: Shockwave therapy has been shown to induce osteoneogenesis in animal models. The mechanism of action is unclear, but experimental evidence suggests micro-fracture formation and increased blood flow as the most likely explanation. Several reports from Europe have suggested good results from the treatment of delayed fracture union with shock-waves. We present the results of a randomized double-blind placebo-controlled pilot study.

Method: Fourteen patients with clinically and radiologically confirmed delayed union of long-bones consented to enter the trial. The treatment group had a single application of 3000 high-energy shockwaves using the Stortz SLK unit with image intensifier control. The control group had the exactly the same treatment but with an “air-gap” interposition to create a placebo-shockwave. Each patient was followed-up with serial radiographs as well as visual analogue pain scores and EuroQol assessments. All o the patients were reviewed for a minimum of two years post treatment.

Results: There was no difference between the groups in terms of time to fracture union (p=0.781 log-rank test). Nor was there any indication of a treatment effect on any of the secondary outcome measures.

Conclusion: We have been unable to recreate the previously reported favorable results of shockwave therapy in the treatment of delayed fracture union. On the basis of this study we have withdrawn a proposal for a multicentre RCT.

Abstract: 1284
Abstract category: Trauma
Paper 5 minutes
Also willing to present as a poster

Tibial nail distal locking: One screw is inadequate, two satisfactory, but three usually unnecessary
P Upadhyay [Warwick Orthopaedics]

Background: Intramedullary nailing is a well established technique for stabilising fractures of the long bones. Design modifications in the new generation of intramedullary nails facilitate multiple interlocking screw positions, but how many interlocking screws provide adequate strength to the construct? This study examines the mechanical performance of tibial interlocking nails under test conditions and compares the fracture stability offered by various interlocking screw configurations in distal tibial fractures.

Method: Torsional and axial loads were applied to the distal end of a tibial fracture model using a test rig and composite bones. The configurations tested were; distal tibial fractures stabilised with one medio-lateral distal interlocking screw, two medio-lateral distal interlocking screws, and two medio-lateral and one antero-posterior interlocking screw.

Results: Two interlocking screws offered greater yield strength than one under axial loading. There was no mechanical advantage in using three (two medio-lateral and one antero-posterior screw) versus two (two medio-lateral) interlocking screws. Torsional loading showed angular displacement increased in a linear manner for all three screw configurations with three (two medio-lateral and one antero-posterior screw) interlocking screws providing no addition torsional stiffness when compared to two distal interlocking screws.

Conclusions: Two distal medial-lateral interlocking screws appear to provide adequate stability when nailing tibial fractures. However, an additional anterior-posterior screw was able to provide better fracture reduction with certain distal fracture configurations.

Abstract: 1290
Abstract category: Trauma
Poster
Also willing to present as a poster

The occult lateral compression pelvic ring fracture - proposed classification LC 0
K Ho [Warwick Orthopaedics]

Background: The Young and Burgess classification of pelvic fractures incorporates anatomic mechanism and fracture configuration, and includes three grades of lateral compression fracture (LC I - LC III); diagnosis is normally made from plain radiographs.

Methods and results: We report a case of a lateral compression injury with significant pain over the sacrum. Initial plain radiographs and computer tomograph failed to demonstrate any abnormality. In particular, there was no anterior pelvic ring injury. However, a magnetic resonance scan confirmed the diagnosis of a stable impacted trabecular fracture of the sacral alar with extensive bone bruising. The patient was mobilised and recovered over the following six weeks.

Conclusion: We believe that lateral compression injuries to the pelvis are under-diagnosed. This may be due to the relative insensitivity of plain radiographs to detect subtle cortical changes or of CT to visualise marrow oedema. Magnetic resonance imaging is likely to provide the diagnosis in such cases. We would advocate the use of MRI in patients with undiagnosed pelvic ring pain after a lateral compression injury, who may have what we have called an LC 0 fracture.

Abstract: 1293
Abstract category: Trauma
Paper 5 minutes
Also willing to present as a poster

An evaluation of wound irrigation systems in the management of contaminated wounds
S Cutts [Warwick Orthopaedics]

Background: Irrigation of a contaminated wound is an essential part of the debridement process. In this study we assessed the relative effectiveness of four different systems for wound irrigation; a bulb and syringe was compared to fluid from a giving set, high-pressure pulsed lavage and the Versijet system.

Methods: Twelve sections of bovine skeletal muscle were incised and the resulting wound contaminated with 15 grams of sand. The meat was then irrigated using one of the four methods and the amount of sand removed was measured. The costs of each technique were then compared against relative efficacy.

Results: All four techniques removed over 94% of the sand. The Versijet system achieving the highest level of sand removal (98.5%). Confidence intervals showed that the Versijet is significantly superior to the bulb and syringe method but there was overlap between the results of the other methods.

Conclusion: Specifically designed wound irrigation systems may provide statistically better debridement than a bulb and syringe. However, it is questionable whether the small difference in efficacy can justify the increased cost of such systems.

Abstract: 1296
Abstract category: Trauma
Paper 5 minutes
Also willing to present as a poster

Non-operative management of both-column acetabular fractures - a 20 year experience
A Lakdawala [Warwick Orthopaedics]
Background: The management of both-column acetabular fractures is complex and controversial. We report the outcome following non-operative management of both-column fractures and compare this to the reported outcomes following surgical management.

Methods: Fifty-seven patients with both-column acetabular fractures and secondary congruency were managed non-operatively between 1984 and 2004. Each patient was assessed using a modified Merle d’Aubigne (Matta’s modification) score and the SF-36 general health questionnaire. Radiographs were inspected for the presence of avascular necrosis, non-union, secondary osteoarthrosis (OA) and heterotopic ossification.

Results: During the follow-up period, ten patients died from unrelated causes and 16 were lost to, or declined follow-up. The remaining 31 patients were reviewed with a minimum follow-up period of one year. The mean hip score was 17, with 72% of the clinical scores being in the excellent or good categories. The SF-36 scores were not significantly different from the normal population. All fractures had clinically and radiologically united at follow-up. Surprisingly, there were no cases of heterotopic ossification or avascular necrosis. 10 patients developed secondary OA out of which 3 have had total hip arthroplasty.

Conclusions: Our results demonstrate that good clinical outcomes with minimal complications can be achieved with conservative management in the majority of patients with secondary congruency of a both column acetabular fracture. Our results are comparable to those observed in Matta’s series of operative management.

Abstract: 1299
Abstract category: Trauma
Paper 5 minutes
Also willing to present as a poster

Intracapsular fracture neck of femur: The role of internal fixation in displaced fractures
G Myers [Warwick Orthopaedics]

Background: The debate continues as to the best management of fractures of the neck of femur, in particular the appropriate management of displaced intracapsular fractures. We present an audit of 404 patients treated in a single unit.

Methods: All patients over the age of 65 who underwent surgery for intracapsular fracture neck of femur in 2000 and 2001 in our hospital were reviewed. 404 patients satisfied the inclusion criteria, with a mean age of 83 years (range 65-100). 271 patients had sustained a displaced fracture and 133 were undisplaced.

Results: There was an overall 7% 30-day and 26% one-year mortality rate. There were 1.5% deep infection and 6% superficial infection rates. 10% of patients managed with arthroplasty, and 29% of patients managed with internal fixation required further surgery. Of those patients treated with internal fixation, 19% of undisplaced and 53% of displaced fractures required further surgery. 80% of the further operations involved conversion to either a total hip replacement or hemiarthroplasty.

Conclusion: This study confirms the high rate of failure following internal fixation of displaced intracapsular fractures. We recommend primary arthroplasty for these fractures.

Abstract: 1325
Abstract category: Trauma
Paper 5 minutes
Also willing to present as a poster

Choosing the right material for rapid prototype models
D Marlow [Warwick Orthopaedics]

Background: Rapid prototyping is a useful aid to pre-operative planning and rehearsal of fracture reduction and fixation. One of the issues that we have encountered in this process is choosing a material that has characteristics appropriately similar to bone.

Methods: 20 different materials used in various stereolithography techniques were assessed with regard to: the reduction and hold with reduction forceps, drilling, tapping, screw insertion and sawing. Five surgeons of different grades from SHO to consultant scored each material on a Likert scale with bone as the reference material.

Results: A wide range of properties from the sample was demonstrated. SLA 9120 was judged the best material to work with based upon overall ease of handling and similarities to bone. We would advocate the use of this material for use in rapid prototype models.

Conclusion: From this study we have enabled engineers to build rapid prototyping models using the most suitable material for surgeons.

Abstract: 1703
Abstract category: Trauma
Paper 5 minutes
Not willing to present as a poster

Resource allocation for the new Midlands Pelvic and Acetabular Service
A Bruce [Warwick Orthopaedics]

Introduction: Several BOA and RCS reports have emphasised the need for improved trauma services in the UK, and especially for the centralisation of care of the severely injured. Pelvic and acetabular (P&A) fractures are especially suitable for centralisation; we report on the resource implications of setting up the new Midlands Pelvic and Acetabular Service.

Methods: The majority of P&A fractures in the West Midlands have traditionally been referred to Coventry and Warwickshire Hospital or Selly Oak Hospital. We retrospectively reviewed the activity of these two hospitals. We estimated the likely resource requirement and compared it to the capacity of the new Midlands Pelvic and Acetabular Service.

Results: During the last eight years a total of 498 patients were referred. Mean hospital stay was 39 days (1-109 days). 320 patients had surgical treatment, generating 260 theatre episodes and 482 coded operative procedures. Activity has increased rapidly, so that annual volume of operative surgery is now around 70 cases. We estimate that this will occupy at least 0.6 of a whole time equivalent consultant trauma surgeon, require an average of 3 theatre sessions per week, and occupy 1000 bed days per year. To achieve this we have created a centrally funded collaboration of three fellowship trained P&A fracture surgeons, two hospitals (the new University Hospital associated with Warwick Medical School, which is a Level 1 trauma centre, and Selly Oak Hospital), and two helicopter ambulance services, and reserved two beds and two operating sessions per week in each hospital.

Conclusions: The Midlands Pelvic and Acetabular Service has the resources to run a 24/7 tertiary referral service with helicopter collection and multi-disciplinary support. We believe that, in this sub-speciality at least, we are coming close to achieving the aspirations of successive BOA and RCS trauma care recommendations.
placement of metal work without intrusion into the joint. This can often be difficult to visualise using conventional image intensifier equipment in a 2D plane.

**Methods:** We used a 3D image intensifier (Siemens ARCADIS Orbic) to produce CT-quality multi-axial images which could be manipulated intra-operatively to give immediate feedback of positioning of internal fixation. The reported radiation dose is 1/5 and 1/30 of a standard spiral CT in high and low quality modes, respectively.

**Results:** We describe our experience of our first 32 trauma cases using this system; including complex fractures of the pelvis/acetabulum, calcaneum, and tibial plateau and plafond. Only a short period of training was required by the radiographers and surgeons in order to use the device effectively. In each case fracture reduction and location of fixation devices was demonstrated in multi-planar reconstructions and 3D surface models. Surgery proceeded as quickly or more quickly than would be expected with a normal image intensifier, and in more than two thirds of cases the surgeon modified reduction or fixation according to 3-D information. Surgeons especially remarked on the confidence that the 3-D images gave them. Intra-operative 3-D imaging also reduced the need for pre and post-operative CT.

**Conclusion:** The use of 3-D image intensification is a novelty in the UK. Our results suggest that the 3D image intensifier is a valuable aid in the field of minimally invasive and percutaneous surgery. Accurate fracture reduction and positioning of internal fixation devices can be confidently confirmed ‘on-table’. The radiation dose is also significantly less than a standard spiral CT.

---

**Conclusion:** On the basis of these results, we would recommend the use of steroid injections over NSAID injections for the treatment of subacromial impingement syndrome.
Abstract: 1757
Abstract category: Elbow and Shoulder Surgery
Paper 5 minutes
Also willing to present as a poster

Imaging of rotator cuff – Is ultrasonography reliable?
S Karthikeyan [Warwick Orthopaedics]

Background: The use of high resolution ultrasonography for the detection of rotator cuff tears has achieved only limited acceptance by orthopaedic surgeons. Uncertainty about the accuracy of ultrasonography may be a contributing factor. The purpose of this study was to evaluate the accuracy of high-resolution ultrasonography compared to shoulder arthroscopy in the detection of rotator cuff tears.

Methods: 100 consecutive patients with shoulder pain in whom arthroscopic surgery was planned, underwent standardized preoperative ultrasonography. The ultrasound examinations were done by a single experienced musculoskeletal radiologist using a standard protocol. The findings at ultrasound were classified into intact cuff, tendinopathy, partial-thickness tear, and full-thickness rotator cuff tears. The size of the tear was measured in centimetres. The location was designated as subscapularis, supraspinatus, infraspinatus, or a combination. All of the subsequent shoulder arthroscopies were done by a single surgeon. The presence or absence of a rotator cuff tear and the size and extent of the tear when present were recorded. We then compared the ultrasonographic findings with the definitive operative findings.

Results: For the detection of rotator cuff tears, ultrasound had a sensitivity of 95% and a specificity of 94%; accuracy 95%. There was 100% sensitivity for full thickness tears (specificity 91% and accuracy 95%), while for partial-thickness tears there was a sensitivity of 80%, (specificity 98% and accuracy 95%).

Conclusion: In experienced hands, ultrasound is a highly accurate diagnostic method for detecting rotator cuff tears. The results of this study compare favourably with the published results of magnetic resonance imaging for the investigation of this condition. Furthermore, dynamic imaging and comparison with the opposite shoulder is possible with ultrasonography.

Abstract: 1758
Abstract category: Children’s Orthopaedics
Paper 5 minutes
Also willing to present as a poster

Intra-operative CT-like 3D imaging using a motorised intensifier in paediatric hip surgery
A Gaffey [Warwick Orthopaedics]

Background: Paediatric pelvic corrective surgery for developmentally dysplastic hips requires that the acetabular roof is angulated improve stability and reduce morbidity. Accurate bony positioning is vital in a weight-bearing joint as is appropriate placement of metalwork without intrusion into the joint. This can often be difficult to visualise using conventional image intensifier equipment in a 2D plane.

Methods: The ARCADIS Orbic 3D image intensifier produces CT-quality multi-axial images which can be manipulated intra-operatively to give immediate feedback of positioning of internal fixation. The reported radiation dose is 1/5 and 1/30 of a standard spiral CT in high and low quality modes, respectively.

Results: We present 15 elective cases of paediatric pelvic osteotomy and fixation of SUFE, with use of the ARCADIS Orbic 3D image intensifier. Images were taken intra-operatively in order to confirm satisfactory fracture reduction and appropriate positioning of fixation devices avoiding joint spaces. This was achieved by 3D reconstruction and review of the surgical field in theatre. In all of the cases appropriate bony placement and position of fixation devices was demonstrated in the multi-axial images and 3D reconstruction.

Conclusions: The use of 3D image intensification is a novelty in the UK. Our results suggest that the 3D image intensifier is a valuable aid in the field of paediatric surgery. Accurate positioning of internal fixation devices can be confidently confirmed ‘on-table’. The radiation dose is also significantly less than a standard spiral CT.

Abstract: 2072
Abstract category: Children’s Orthopaedics
Paper 5 minutes
Also willing to present as a poster

Severity of playground fractures: play equipment compared to standing height falls.
G Pattison [Warwick Orthopaedics]

Aim: To compare the severity of fractures from playground equipment falls to the severity of fractures from standing height falls occurring on the playground.

Methods: This case control study used data on all children presenting to the Hospital for Sick Children (Toronto) from 1995 to 2002 with a fracture due to a playground fall. Cases were children who fell from a height off playground equipment. Controls were children who fell from standing height on a playground. Fractures were major if they required reduction and minor if they did not.

Results: Fractures from equipment falls were 3.91 (95% CI 2.76 to 5.54) times more likely to require reduction than were fractures from standing height falls.

Conclusion: Major fractures were strongly associated with falls from playground equipment, whereas minor fractures came from both play equipment and standing height falls. Efforts to prevent major fractures should target playground equipment and the impact absorbing surface beneath it.
**Abstract:** 2163  
**Abstract category:** Children's Orthopaedics  
**Paper 5 minutes**  
**Also willing to present as a poster**  

**Modifying Ponseti casting – a new soft option**  
*MBS Brewster [Warwick]*

**Background:** The Ponseti technique for correcting club foot deformity is gaining in popularity. However, there remain problems associated with the use of serial plaster casts. We assessed the effectiveness of treating club feet by modifying the Ponseti casting technique using below knee "Soft Cast" to maintain the foot corrections.

**Methods:** On each visit the feet are evaluated with a Pirani score. After manipulation, a moulded below knee "Soft Cast" plaster is applied over a stockinette. This is continued at weekly intervals until the hindfoot is the predominant deformity. A routine Ponseti tendo-Achilles tenotomy is then performed, followed by a below knee "Soft Cast" plaster. Patients are progressed to Dennis Brown boots and duration of treatment to this date is recorded.

**Results:** There were 50 feet in 34 children with a mean age at presentation of 4 weeks. The average Pirani score at presentation was 5.5. On average 10 weeks of casting was required before the tenotomy. Dennis Brown boots were applied at an average of 3.5 weeks after tenotomy. 3 children experienced blisters/rash around the plaster. At the most recent follow up, all patients have painless, flexible plantigrade feet.

**Conclusion:** As the technology of the materials in orthopaedic practice develops, it would be wrong to not consider whether a good technique could be improved. The below knee "Soft Cast" plaster achieves the desired results in an acceptable period and has many advantages over the original style. Being below knee the cast does not confine the tibia longitudinally during growth and is easy to manage by the parents. The "Soft Cast" allows adequate moulding and is easily removable without using a plaster saw or knife. We believe these factors make for a smooth running system liked by the children, the parents and the surgeons.

---

**Spine surgery**

**Abstract:** 1308  
**Abstract category:** Spinal Surgery  
**Paper 5 minutes**  
**Also willing to present as a poster**

**Clinical and radiographic evaluation of stand-alone cages used for anterior lumbar interbody fusion**  
*J Gilbody [Warwick Orthopaedics]*

**Background:** Stand-alone cages represent the latest stage in the evolution of anterior lumbar interbody fusion implants. The objective of this study is to report the preliminary clinical data from a stand-alone interbody fusion cage (Stabilis).  

**Methods:** Anterior lumbar interbody fusion was performed using either Brantigan cages (n=6) with posterior augmentation, or using Stabilis cages (n=19). Clinical assessment was performed using standardised questionnaires that patients completed pre- and post-operatively. Radiographic assessment was done post-operatively using lumbar flexion/extension views to assess union and implant subsidence.

**Results:** The Stabilis group showed an improvement in Oswestry Disability Index (ODI) (pre: 49.4; post: 39.3; p=0.024), visual analogue scales (pre: 76.1; post: 47.8; p<0.01) and modified Zung Depression Inventory (pre 32.9; post: 20.6; p< 0.01). There was no statistical improvement in the Brantigan cage group. Despite this clinical improvement, five patients in the Stabilis group failed to unite and six demonstrated subsidence of the implant. The relationship between non-union and subsidence was statistically significant (p = 0.017). Furthermore, the change in ODI between patients who united and those who did not was both statistically significant (p=0.03) and the difference in mean ODI between the two groups was considerable (21%).

**Conclusions:** Stand-alone cages for anterior lumbar interbody fusion show great promise in the treatment of degenerative disc disease and involve a shorter operating time and less tissue trauma for the patient. However, this study has identified a high rate of non-union and implant subsidence, although this did not appear to be clinically relevant.
**Hand surgery**

Abstract: 1313
Abstract category: Hand Surgery
Paper 5 minutes
Also willing to present as a poster

**Spiral linking technique: Looking for optimal configuration**

Y Kuliov [Warwick Orthopaedics]

**Introduction:** A previous biomechanical study of the Spiral Linking Technique for tendon repairs showed that it is strong enough to be used in clinical practice as an alternative to the Pulvertaft tendon repair. However, a lack of stiffness and the need for longer tendon ends were identified as deficiencies when compared to Pulvertaft. In this study we changed two variables looking to improve the spiral technique.

**Methods and results:** We reduced the 3 spiral tendon ends to a double spiral and then a single spiral tendon, while maintaining overlapping length at 35-40 mm and same number of mattress sutures. This reduced the length of tendon ends required for repairs, while preserving adequate peak loads in double (95.5N mean) and even single (89.9N mean) spiral repairs. This also improved the stiffness of the repair (10.6N/mm and 9.8N/mm respectively) to the level of Pulvertaft repairs (11.1N/mm). Suturing parallel, rather than spiral tendons, dropped peak loads significantly (77.5N mean). We then used an alternative cross stitch technique to reduce the number of sutures employed in the repair. By using one cross stitch, rather than two mattress stitches, we reduced the number of sutures to five. This reduced the overlapping length to 30-35 mm. Using one cross stitch improved peak load to a mean of 111.8N, but made no difference to the stiffness of the construct.

**Conclusion:** Creating two spirals appears to give the optimal configuration to spiral tendon repairs. A single spiral repair may also provide adequate strength in cases of limited tendon length. A single cross stitch in the middle of the repair can be used to reduce the number of stitches, without affecting the strength of the construct.

---

**Limb reconstruction**

Abstract: 1316
Abstract category: Limb Reconstruction
Paper 5 minutes
Also willing to present as a poster

**SpatialCAD software in the planning of deformity correction**

A Gaffey [Warwick Orthopaedics]

**Background:** The Taylor Spatial Frame® is a six-axis deformity correction device. Until recently there was no way of planning the correction electronically. The plan was developed with standard radiographs with the help of pencils, rulers and protractors. Orthocrat® has developed a piece of software that can plan the deformity correction from two orthogonal radiographs. The radiographs can be imported into the computer via a PACS server as a DICOM image, or as JPEGs which can be imported from a digital camera.

**Method and results:** A Taylor Spatial Frame was programmed with a 5 degree valgus angle using web-based software in a chronic deformity mode of correction. The frame was assembled and photographed from 6 differing view-points (3 pairs 90 degrees apart). The deformities were then analysed on paper and with the SpatialCAD® software. The measured deformities were programmed into the web-based software in Total Residual Mode. The final frame configuration was then established based on the initial frame parameters. The final frame was scored on a root mean squared system. The programming based on the SpatialCAD® software gave a better result and was easier to use than the traditional pencil, ruler and protractor technique.

**Conclusion:** The SpatialCAD® software is a useful tool for the planning of deformity correction with the Taylor Spatial Frame®. It may be especially useful when the frame is mounted off the orthogonal axis of the limb.

Abstract: 1315
Abstract category: Limb Reconstruction
Paper 5 minutes
Also willing to present as a poster

**Amputation versus reconstruction for the mangled leg**

J Gilbody [Warwick Orthopaedics]

**Introduction:** Many orthopaedic surgeons believe that a below-knee amputation with a well-fitted prosthesis is a better alternative to limb reconstruction surgery for patients with mangled extremities. The aim of this study was to compare the long-term functional outcomes in patients who had limb salvage surgery with similar patients who had below-knee amputations.

**Methods:** The amputation group (n=12) had been treated with below-knee amputation following a variety of lower limb fractures. The other group (n=11) had developed complications following tibial fractures and undergone limb salvage surgery using the Ilizarov method. The groups were compared using the Oswestry Disability Index and the SF-36 Health Survey.

**Results:** There were no differences in the Disability Index scores. However, for the two scales in the SF-36 measuring functional health, there were potentially clinically significant differences in favour of limb salvage (95% confidence intervals: -6.4 to 45.4 for Physical Functioning and -7.4 to 61.2 for Role-Physical).

**Conclusions:** This study suggests that limb conserving surgery may offer improvement in long term functional health.
Sports trauma

**Abstract:** 1318  
**Abstract category:** Sports Trauma  
**Paper 5 minutes**  
Also willing to present as a poster

**Anterior ankle impingement in professional gymnasts**  
A Lakdawala [Warwick Orthopaedics]

**Background:** Professional gymnasts are particularly at risk of anterior ankle impingement due to the forceful dorsiflexion of the ankle joint that occurs upon landing. We review the outcome of surgical intervention in this group of patients.

**Methods:** Nineteen professional gymnasts have been treated surgically for this condition at our institution between 1995 and 2004. All of these gymnasts belonged to the British Olympic Association (BOA) team and performed either at national or international levels. The patients presented with anterior ankle pain with limited and painful dorsiflexion. Those with ankle instability were excluded from this study. All of the patients were followed up for a minimum of 12 months. Success of the treatment was judged by whether the gymnasts continued to perform at the same level as before the procedure.

**Results:** There were 20 procedures performed in 19 gymnasts. The mean age at the time was 16.2 years. According to McDermott’s radiological classification there were 18 stage I cases and 3 stage II. Nineteen procedures were carried out arthroscopically and in 2 cases through a mini-arthrotomy. A mini-arthrotomy was used where the patients had osteophytes on the anterior surface of the talus. All of the gymnasts returned to the same level of performance at a mean of 4.6 weeks. Four reported some discomfort in the ankle for up to 3 months but could continue to perform with their respective team.

**Conclusion:** Excellent surgical results can be achieved in this high demand group of patients, provided that the condition is detected early.

**Abstract:** 1320  
**Abstract category:** Sports Trauma  
**Paper 5 minutes**  
Also willing to present as a poster

**The 5-9 year results of autologous chondrocyte implantation cartilage repair of the knee in active Armed Forces personnel**  
T Spalding [Warwick Orthopaedics]

**Background:** During the period 1995-2000, Armed Forces personnel in the United Kingdom who were facing medial discharge due to symptomatic chondral defects in the knee were offered ACI in an attempt to improve knee function sufficient to enable retention within the Armed Forces.

**Method:** Surgery was indicated for isolated full thickness osteochondral lesions greater than 2cm2. All 14 of the patients had undergone previous arthroscopic procedures including debridement or drilling. A periosteal patch was applied to the prepared defect and cells (Carticel) were then inserted according to the original technique from Lars Peterson.

**Results:** There were 12 men and 14 women. The medial femoral condyle was the most common site repaired. The mean defect was 5.27cm2 (2.5-12). At 1-2 years 13 out of the 14 patients had improved on the Modified Cincinnati Knee Rating Scale. At 5-9 years, 75% of the patients were retained in the Armed Forces.

**Conclusion:** This study, on a specific high functional demand group, has shown that ACI is valuable in the medium term for the treatment of osteochondral defects and has facilitated the retention of the personnel within the Armed Forces.

**Abstract:** 1321  
**Abstract category:** Sports Trauma  
**Paper 5 minutes**  
Also willing to present as a poster

**Medial patellofemoral ligament reconstruction using hamstring tendon**  
P Thompson [Warwick Orthopaedics]

**Background:** Recurrent patella instability and painful patella mal-tracking are common and debilitating conditions. We describe a technique to reconstruct the medial patellofemoral ligament.

**Method:** Autologous hamstring tendon is passed through patella drill holes and fixed near the medial femoral epicondyle using an interference screw. The position of femoral attachment is the most important factor in achieving an isometric graft. We have performed this procedure in a consecutive series of 21 patients with an average age of 29.9 years.

**Results:** There was a significant increase (p<0.001) in mean Fulkerson score from a pre-operative value of 47.4 to a post-operative value of 82.9. Sixteen of the patients rated their knees as good or excellent and there was only one complication.

**Conclusion:** We would advocate this technique is an effective surgical option for patients with recurrent lateral instability as well as those with painful lateral mal-tracking.
Research

Abstract: 251
Abstract category: Research
Paper 5 minutes
Not willing to present as a poster

Achilles tendinopathies
M Costa, S Donnell, F Robinson, G Riley [Warwick Orthopaedics]

Background: Achilles tendinopathies are common and cause debilitating symptoms ranging from chronic pain to tendon rupture. In order to direct therapeutic interventions we must understand the histopathology underlying the different forms of tendinopathy.

Methods: We performed a histopathological review of surgical debridement specimens from patients with chronic Achilles tendon pain and from patients with acute Achilles tendon rupture and compared these with "normal" cadaveric and lacerated Achilles tendon.

Results: The qualitative assessment showed that all of the patients with Achilles tendinopathy demonstrated a loss of the normal fibre structure and alignment within the tendon. The semi-quantitative analysis showed that the biopsies from patients with ruptured tendons were significantly less vascular and had reduced numbers of cell nuclei than the normal tendon biopsies. This was not the case for the chronic painful tendinopathy samples.

Conclusions: These findings suggest that there may be a different pathogenesis in painful tendinopathy compared with the pathology in Achilles tendons that rupture.

Clinical relevance: Therapeutic interventions may be targeted to address specific histopathological changes within the tendon.

Abstract: 509
Abstract category: Research
Paper 10 minutes
Not willing to present as a poster

Does teacher training improve medical education? A randomised trial of teaching in undergraduate orthopaedics and trauma
M Costa [Warwick Orthopaedics]

Background: The majority of current surgical trainees are required to undertake some formal training in educational theory and teaching methods. We performed a randomised trial to determine the effect of "teacher training" upon undergraduate education in orthopaedics and trauma.

Method: Eight-one students were randomised into two groups. The first group received a series of teaching sessions from trainees who had attended a teacher training course; the second group from trainees who had not.

Results: The students who were taught by the trainees with teacher training rated the content (p=0.018) and assessment (p=0.001) of their teaching experience more highly than the other group. However, there was no difference in the performance of the students in their s. Since these skills are considered valuable in many of the other facets of life as a surgeon, then teacher training is likely to be beneficial for the majority of surgical trainees.

Conclusions: The results show the importance of accounting for the presence of anatomical joints in biomechanical study.

Abstract: 1323
Abstract category: Research
Paper 10 minutes
Also willing to present as a poster

Biomechanical testing of trauma implants: Have we forgotten to include joints?
P Upadhyay [Warwick Orthopaedics]

Introduction: Biomechanical testing of orthopaedic implants has traditionally been performed on test rigs which provide little or no movement between the bone-implant construct and the test rig. These systems do not account for the joint above and below the implant. This biomechanical study was performed to evaluate a new Universal Joint Simulator developed to simulate the presence of a joint (ankle, knee, hip etc) in test rigs.

Methods: The Universal Joint Simulator was developed using a bi-axial linkage hinge system and a flexible end restraint which allows the user to programme the amount of movement desired at a particular joint. The system was tested against a conventional test rig design which did not permit any movement between implant and test rig. The fracture configuration used for the testing was an unstable distal tibial fracture (AO Fracture Classification Type 43-A2.3) the fracture was fixed using T2 intramedullary nail and the effect of one, two and three distal interlocking screws on the stability of the distal fragment was evaluated.

Results: Using a conventional test rig, there was no statistical significance (p = 0.758) in the load to failure between one vs. two distal interlocking screws. Testing with the presence of a "joint", using the Universal Joint Simulator, showed a statistically significant difference (p value 0.019) in load to failure between the use of one vs. two screws. The results obtained Universal Joint Simulator are consistent with clinical studies showing that one distal locking screw fails more often than two distal interlocking screws.

Conclusions: The results show the importance of accounting for the presence of anatomical joints in biomechanical testing.
Factors affecting the cohesion of impaction bone graft
J Oakley [Warwick Orthopaedics]

Background: There are several factors that influence the mechanical properties of impaction bone graft. We sought to determine the optimal combination of constituent materials for use in clinical practice.

Methods: We performed an in vitro study to determine which factors influence the cohesive properties of mixes for impaction grafting, including the use of pure bone, graft extenders (solid and porous), bone washing and the addition of clotted blood. Sixteen groups of samples produced using fresh frozen femoral heads, graft extender, and clotted blood. Samples impacted then loaded on servo-hydraulic testing machine. The cohesion of each sample was calculated from the stress/strain diagrams produced.

Results: Pure bone has significantly higher cohesion than when mixed with extender ($p<0.001$). Pure graft extender has zero cohesion. Washing bone chips had no significant effect on the cohesion. Adding clotted blood significantly increased the cohesion of pure bone graft ($p=0.019$) and samples with a 50/50 mix of bone and porous graft extender ($p=0.054$).

Conclusions: Graft extender is less cohesive than bone so is harder to work with. Handling of porous extender when mixed with bone can be improved with the addition of clotted blood.

Do surrogate bone materials have similar properties to cadaveric bone? Validation of a new composite material for application in orthopaedic bio-mechanical research
P Upadhyay [Warwick Orthopaedics]

Introduction: Ideally biomechanical testing of implants would be performed in real bone, but legislation, inability to obtain large number of specimens and large inter-sample variation necessitates the use of simulated bones in most cases. We have investigated the characteristics of glass fibre reinforced epoxy and polyurethane foam and compared it with an alternative surrogate and real bone.

Methods: Polyurethane foam artificial tibiae (those often used in surgical workshops) and composite tibiae composed of glass fibre reinforced epoxy and polyurethane foam were tested using a specially designed test rig able to simulate the movements of anatomical joints for ultimate compressive, tensile and torsional stress. Simulated tibiae were then strained at various rates (0.5mm, 1mm, 5mm, 10mm, 50mm and 500mm/min) and the dynamic response was analysed.

Results: The ultimate compressive and tensile strength of the composite tibiae correlated well with published data on cadaveric tibiae. Analysis of the dynamic response showed the existence of a critical velocity similar to bone at various strain rates. At low strain rates typical shear type failure pattern was noted and high rate failure was typified by splintering and multiple fragments. Simple polyurethane foam tibiae had much lower yield strength and were much more brittle than real bone.

Conclusions: A surrogate tibia made from glass fibre reinforced epoxy and polyurethane foam shows similar mechanical properties to a real tibia, and is suitable for biomechanical testing of implants. Tibiae made from polyurethane foam alone are not.

Measuring corporate uncertainty: a new method to select patients for inclusion in a randomised controlled trial.
D Griffin [Warwick Orthopaedics]

Introduction: A particular problem in the performance of randomised controlled trials (RCTs) in surgery is that surgeons are not temperamentally inclined to uncertainty, so the concept of individual equipoise is not easy to apply. Peto’s principle of randomising all patients for whom the treating doctor is uncertain is not appropriate because most orthopaedic surgeons believe they “know” what is best for any particular patient even when surgeons disagree with each other. We developed a method to quantify ‘corporate uncertainty’ among a large group of surgeons, and propose it’s use in orthopaedic RCTs.

Methods: We presented a hypothetical typical patient with displaced intra-articular calcaneal fracture to two groups of surgeons: general orthopaedic surgeons (70) and specialist foot and ankle surgeons (141). All were asked to estimate the probability that the patient would be better or worse by various degrees if treated operatively or non-operatively.

Results: Both groups showed similar levels of uncertainty about whether surgery was indicated. Interestingly, after a debate in which evidence for and against treatment was presented, the generalists became even more uncertain. The specialists’ opinion was almost unchanged by debate.

Conclusion: We used a Bayesian analysis of this data to plan the sample size for a large RCT of calcaneal fracture management, and are piloting an on-line version of this ‘corporate uncertainty’ measurement as the inclusion criterion for patients within this RCT. This approach appears to have methodological and ethical merit, is popular with surgeons, and may offer a way to work with surgeons predisposition not to be certain - a major obstacle to any RCT in orthopaedics.
Audit and management

Abstract: 1329
Abstract category: Audit & Management
Paper 5 minutes
Not willing to present as a poster

Do experienced orthopaedic surgeons make better pilots?
M Dunbar [Warwick Orthopaedics]

Introduction: Modernising Medical Careers means that trainee doctors will be making decisions about their careers at a much earlier stage. Future plans include assessing aptitude for orthopaedic surgery before surgical training begins. We tested a possible surrogate measure of aptitude to develop dexterity, coordination and spatial awareness during surgical training.

Methods: Four groups of tried to land a Boeing 737-400 at Chicago O’Hare International airport on a windy afternoon on final approach in a flight simulator. The groups of 10 participants consisted of medical students, specialist registrars, consultant orthopaedic surgeons and psychiatrists. No participant had previously experienced flight simulation. They were assessed according to predetermined criteria on their approach, landing speed, accuracy and survival probability. Each participant was allowed 15 minutes exposure to the simulator. This involved a demonstration and up to 2 practice sessions before final assessment.

Results: There was no difference between the groups with respect to survival probability, landing speed and accuracy. Accuracy of approach was better in the consultant surgeon group, and just reached significance (p=0.04). The arthroscopic specialists performed slightly better than the non-arthroscopists, but this was not significant (p>0.05).

Conclusions: Ability to fly is not necessarily a useful predictor of orthopaedic abilities. The traditional teaching strategy of “see one, do one, teach one” ended up with an unacceptably high fatality rate in this experiment. Orthopaedic surgeons do not necessarily make good pilots, but some psychiatrists can fly.

Abstract: 1754
Abstract category: Audit & Management
Paper 5 minutes
Also willing to present as a poster

The role of the extended scope practitioner in knee surgery
D Wright [Warwick Orthopaedics]

Background: Physiotherapists are now working alongside Consultants in some orthopaedic clinics in an extended role to assess and manage secondary care referrals. There is no standard remit for an Extended Scope Physiotherapist (ESP), and therefore the effect and consequence of their presence in out-patient clinics varies significantly across the country. We present our experience at the University Hospitals Coventry and Warwick NHS Trust.

Methods: The work of an ESP has been prospectively studied over six months.

Results: One ESP has been working with 4 lower limb Consultant teams. Over a six month period, 141 new patients and 442 review patients have been assessed by the ESP. During the course of the assessments, 68 (48%) of new patients and 40 (9%) of review patients underwent X-rays, 7 (5%) and 40 (9%) had MRI scans respectively and 41 (29%) and 80 (18%) were referred for Physiotherapy with or without review. Fifty-nine (42%) and 48 (11%) of the new and review patients respectively were placed on the surgical waiting list whereas 23 (16%) and 185 (42%) were discharged from clinic.

Conclusions: An ESP can reduce the waiting time for orthopaedic assessment; freeing Consultants to spend more time with complex surgical problems. However, our review shows that there are significant resource implications associated with the role. There is also a danger that by increasing the through-put of patients, the waiting time may simply be transferred to the pre-operative phase. The developing role of the ESP could alter the balance of a Consultant’s practice towards more complex patients and greater time in theatre.
Finding evidence based orthopaedics on the internet - a practical guide
Y Kwong [Warwick Orthopaedics]

**Background:** Keeping up to date with the latest developments in evidence-based surgery is an essential part of good medical practice, especially in a field like Orthopaedics where innovations are numerous. With the explosion in knowledge, there has been a corresponding increase in the number of journals that report new material. It is no longer possible to keep abreast of new developments by reading a few journals every month. Also, not all of this new material will necessarily help practitioners make informed decisions about alternative approaches. Can the internet be used to identify systematic reviews and high quality randomised controlled trials, from the mass of information that exists?

**Method:** We systematically reviewed the use of various search engines and web-based databases.

**Results:** We found that selective search strategies can increasingly separate high quality studies from those that are not likely to add to the evidence base. Many of these studies are also hyper-linked to full text copies on the publishers’ websites, or can be downloaded through an institutional subscription.

**Conclusion:** We have described the databases and web links where orthopaedic information can be found, and also the limitations of the current search methods. Trawling through libraries looking for articles and photocopying them is slowly becoming a thing of the past.

---

Orthopaedic photography: How to do it better
P Upadhyay [Warwick Orthopaedics]

**Background:** Point and shoot digital cameras are small and easy to use. They are even making their way into the ubiquitous mobile phone. Many orthopaedic surgeons routinely carry digital cameras. Such cameras can be used as part of clinical practice; for instance to take pictures of open fractures (preventing unnecessary wound exposure). However, the images produced are not adequate for use in presentations and research papers.

**Methods:** The authors demonstrate a method of acquiring high quality images of radiographs, using cameras which avoid many of the pitfalls of standard point and shoot camera photography. The camera is mounted on a stable platform and timer delayed exposure is used to ensure minimal vibration. A wide aperture lens (f 1.8) maximises the available light and eliminates the need for a flash which can cause bright spots on the image. The radiographs are mounted on standard light boxes of the type found commonly in most departments. A reference scale is included by using a highlighted ruler. We suggest using the highest possible resolution as this preserves image detail whilst allowing magnification of areas of specific interest. We recommend using cameras capable of capturing images in RAW or TIFF format because this allows a significant amount of post-image processing without loss of any original data.

**Conclusion:** This method allows integration with the emerging digital Picture Archiving and Communication Systems as they are being rolled out across the NHS with NPfIT.

---

Computer tracking of patients with surgical site infection
M Brewster, J Gilbody, R Cherry [Coventry]

**Abstract:** We assumed that a bacteriological specimen would be sent to the laboratory for all significant surgical wound infections. In Coventry we have one central bacteriology laboratory that handles all specimens for a very large area. We used a computer routine to match cohorts of patients who had undergone various types of surgery as recorded by our Theatre management system with approximately half a million bacteriology specimens received by the laboratory over the following two years and reviewed the notes of those patients with a relevant match. This enabled us to identify all patients with a surgical site infection including those that developed long after discharge from hospital. There were relatively few sets of notes to be reviewed as in the majority of patients there were no specimens received by the laboratory. Scrutiny of the notes was a straightforward task for one of our SHOs. We also undertook a separate review of all notes for one group of patients (total joint replacement) to see whether there were any infections that had not already been identified by the computer system. There were none. This supports our view that in our area the vast majority if not all such infections will ultimately be represented by a positive specimen in our laboratory and will thus be revealed by the system of computer matching. We intend to use this system as an easy way of tracking patients long after they have had their primary operation.

---

Congenital dislocation of hip: A reappraisal of the upper age limit for treatment
By VRP Vallamshetla, MS(Orth) MRCS, Ejaz Mughal, MRCS, JN O’Hara, FRCS Orth

**Introduction:** Difficulties posed in managing late diagnosed CDH include a high placed femoral head, contracted soft tissues and a dysplastic acetabulum. A combination of open reduction with femoral shortening of untreated congenital dislocations is now well-established practice. Femoral shortening prevents excessive pressure on the located femoral head which can cause avascular necrosis. Instability due to a co-existing dysplastic shallow acetabulum is frequent and so a pelvic osteotomy is performed to achieve stable and concentric hip reduction.

**Methods:** We retrospectively reviewed 15 patients (total 18 hips) presenting with CDH age 4 years and above who were treated by one stage combined procedure performed by the senior most author. The average age at surgery was 5years and 9months (range 4 years to 11 years). The average follow up was 6 years 10 months (range 3years - 9years ). All patients were followed up clinically and radiologically in accordance with McKay criteria and modified Severin classification.

**Results:** According to the McKay criteria 12 hips were rated excellent while 6 good. All patients but one had full range of movement. Eight had an limb length discrepancy in the area of 1cm. All were Trendelenburg negative. Modified Severin classification demonstrated 4 hips of grade IA, 6 were IB, and 8 were grade II. 1 patient had AVN and 1 patient had an early subluxation requiring successful revision surgery.

**Conclusions:** In conclusion, one stage correction of congenital dislocation of the hip in an older child is a safe and effective treatment with good results in short to medium term follow up.

Flexible intramedullary nails for unstable tibial fractures in children: An 8 Year Experience
By V R P Vallamshetla, MRCS, U De Silva, MRCS, C E Bache, FRCS Orth, P J Gibbons, FRCS Orth

**Introduction:** The authors demonstrate a method of acquiring high quality images of radiographs which avoid many of the pitfalls of standard point and shoot camera photography. The camera is mounted on a stable platform and timer delayed exposure is used to ensure minimal vibration. A wide aperture lens (f 1.8) maximises the available light and eliminates the need for a flash which can cause bright spots on the image. The radiographs are mounted on standard light boxes of the type found commonly in most departments. A reference scale is included by using a highlighted ruler. We suggest using the highest possible resolution as this preserves image detail whilst allowing magnification of areas of specific interest. We recommend using cameras capable of capturing images in RAW or TIFF format because this allows a significant amount of post-image processing without loss of any original data.

**Conclusion:** This method allows integration with the emerging digital Picture Archiving and Communication Systems as they are being rolled out across the NHS with NPfIT.
Background: Flexible intramedullary nailing is gaining popularity as an effective method of treating long bone fractures in children. However, there is a paucity of documentation in the literature with regards to its use in tibial fractures.

Methods: We retrospectively reviewed case notes, operation records and radiographs of fifty six unstable tibial fractures in fifty four children between March 1997 and May 2005. All children were followed up for at least 2 month after eventual removal of the nail.

Results: Of the fifty six tibial fractures thirteen were open. There were no non-unions. The time to clinical and radiological union averaged 10 weeks. Two had residual angulation of the tibia, two had leg length discrepancy, two had deep infections and two had failure of fixation. All went on to have excellent functional outcomes.

Conclusion: Flexible intramedullary fixation is an easy and effective method of managing both open and closed unstable fractures of the tibia in children.