

## BOTP Key Papers Summary

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### Shoulder & Upper Arm

**Jacobs et al, (*J Shoulder Elbow Surg*, 2009, 18; 348-353)**

***MUA vs. steroid injection for frozen shoulder***

Study of 53 shoulders randomised to MUA and physio (28), or course of three 6-weekly steroid/LA glenohumeral injections (25). No difference in Constance Score, SF-36 or VA-pain score at 6 weeks to 2 years.

**Thomas W et al, (*JBS* 2011, 93-B; 1377-81)**

***Treatment of frozen shoulder by manipulation under anaesthetic and injection- does the timing of treatment affect the outcome?***

Single-surgeon retrospective review of a consecutive series of 246 shoulders over 10 year period. Inclusion: frozen phase, no other cause and normal x-rays. Exclusion: non-primary frozen shoulder, unfit for GA. MUA performed within 4 weeks of listing, with 10ml bupivacaine 0.5% + 80mg dep-medrone injection into gleno-humeral joint. Followed by a rehabilitation programme started on day 1 post-op, with one session of hydrotherapy. Weekly physio continued until no further improvement in ROM. Further MUA given if persistent symptoms at 3 weeks **and** a change in Oxford shoulder score <6.

99% had 3 week follow-up data, and 81% had subsequent assessment by postal questionnaire. Significant improvement in symptoms (OSS change 16 points). At 3 weeks, 61% regained normal or near normal function. Zero complications. 20% required 2<sup>nd</sup> MUA, and 1 % a third MUA. Mean OSS=43 at 3 weeks, and maintained at 4 weeks with OSS=44.

Recurrence in 15% at mean 113 days (nearly 4 months) – 50% of the IDDM and 25% of the NIDDM population suffered a recurrence. A total of 8 patients went

on to have other surgery: 7 sub-acromial decompressions and 1 arthroscopic release. Linear regression showed **no** correlation between long-term OSS and duration of symptoms prior to MUA.

**N. Südkamp et al, (JBJS, 2009, 91-A; 1320-1328)**

***Case series of ORIF using locking proximal humerus plates (LPHP)***

187 closed displaced/unstable surgical neck of humerus fractures treated acutely by ORIF using Synthes LPHP. At 1 year, achieving 85% of ROM, and Constant & DASH score compared with uninjured side. Complication rate 34%, with half being related in technical error (e.g. screw perforation into joint). 20% required re-intervention within 1 year.

**Lewis E, (CORR, 2009, 467:2007-2010)**

***ROM after Lateral pinning of Paediatric supracondylar fracture – case series***

63 closed Gartland 2 or 3 fractures treated by 2 or 3 lateral K-wires and immobilisation for 3-4 weeks. Sports resumed after 3 months. ROM returned to 72% at 6 weeks, 84% at 12 weeks, 94% at 6 months and 98% at 1 year. Gartland 3 injuries recovered more slowly, but no difference at 1 year.

**Canadian Orthopaedic Trauma Society, (JBJS, 2007, 89-A:1-10)**

***Displaced mid-shaft clavicle fracture – ORIF vs. conservative***

Closed acute displaced fracture to mid-shaft clavicle (age 16-60, mean 33). 49 managed conservatively in sling for 6 weeks. 62 had ORIF with ROM-physio started at 10 days, strengthening-physio at 6 weeks, and return to sports at 3 months. At 1 year ORIF offered better union (2% vs. 14%), Constant & DASH score (10 points better), satisfaction and cosmesis. No difference in ROM. Overall complication rate 37% (ORIF), and 63% (conservative), with no permanent NV-injuries.

**Kukkonen J et al (JBJS Am 2015; 97: 1729-37)**

***Treatment of nontraumatic rotator cuff tears***

180 degenerative supraspinatus tears randomised into 3 groups: (1) physiotherapy, (2) subacromial decompression + physio, (3) cuff repair, SAD + physio. Primary outcome measure = Constant score, secondary measures = VAS pain score, satisfaction, cuff integrity and cost.

167 shoulders (160 patients) had 2 years follow-up. No significant difference in mean change of Constant score, satisfaction or pain scores. Surgical interventions in groups 1 & 2 costed more than pure physiotherapy. However cuff repair did significantly reduce tear progression – what is the clinical significance of this not discussed; re-tears still seen and no difference in glenohumeral or ACJ arthritis rates between groups.

Conservative treatment is a reasonable option for primary initial management of degenerate cuff tears in patients over 55 years.

**Clement D et al (IBJS 2010, 92-B (8); 1112-7)**

***Does Diabetes affect outcome after arthroscopic repair of the rotator cuff?***

Case control study of diabetic patients (n=32) who failed a trial of conservative management, vs. non-diabetics matched for age, gender, tear size, as well as type & number of comorbidities. Day-case, arthroscopic cuff repair performed under GA and scalene block, coupled with sub-acromial decompression. Small tear <1 cm, medium 1-3 cm, large 3-5 cm, massive >5 cm (excluded). Rehab: 4 weeks pendular movements, 4 weeks passive and active-assisted movements with physio, 4 weeks active exercises, and then start strengthening exercises at 3 months. Assessed with Constant and SF-12 scores at 6 months and 12 months.

No difference in pre-operative scores, but greater improvement seen in non-diabetics ( $\times 1.5$  times), with approximately  $10^\circ$  better forward flexion and abduction. Zero failures in either group, and only one superficial portal site infection in diabetic group. Subgroup analysis of insulin vs. non-insulin dependent patients inconclusive on account of small numbers. Previous history of adhesive capsulitis reduced scores by 3.7 points (25%) approaching significance ( $p=0.09$ ). Should diabetic patients have earlier physiotherapy to address the increased risk of post-operative stiffness?

**Mittonis G et al (J Shoulder Elbow Surg 2010, 19; 513-519)**

***Comparative study of surgical treatment of ulnar nerve compression at the elbow***

Level III retrospective review of management of 113 cases of ulnar nerve entrapment: decompression alone (n=31), decompression and partial medial epicondylectomy (n=35), and decompression with anterior transposition (n=37). All groups achieved 80% power grip and 90% key pinch strength of other side. 80% had excellent/good outcomes with decompression and decompression with medial epicondylectomy, but only 60% with anterior transposition ( $p<0.05$ ). Conversely, statistically fewer poor results seen in decompression alone (6%), compared with epicondylectomy (16%) and transposition (30%).

Possible better results with in-situ decompression alone in mild cases (McGowan 1 patients with subjective sensory symptoms only), and medial epicondylectomy reserved for McGowan 3 patients with profound objective sensorimotor disturbances. Group 2A/2B options are equivocal between decompression alone or combined with epicondylectomy.

**Kukkoken J et al (BJJ 2014, 96B (1); 75-81)**

***Treatment of non-traumatic rotator cuff tear***

RCT 1 year comparison of Constant Scores for 3 groups: physiotherapy (58) vs. subacromial decompression & PT (59) vs. arthroscopic repair & PT (59). Inclusion criteria: age > 55, MRI proven scan <75%, pre-existing FROM. No difference in final Constant score (around 77 points) or mean improvement (around 18 points). Physiotherapy: increasing GH-ROM and scapular retraction, up to 3 months; 3-6 months active resistance & strength training.

## Wrist & Hand

**Knirk J et al (JBJS, 1986 68-Am (5);647-59)**

***Intra-articular Fractures of the Distal End of the Radius in Young Adults***

43 fractures in 40 patients aged 19-39 in the series. Treatment: 13 in cast, 14 MUA + plaster, 17 MUA + pins & plaster, 2 external fixator, and 3 by ORIF. 100% loss of reduction in all fractures treated with plaster alone vs. 38% treated with pins and plaster. High rate of sensory neuritis (33%) in those treated with external pins. 60% loss of initial reduction in unstable (Frykman V & VI) fractures.

Concomitant ulnar styloid process non-union offered a 60% relative risk of “fair” or “poor” result. Severe radial shortening precluded an “excellent” result on patient questionnaire. Radiographic and clinical post-traumatic arthritis if failure to restore articular surface with >2mm articular step of, or a non-reduced die-punch fragment.

**Sletten et al (J Hand Surg Eur 2015; 40: 76-83)**

***Conservative treatment has comparable outcome with bouquet pinning of little finger metacarpal neck fractures.***

Conservative treatment vs. bouquet pinning in a cohort of 85 patients with little finger metacarpal neck fracture with >30° angulation. No difference in pain, Quick DASH or satisfaction at 1 year.

**Trumble et al (JBJS 2010, 92-A (6); 1381-89)**

***Zone-II Flexor Tendon Repair: a randomised prospective trial of active place-and-hold therapy compared with passive motion therapy***

15-75 year old patients with both FDS and FDP ruptures in the same digit. No soft tissue injuries, no history of gout, pre-existing injury, and good pre-injury ROM. Tendon repair using 4-strand 2 core sutures, and a continuous epi-tendinous suture. Therapy started within 72 hours of surgery: passive therapy (Duran & Kleinert protocol, n=52), and active+passive therapy (n=54).

Active and passive therapy group had better ROM and reduced flexion contracture at 6 weeks and 1 year. Also significant better satisfaction score at 1 year. No difference in DASH, Purdue pegboard or Jebson-Taylor dexterity scores at 1 year. Associated nerve injuries (n=20) worsened final ROM and flexion contracture, and smoking (n=16) worsened final ROM. Active+passive group returned to work 3 weeks earlier, and little cost difference as the passive group needed an extra 4 weeks rehab.

**Costa et al (DRAFFT trial, BMJ August 2014)**

***Percutaneous fixation with Kirschner wires versus volar locking plate fixation in adults with dorsally displaced fracture of distal radius: randomised controlled trial***

Adequately powered, multi-centre RCT looking at dorsal-angulated distal radius fractures in adults that could be reduced without articular step if intra-articular. Excluded open injuries, or over 2 weeks old. Included if treating surgeon believed should have surgery. Primary outcome measure was Patient Related Wrist Evaluation (PRWE) and secondary measures were: DASH and complications.

K-wire group (n=208) surgical time was significantly shorter (31 mins) than ORIF group (n=213). Primary measure – both groups improved but were 15% worse than pre-injury level; no difference in DASH or complications (re-fracture, NV injury, tendon injury, superficial or deep infections). Thus K-wire fixation offers cheaper and shorter surgery without detrimental PROM data.

## Hip

**Hirst et al, *J Shoulder Elbow Surg* (1987) 69, 229-233**

***Bone grafting in Protrusio Acetabuli – Wrightington Technique.***

Protrusion defined as >5mm medial projection of femoral head into medial wall of acetabulum. Normal males have an acetabular line 2mm lateral to ilio-ischial line, so protrusion = >3mm medial projection. Normal females have an acetabular line 1mm medial to ilio-ischial line, so protrusion = >6mm medial projection.

Review of 61 protrusio patients treated with THR. Femoral head used to make 2mm bone wafers, with cortex trimmed. Moulded into acetabular defect, to reduce volume of cement needed to restore Shenton's line. Improved function. Remodelling never crosses ilio-ischial line, and avoids pushing cement beyond graft as this stops integration and remodelling of acetabulum. Remodelling most apparent in greater degrees of protrusion, and therefore recommended only for Grade 2 and 3.

**McCalden et al, *J Shoulder Elbow Surg* (2009) 91, 773-782**

***Wear Rate of THR highly cross-linked polyethylene liner***

Powered RCT comparing 50 patients with conventional liner with 50 highly cross-linked polyethylene liners in THR. 98% clinical scoring follow-up, and 75% x-ray follow-up. No difference in functional scores. Reduction in overall steady-state wear rates with highly cross-linked polyethylene, which takes into account bedding-in over the first year. More pronounced and significant in males, who have generally higher wear rates of conventional liners. No comment on longevity of implant, and no differences in osteolytic lesions

**Corten et al, *JBJS* (2009) 91B (11)**

***An algorithm for the surgical treatment of periprosthetic fractures of the femur around a well-fixed femoral component.***

Vancouver classification for periprosthetic fractures of THR: A = trochanteric fractures (G-greater, L-lessor), B = around tip of prosthesis (1-stable, 2-unstable femur, 3-unstable with bone loss), C = distal to prosthesis (can use LISS system if greater than 2 diameters below tip of prosthesis allowing 4 bicortical screws)

45 B1 patients, of which 20% were actually B2 on intra-operative assessment. n=34 (B1 29, C 4) underwent ORIF with lateral plate & cable system (PCS). 95% united within 6.5 months. Mean follow-up 4 years with 1 revision, and restoration of UCLA Hip scores to pre-fracture level. 9 complications (25%) - death 4, deep infection 3 (1 revised to girdlestone), 2 fractures.

***Spence G et al (JBJS Am, 2009, 91:2622-2636)***

**Effect of Innominate and Femoral Varus Derotation Osteotomy on Acetabular Development in Developmental Dysplasia of the Hip**

Retrospective cohort study (single blinded) of 35 Varus Derotation Osteotomies vs. 32 Pelvic Osteotomies for late presentations of DDH with dislocated hips. All combined with open reduction of hip before osteotomies, with average 6 years follow-up. No functional assessment, pure radiological endpoints, of acetabular index and femoral head centering ratio. At 4 years, pelvic osteotomy offered better: acetabular index (9.5° lower), improved acetabular floor thickness, and lateral/superior centering ratios. Therefore better radiographic remodelling of dysplasia with pelvic osteotomies vs. varus derotation of the femur - but no functional outcomes or degenerative arthritis rates reported.

***Vestergaard P et al (Acta Ortho, 2009, 80(5):525-30)***

**Loss of life years after a hip fracture**

Cohort Danish study from 1977 to 2001 (over 24 years). Hip fracture population (n=169,000) and age-sex matched controls (n=500,000). After a hip fracture, men aged 51-60 years lived 7.5 years less on average while men over 80 years of age lived 3 years less. Men ≤50 years of age lost 18% of their expected remaining years of life, as opposed to men > 80 years of age who lost as much as 58% of their expected remaining years of life. In women, the trend was similar but less pronounced (27% loss in women ≤50 years of age vs. 38% in women >80 years of age).

***Parker et al (JBJS Br, 2009, 2010;92-B:116-22)***

**Cemented versus uncemented hemiarthroplasty for intracapsular hip fractures**

Cochrane review in 2006 states cemented prosthesis offers better pain control and mobility. RCT: included displaced NOF# in patients over 60, but excluded patients aged 60-75 in whom had no pre-morbid mobility impairment. Standard Hardinge approach by single surgeon (or under his supervision), with cementing using Palacos-G and a cement restrictor. Mean follow-up of 3.7 years in survivors. N=189 in each group.

Uncemented technique offered significant shorter surgery (7 minutes), but higher intra-operative femoral fracture rate. No difference in cardiovascular complication rates, infections, re-operations/revisions or mortality (around 25%) . Minimal improvement in pain score (by 0.3 to 0.6) and mobility (< 1 point), significant in the first year only.

**Jansen D et al (2005, JBJS 87-B (11); 1561-7)**  
***Finite-element analysis of failure of the Capital Hip designs***

Theoretical computer model using data generated from CT scans of Capital Hip prosthesis (flanged and roundback designs in both steel and titanium), as well as CT scan data from cadaveric femoral shafts. Based on 2mm cement mantle (instead of clinical practice of 1mm), and 20 million loading cycle with 1:9 ratio of stair-climbing vs. walking.

Predicted loosening and failure rates in keeping with clinical findings of Royal College Investigation on 1899 clinical cases of Capital Hip prosthetic failure. Identified posterior migration of prosthetic head indicating longitudinal rotational failure, and increased contact stresses postero-medially and antero-laterally **independent** of Capital Hip design and material. *Suggestion that this can be a pre-clinical model for testing new prostheses, but does **not** take into account biological processes in loosening.*

**Pederson et al (2010, JBJS 92-B (7); 929-34)**  
***Risk of revision of a total hip replacement in patients with diabetes mellitus***

Review of Danish databases for hip registry, patient registry and prescriptions. 57575 primary THRs over 10 years (1996-2005), of whom 3275 had diabetes (5.7%). Relative risk of *revision due to deep infection* in diabetics was 1.45 (95% CI 1.0-2.1).

But higher relative risk of: 1.7 in patients with recent diagnosis of diabetes under 5 years prior, 2.1 in patients with diabetic complications, and 2.35 if diabetes and cardiovascular comorbidities. Recommend good glycaemic control prior to surgery, and awareness of higher risks of deep infection.

**Inaba Y et al (2011 Journal of Arthroplasty, 26 (7); 1117-1122)**  
***Little clinical advantage of modified Watson-Jones approach over modified mini-incision direct lateral approach in primary total hip arthroplasty***

Prospective RCT comparing muscle sparing approach (n=52) with mini-incision of gluteus medius which is **not** detached from the trochanter (n=50). Excluded patients who were normally chosen for the mini-incision group, as these would be harder to perform the muscle sparing surgery for. No difference in Harris Hip scores, WOMAC functional scores, pain VAS scores. No difference in muscle strength at 2 years, but abduction recovered more quickly in muscle sparing group at 6 weeks. No difference in WCC, CRP or muscle CK at 2 weeks, but less rise in CK on 1<sup>st</sup> post-operative day in muscle sparing group.

**Chemaly O et al (2013, Bone Joint J 2013;95-B:95–100)**

***Heterotopic ossification following total hip replacement for acetabular fractures***

Retrospective review of all cases (n=36) of acetabular fracture managed early (<2 months) or late (>1 year) with a THR – metal on polyethylene uncemented cups. Early cases had simultaneous ORIF to achieve stable columns before acetabular reaming, with autologous femoral head used as graft, and given prophylactic indomethacin (25mg TDS) and kept TTWB for 6 weeks.

Incidence of heterotopic ossification was 38% (15 of 36); with a 4-fold increase risk amongst the early group. The early group had a greater chance of the HO being severe with reduced functional scores, and also had double the blood loss intra-operatively. **Confounding factor:** all the polytrauma or high energy injuries were in the early group.

**Lewinnek G et al (JBJS 1978, 60-A (2); 217-20)**

***Dislocations after total hip-replacement arthroplasties***

Classic paper which sets standard for acetabular component positioning: inclination  $40^{\circ} \pm 10^{\circ}$ , and anteversion  $15^{\circ} \pm 10^{\circ}$  (p=0.045). Actually a terrible paper with several flaws.

Study group of 291 patients with 9 dislocations only. 178 of the non-dislocators lost to follow-up, and 3 of the 9 dislocations occurred within this safe zone. Individual analysis of inclination revealed no significant difference between dislocation and control group. Anteversion over  $25^{\circ}$  was significant but only for the 3 anterior dislocations. It should be noted that there were 6 posterior dislocations and no check whether they had a posterior repair! All 291 patients had a posterolateral approach, but only 190 patients had their posterior muscles repaired. Furthermore, 6 of the 9 dislocations actually were having revision surgery (p<0.01).

## Knee

**Dowsey M et al (2010, JBJS 92-B (4); 513-520**

***The impact of pre-operative obesity on weight change and outcome in total knee replacement.***

Prospective single institute study of TKRs performed over a 2 year period, according to a standardised peri-operative regime defined by an ICP. 5% weight loss deemed criteria based on FDA standards, as this confers favourable CVS & metabolic benefits. 529 patients with median BMI 31.

60% were obese or morbidly obese. Only 14% lost weight; 65% remained same weight, and 20% increased weight at 12 months post-op. All IKS-scores improved, but 10 points lower if BMI>30. Diabetes and CVS disease potential confounders as more prevalent in obese groups. Complications more common in obese & morbidly obese: DVT, superficial and deep joint infection, pain & locking. Overall 35% 12-month complication rate in morbid obese vs. 22% obese and 14% non-obese. Each increment in BMI confers 8% increase risk of an adverse event.

**Bedi A et al, (JBJS 2010, 92-A (6); 1398-1408)**

***Dynamic Contact Mechanics of the Medial Mensicus as a function of radial tear, repair and partial meniscectomy***

Cadaveric, powered study (n=8 per group) using sensors and a Stanmore knee simulator mounted with human bone. Found that mean contact pressure across the entire medial plateau at 14% and 45% of gait cycle 2-fold higher after partial meniscectomy, when compared with: normal knee, knees with untreated radial tear (30%, 60% & 90%), and knees with meniscal repairs.

Suggested that partial meniscectomy for the treatment of radial tears of the medial meniscus can have a detrimental effect on the contact mechanics of the knee, and that mattress suture repair or even benign neglect of the lesion may be *biomechanically* more favourable alternatives.

**Parratte S et al (JBJS 2010, 92-A; 2143-49**

***Effect of postoperative mechanical axis alignment on the fifteen-year survival of modern cemented total knee replacements***

Retrospective double-blinded review of a single surgeon's practice using 3 TKRs (Kinematic Condylar 2, PFC & Genesis). Split into 2 groups: well aligned to mechanical axis  $0^{\circ} \pm 3^{\circ}$  (n=292), and non-aligned (n=106). At 15 year follow-up no difference in revision due to mechanical failure along, and excluding patella problems.

No comment on function or satisfaction; only assessed coronal alignment. Are the much vaunted accuracy improvements offered by navigation worth the extra cost? (Note: incidental high infection rate requiring revision of 6.8%)

**Barrack R et al (JBJS 1997, 79-A; 1121-31)**

***Resurfacing of the patella in total knee arthroplasty, a prospective, randomised, double-blinded study***

Multi-centre RCT of patella resurfacing (n=58) vs. "patelloplasty" (n=60; osteophylectomy & drilling), with intra-operative randomisation during TKR. No difference in knee society score, satisfaction, or Insall-Salvati ratio. But 10% revision rate for delayed resurfacing. Overall anterior knee pain 7% in resurfaced patellae TKR vs. 13% in TKR without resurfacing.

If pre-existing anterior knee pain, resurfacing halved the relative risk of persistent anterior pain from 9% to 4%. But the degree of chondromalacia did not correlate with post-operative pain or function, in order to assist in identifying patients best suited for patella resurfacing. Interestingly unresurfaced patellae showed greater tilt on x-rays, but unrelated to any change in pain or function – and only added an average 8 minutes to surgery time.

**Gallacher et al (The Knee 2010, 17; 270-3)**

***White on white meniscal tears to fix or not to fix?***

Retrospective review of 87 meniscal repairs over a 10 year period with average 3 years follow-up. Meniscal repair within mean 8 months using 2 all-inside methods: clear fix screws or T-fix sutures. Kept PWB 3 weeks, then no weight-bearing flexion over 90°. Closed chain physiotherapy first 3 weeks, resume impact activity 3 months.

68% success rate, using re-operation on meniscus (re-repair or meniscectomy) as end point. No comment on delaying early arthritis. Increase in Lysholm knee score from 61 to 75 (but only assessed 35 of the 87 cases). Criteria for white on white meniscal repair:

1. Meniscus reducible, without a rolled edge
2. Fixation sound at end of procedure
3. Meniscus not degenerate
4. No concomitant ACL injury
5. No cartilage injury requiring chondroplasty or microfracture

Poor evidence to support repair as multiple criteria, no comment on long term arthritis risk, and 1 in 3 fail.

**Merill et al (JBJS 2005, 87-A; 2411-14)**

***The effect of femoral notching during total knee arthroplasty on the prevalence of postoperative femoral fractures and on clinical outcome.***

Case series of 1089 TKRs performed over 2 years with no exclusions. Double-blinded and assessed post-operatively for anterior femoral notching and its effect on supracondylar femoral fracture rate, pain, function and range of motion. Only two fractures in patients without notching. No effect on post-operative pain and function scores, or range of motion.

**Harris JD et al (JBJS 2010, 92-A; 2220-2333)**

***Autologous Chondrocyte Implantation – A Systematic Review***

Included 13 studies of level 1 and level 2 evidence. Comparing ACI vs. microfracture – only 3 of 7 studies supporting ACI. No differences between different generations of ACI – all 4 studies. ACI vs. OATS – no difference in all 2 studies. But poor methodology scores in all 13 studies (mean Coleman 54). Used effect size to compare different validated clinical outcome scores. Did find certain patient factors favoured in ACI: younger (<30-35), more active, early surgery, no failed prior surgery

**Van Jonbergen et al (JBJS 2011, 93-B (8); 1054-9)**

***A randomised controlled trial of circumpatellar electrocautery in total knee replacement without patellar resurfacing***

RCT comparison of primary TKR with circumpatellar electrocautery (n=150) to TKR alone, via standard lateral para-patella approach using Zimmer NexGen posterior stabilised prosthesis. Incidence of anterior knee pain was 19% in electro-cautery group and 32% in control group – a relative risk reduction of 40%. Also the electro-cautery group had better WOMAC total and functional scores at 2 years. However, no difference in overall American Knee Society scores at 2 years.

**Sun K et al (2011, Arthroscopy, 27(9); 1195-1202)**

***Arthroscopic Anterior Cruciate Ligament Reconstruction With at Least 2.5 Years' Follow-up Comparing Hamstring Tendon Autograft and Irradiated Allograft***

Acute and chronic isolated ACL ruptures following a first time knee injury. Excluded if had contra-lateral ACL injury. Single surgeon study for uniform surgical technique, but unpowered and unblinded. Started CPM post-op from 0-45 degrees and increased 10 degrees per day to 120. Also started closed chain and active quads exercises. Hydrotherapy at 8 weeks, jogging at 3 months and contact sports at 6-12 months with a functional brace for first 1-2 years.

n=75, but 8 lost to follow-up for full (with 6 in allograft group - of whom 2 because of poor outcome) Analysis on 67 patients with mean follow-up of 42 months (3.5 years). Autograft n=36, allograft n=31.

Allograft surgery 15 minutes shorter, but patients had a fever (>37.2) for significant 2.5 days longer but with no difference in elevation of CRP/ESR levels. No cases of arthrofibrosis, kneeling pain, deep infection, DVT or failure of fixation. **But allograft had significantly residual positive anterior drawer test and Lachman test.** But no difference in subjective or objective IKDC scores, ROM, vertical jump height or single-leg hop test. **But no idea if long-term results may show trouble from increased laxity of allograft.**

**Bloch B et al (BJJ 2014, 96-B (1); 122-6)**

***Thromboprophylaxis with dabigatran leads to an increased incidence of wound leakage and an increased length of stay after total joint replacement***

Comparison over two 3 month periods of TKR & THR patients given 14 days of dabigatran vs. inpatient dalteparin & 150mg aspirin for 6 weeks. Wound leakage higher in dabigatran group (20% vs. 5%,  $p < 0.001$ ), and inpatient stay lengthened by 1 day ( $p < 0.05$ ). VTE rate worse for dabigatran group (1.3% vs. 0.3%,  $p < 0.05$ ).

## Foot & Ankle

**Ramsey PL et al (1976, JBJS 58-A (3); 356-7**

***Changes in tibiotalar contact area caused by lateral talar shift***

Carbon-black transference used to measure tibiotalar contact area with ankle plantargrade and a fixed axial force equivalent to 70kg applied. 26 cadaveric specimens used. Talus shifted laterally and contact area measured again.

From 0-1mm lateral shift, contact area reduced by 42%. 1-2mm reduced contact area a further 14%, 2-4mm a further 9%, and 4-6mm only a further 3%. Even 1mm lateral talar shift reduces contact area and therefore increases point loading on the ankle joint's articular surface by 42% - contributing to early post-traumatic arthritis.

**Wallace R et al (JBJS, 2011; 93-B; 1362-66)**

***The non-operative functional management of patients with a rupture of the tendo Achilles leads to low rates of re-rupture***

Enrolled by clinical diagnosis based on classical history and examination findings (palpable gap, bruising and absent calf-squeeze test). **949** ruptures tendons treated non-operatively in patients with a mean age of 49, of whom 70 were delayed presentations. Minimum 2 year follow-up.

Protocol: A&E referrals to Achilles rupture clinic, and placed immediately in an equinus cast. At 4 weeks changed to pneumatic walker with heel raises removed fortnightly. Walker removed at 8 weeks, and began physiotherapy (gait training, strength and mobility) for a period of 6 weeks before discharge.

Good to excellent subjective assessments in 99.4%. All returned to work and pre-injury sporting level within 3 months of finishing physiotherapy. Re-rupture rate just 2.8% - all occurred within 3 months. Age, return to sport and delayed presentation did not influence re-rupture rate. Other complications: DVT 1%, heel pain 2%, reduced ROM 1%.

**Healy et al (JBJS, 2010; 92B (5) 646-650)**

***Venous thromboembolism following prolonged cast immobilisation for injury to the tendo Achilles***

Retrospective case series of 208 patients, managed in cast for 6-8 weeks following surgical and conservative repair of the TA-injury (rupture or tendinitis). Symptomatic VTE rate proven on USS scan around 6.3% (comparable to rate following arthroplasty). No DVT prophylaxis given to any of the cases, despite 50% having risk factors for VTE.

**Willits K et al (JBJS 2010, 92-A; 2767-750**

***Operative vs. nonoperative treatment of acute Achilles tendon ruptures***

Multi-centre RCT with minimum 2 years follow-up for acute (less than 2 weeks) TA rupture. Excluded patients on fluoroquinolones or IDDM. Comparison of surgery plus accelerated rehab (n=58) with pure accelerated rehab alone (n=58), with primary outcome of re-rupture, and secondary outcomes of isokinetic strength, Leppilahti score, ankle ROM and calf circumference. Each group underpowered by 20, but initial power calculation based on much higher re-rupture rates seen with standard rehab as opposed to early weight bearing.

Reruptures: 2 in surgery group, and 3 in nonoperative group – not significant. Both groups achieved 80% plantarflexion and 100% dorsiflexion compared to uninjured side. But *operative group had 20% more strength* relative to uninjured side. No difference in calf circumference (both groups reduced by 1.3 cm). Total complications 18% vs. 8%, with *more complications related to surgery*.

Accelerated program:

Time	Activity
Week 0	NWB equinus cast
Week 2	PWB in air cast boot with 2 cm heel insert, worn even when asleep. Passive ROM exercises up to plantargrade (neutral) position
Week 4	Allow FWB in boot
Week 6	Remove heel raise, and start dorsiflexion stretching
Week 8	Wean off the boot
Week 12	Start strength training, and sport specific training with physiotherapist.

**Soroceanu A et al (JBJS 2012; 94-A: 2136-43**

***Surgical Versus Nonsurgical Treatment of Acute Achilles Tendon Ruptures: A Meta-analysis of Randomized Trials***

Included RCTs comparing open or mini-open surgery vs. any form of non-operative management for acute primary TA ruptures (<3 weeks old). TEN studies only: surgical group n=418, conservative group n=408, mean age 40. Overall risk difference of re-rupture favoured surgery - 5.5% (but absolute reruptures after surgery was 40% the number in the conservative group). **But** looking at functional rehabilitation vs. surgery, the risk difference fell to 1.7% (not significant). Prolonged immobilisation raised the risk difference to 9%.

Other complications: infection, stiffness, scar adhesions, sural nerve injury, tendon lengthening, VTE. Risk difference favoured conservative management at 16%, with a relative risk of 7. Put another way, 1 in 7 surgical patients could expect one of these *other* complications. Surgical patients did return to work 19 days earlier, with no clinical difference in ROM, calf circumference, strength or functional scores.

**Wood P et al (JBJS 2008; 90-B (5); 605-9)**

***Total Ankle Replacement – medium-term results in 200 Scandinavian Total Ankle Replacements***

Review of 200 STAR prostheses – only 143 remained alive to participate in medium term review. 119 performed for inflammatory arthritis, and 81 for OA – 25 had previous fractures. 12.5% showed signs of aseptic loosening – half of whom were symptomatic to require revision or fusion. <5% had edge loading requiring bony-re-alignment or revision. Overall 12% revision rate for failure, most of which required fusion at an average 4 years.

5% sustained intra-operative malleolar fracture, and further 5% had a post-operative fracture all within 1 year of primary surgery. Valgus-varus deformity > 15° associated with failure risk. Two thirds (67.5%) have good relief of pain and no complications.

**Tomeson T et al (JBJS 2011; 93-A; 920-928)**

**Treatment of Displaced Intra-Articular Calcaneal Fractures with Closed Reduction and Percutaneous Screw Fixation**

Series of 39 (out of original 69) closed, isolated intra-articular fractures over a 8 year period with minimum 2 years follow-up and average 5.5 years – in general large fracture fragments required to choose this less invasive technique.

Bohler's angle improved from 3° to 22° after surgery, and maintained at 20° at final follow-up. Of the 39: two patients had persistent deformity or were unable to return to work, 8 patients required modified footwear. On average regained 80% of ankle ROM and 55% of subtalar ROM. Infection rate of 13% - all 5 patients needing removal of metalwork. 73% has good or excellent outcomes (AOFAS), and 90% reported little or no pain at final follow-up.

## Spine

**Fairbank J et al (BMJ, 2005, 330:1233-**

***Randomised controlled trial to compare surgical stabilisation of the lumbar spine with an intensive rehabilitation programme for patients with chronic low back pain: the MRC spine stabilisation trial***

Comparison of fusion vs. rehab in patients 18-55 with chronic LBP >12 months. Randomised, multi-centre and prospective, but unblinded. Adequate power. Included only if surgeon unsure of outcome choice. Excluded patients with inflammatory arthritis, tumour, fracture, infection or previous stabilisation. 176 patients had surgery (fusion or flexible stabilisation). 173 had an intensive rehab protocol of daily therapy for 3 weeks focusing on: strengthening, flexibility, CVS endurance, spine stabilisation and CBT.

Surgical group had 24 (31%) complications, 11 (6%) required re-operation and 86 (49%) required additional therapy (physio or analgesia). In the rehab group, 48 (28%) required surgery within 1st two years. Overall 55% in surgical group had further therapy compared with only 40% in rehab group. Only ODI showed significant reduction of 4.1 points ( $p=0.045$ ), but no significant improvement in shuttle walking score or SF-36. Problems: best patients for surgery excluded as only included if outcome unknown. Conclusion - NO difference.

**Pratchell R et al (Lancet, 2005, 366: 643-8)**

***Direct decompressive surgical resection in the treatment of spinal cord compression caused by metastatic cancer: a randomised trial***

Randomised and prospective trial looking at patients >18 years with MRI evidence of spinal metastasis with cord compression (single contiguous lesion), 1+ neurologic sign, any paraplegia <48hrs, and expected survival >3 months. Protocol: 100mg dexamethasone, and then 24mg QDS until start of surgery or radiotherapy (reduced if diabetic). Radiotherapy involved 10 fractions of 3Gy targeted to lesion and one vertebra above and below. Surgery by means of decompression +/- stabilisation, with same radiotherapy regime within 14 days post-op. Ambulatory rate = ability to walk 4 steps (aids allowed) immediately, and measured initial success, while ambulatory time measured long-term success.

Combined (n=50), radiotherapy (n=51). In ambulatory patients (n=69) 20% better maintenance of ambulation with surgery and longer duration (>100 days). In non-ambulatory patients (n=32) 60% in combined group regained ambulation for 60 days, compared with 20% radiotherapy group maintained <24 hours. Surgery better as 1st line therapy, as reduced ambulation rate in crossover group from radiotherapy to surgery, compared with surgery directly.

**Peu W et al (BMJ, 2008, online first)**

***Prolonged conservative care versus early surgery in patients with sciatica caused by lumbar disc herniation: two year results of a randomised controlled trial***

Randomised controlled unblinded comparison of early surgery at 6-12 weeks from onset of radicular symptoms with matching radiographic findings. Surgery group n=141, but only 125 underwent microdiscectomy. Prolonged conservative treatment managed by GP with pain killers and mobilisation regime (compliance not checked) in 142; however 62 (40%) required surgery within 6-24 months.

6% of surgical group had recurrent sciatica requiring further surgery. Other complications of surgery in total only 1.6%. No difference in Roland sciatica disability score, VA-leg pain score or satisfaction (7-point Likert) score at 2 years. Early surgery conferred better scores in first 6 months indicating faster improvement and recovery. Regardless after 2 years, 1 in 5 (20%) were dissatisfied independent of treatment arm.

**Weinstein et al (JBJS, 2009, 91:1295-1304)**

***Surgical Compared with Nonoperative Treatment for Lumbar Degenerative Spondylolisthesis***

Randomised and cohort observational arms comparing decompressive laminectomy ( $\pm$  fusion) vs. non-standardised conservative care. Patients must have neurogenic claudication or radicular symptoms for > 12 weeks with matching radiographic findings. May have had failed treatments including: physiotherapy, epidural injections, chiropractic treatment, NSAIDs or opiates.

Numerous patients crossing over from conservative to surgical arms and vice-versa. Analysed on "as-treated" basis. Improved SF-36 body & function scores and better ODI seen in combined operative group (regardless of original chosen or randomised treatment arm) at 2 years which was maintained at 4 years. But chaotic cross-over and complicated statistics detract from this paper.

**Schaberg et al (Spine, 1985; 10 (1); 19-20**

***A profile of metastatic carcinoma of the spine***

Series of 322 cancer patients with known skeletal metastases over 15 years – (1) breast, (2) lung, (3) prostate. 50% of group had spinal metastases, but 100% of bowel cancer primaries spread to the spine. Symptoms: pain (64% back, 93% neck), neurological deficit (20% total, 50% renal, 30% prostate & colon). Only 7 patients (2%) presented with neurologic deficit from an undetected primary malignancy. 36% of patients with spinal lesions were asymptomatic, and this rose to 50% if for thoracic spine lesions.

**Altaf F et al (JBJS, 2011; 93-B (1); 73-77)**

***Repair of spondylolysis using compression with a modular link and screws***

Prospective case series of 20 patients. Inclusion – 12+ months disabling lower back pain without sciatica, L5 pars defect, grade 1 spondylolysis or less, no adjacent degenerative changes. Assessment of union with CT scan along with ODI and VAS pain score. Procedure – autologous iliac bone graft impacted into defect after hole prepared for 5 mm pedicle screw. Pedicle screws placed and connected by a U-shaped link, placed under the interspinous ligament. IV antibiotics given post-operatively until wound is dry.

No loss in follow-up at mean 4 years (minimum 2). Length of stay between 2 and 5 days, with only 2 SSSIs. Union in 16 patients (60%), with the 3 of the 4 non-unions having had a pre-operative grade 1 slip. 18 of the 20 had improved ODI; mean ODI improved from 54% to 8%), and VAS pain score from 8.1 to 1.6. The 2 patients whose scores did not improve, both had non-unions, one of whom was the only smoker in the group. Consider patient selection of those under 30 (less degenerative disease), those with pars defects that are “hot” on bone scan, and non-smokers.

**Lee C-S et al (JBJS, 2011, 93-B; 1400-04)**

***Difference in post-operative functional disability and patient satisfaction between patients with long (three levels or more) and short (less than three) lumbar fusions***

Retrospective review of 56 consecutive patients with a mean 4.1 levels fused (Group 1). Inclusion: degenerative disease, severe restriction of ADLs, failure of conservative treatment for 6 months. Exclusion: previous surgery, painful pseudoarthrosis, combined cervical or thoracic myelopathy, impaired ADLs because of another cause (e.g. Parkinson's , CVA or psychosis). Compared with age and gender matched group who had undergone single or 2-level lumbar fusions (Group 2). All operations involved posterior decompression with titanium cage and instrumentation. Iliac screws used if more than 4 levels fused, but no artificial graft / BMP used. Mean follow-up period was 3 years (2 years minimum).

Group 1 ODI reduced from 55 to 33, pain VAS reduced from 6.6 to 3.4 (back) and 6.8 to 3.8 (leg). In Group 2, ODI reduced from 51 to 26, and pain VAS reduced from 5.7 to 3.5 (back) and 7.2 to 3.3 (leg). Both groups showed ODI improvement, but 10 points (10%) better in short segment fusion Group 2. Particularly better lifting, sitting , standing and travelling reported in Group 2. However, overall patient reported satisfaction **equal**. Most significant difference in post-operative ODI seen when comparing those with <4 levels, and those with >4 levels fused.

**Albert H et al (Eur Spine J 2013, 22:697-707)**

***Antibiotic treatment in patients with chronic low back pain and vertebral bone oedema (Modic type 1 changes): a double-blind randomized clinical controlled trial of efficacy***

Background of work showing high prevalence of *Propionibacterium acnes* and *Corynebacterium propinquum* colonisation of resected herniated lumbar discs. Double-blind RCT adequately powered for simple assessment of amoxicillin versus placebo (CaCO<sub>3</sub>) with identical appearance tablets. 95% compliance and assessment at baseline, after 100 days (14 weeks), and at 1 year. Co-amoxiclav based on published sensitivities and expert opinion, and also because it exerts minimum TNF $\alpha$  anti-inflammatory effect.

*Inclusion:* 18-65 years, MRI confirmed disc herniations between L3 and S1, chronic lower back pain for 6-24 months, and Modic type 1 change in adjacent vertebra. *Exclusion:* antibiotic allergies, pregnancy / lactation, renal disease or pending litigation. *Modic changes:* 1 = endplate alone, 2 = <25% of vertebra, 3 = <50% and 4 = >50% involvement.

Comparison groups: A = 1 co-amoxiclav tablet (n=45), B = 1 placebo (n=36), C = 2 amoxicillin tablets (n=45), D = 2 placebo (n=36). Significant improvement in antibiotic group at 100 days on finishing course and continued improvement seen at 1 year for all outcome measures (questionnaires, pain scores, volume of modic change on repeat MRI and sick days). A trend noted favouring a dose-response effect. 27% had loose bowel movements for > 3 weeks (only side effect), with less than 3% having severe GI symptoms prompting discontinuation.

Interestingly the antibiotic group at 1 year reported a drop in lower back pain from 100% to 67%, constant pain reduced from 75% to 20%, sleep disturbance dropped from 75% to 30%.

## **SPORT Trials Summary**

### **1. Disc Prolapse**

- 1.1. *Weinstein 2006* – open discectomy vs. physio + counselling + analgesia. Minimum 6 weeks persistent symptoms before randomisation. Matched trial based on symptoms, signs and imaging. Performed as an intention to treat with high cross-over rates which could blur results. At 2 years, no significant difference in outcome.
- 1.2. *Weinstein 2008* – re-analysis original dataset on an as-treated basis. Significant improvement in body pain, physical function and ODIs (+ satisfaction). Improvement seen at 2 years and persisted to 4 years.
- 1.3. *Lurie 2014* – continued follow-up of as-treated analysis with superior outcomes in surgical group maintained at 8 years.

### **2. Spondylolisthesis**

- 2.1. *Weinstein 2007* – in patients with lumbar degenerative spondylolisthesis, decompression ( $\pm$  fusion) vs. physiotherapy & injections. Analysis performed on as-treated basis, with better pain, function and ODIs in surgical group.

2.2. *Weinstein 2009* – superior outcomes maintained at 4 years when re-analysed.

### **3. Lumbar stenosis**

3.1. *Weinstein 2008* – patients with 12 weeks of lumbar stenosis symptoms with matching imaging were randomised to decompression vs. physiotherapy + counselling + analgesia. As-treated analysis revealed improved pain, function and ODIs at 3 months, 2 years and 4 years.

## Trauma

### **Naique S et al (JBJS 2006, 88-B (3) 351-7)**

#### ***Management of severe open tibial fractures***

Unpowered retrospective review of Grade IIIB open tibia fractures, with no loss in follow-up: primary group (straight to trauma centre, n=26), and tertiary group (initial debridement/fixation before transfer to tertiary centre, n=47). 70% caused by RTA; compartment syndrome incidence 10%, CPN palsy 6%, limb salvage achieved in 93%.

- 80% had initial debridement within 6 hours in primary group, but only 60% in tertiary group. However no difference in deep infection rates regardless of timing.
- Flap failure rate <10%, and possibly associated with delay in coverage >5 days from injury (approaching significance)
- Flap failure not associated with delay to union, or deep infection.
  - Harder due to oedema, peri-vascular fibrosis, risk of venous thrombosis
- Mean time to union 29 weeks for both ring fixators and IM-nails.
- Nearly half (48%) of patients in tertiary group required early revision
- Superficial infection rate 9% overall; deep infection 9%; pin site infection 7%
- No difference in deep infections in IM-nails or circular frames
- Ilizarov frames used primarily needed fewer secondary procedures
- No difference in functional level for each group, or each type of fixation
- Half returned to full work; 1/5 to reduced activity, and 1/5 unable to work

Advise: radical debridement and stabilisation by senior Orthopaedic team member (in discussion with Plastic surgeons) on an urgent basis as opposed to emergency surgery. IM Nail used in diaphyseal fracture with minimal comminution/contamination, provided soft tissue coverage possible within 36 hours. External fixation used for proximal/distal fractures, gross comminution/contamination, bone loss >2cm, or predicted delay in soft tissue coverage.

### **Pollak et al (JBJS 2010, 92-A (1) 1-6)**

#### ***Relationship between time to surgical debridement and incidence of infection after open lower limb distal extremity fracture (III A-C)***

315 patients treated at level 1 trauma centres - treated with aggressive debridement, antibiotics, stabilisation and soft tissue coverage. 3 month infection rate of 27%. No difference for: time from injury to 1st debridement, time from 1st debridement to tissue coverage. However predictors were bone loss > 2 cm, and prolonged transit time > 2hrs to admitting centre.

### **Khan S et al (Injury 2009, 40; 692-7)**

#### ***Timing of surgery for hip fractures: A systematic review of 52 publications involving 291,413 patients***

A review **not** meta-analysis over 47 years looking at 52 of English language publications regarding timing of surgery for **extra**-capsular NOF#. Ideally looking for prospective

papers which **excluded** patients deemed initially unfit for immediate surgery (3 papers). All studies which excluded initially unfit surgery was 10 of 52. Excluded one paper which randomised patients on admission to peri-operative HDU/ITU care – those receiving stepped-up care had later surgery(6.5 days vs. 3.7), with reduced mortality (3% vs 29%).

	<i>Mortality</i>	<i>Medical Complications</i>	<i>Length of hospital stay</i>	<i>Failure to return home</i>
<i>No effect</i>	23	9	6	2
<i>Incr. (early)</i>	22	9	13	2
<i>Decr. (early)</i>	2	0	0	0

**Holt G et al (JBJS 2010, 92-B (6) 835-841)**

***Does delay to theatre for medical reasons affect the peri-operative mortality in patients with a fracture of the hip?***

Retrospective audit of 4284 NOF-fractures using Scottish national audit data. No change in 30-day mortality with delay in surgery (beyond 2<sup>nd</sup> day), once corrected for co-morbidities and major pre-operative abnormalities. However uncorrected major physiological parameters reduced 30-day survival to 73%, while correcting these anomalies increased 30-day survival to 92%.

Major negative physiological parameters:

1. systolic BP < 90 mmHg
2. Pulse ≤ 40 or >120 ± AF
3. Temp ≥ 38.5 + infection on CXR
4. New MI or angina with ECG changes
5. Acute LVF
6. O<sub>2</sub> sats < 90%, PaO<sub>2</sub> < 8kPa, PaCO<sub>2</sub> ≥ 7.4kPa
7. INR > 1.6
8. Na < 125, K < 2.5, HCO<sub>3</sub> < 18 mmol/l
9. Glucose > 33 mmol/l
10. Ur >18 mmol/l or Cr>225 µmol/l
11. Hb ≤ 7.5 g/dl

**Barton T et al (2010, JBJS 92-A; 792-8)**

***A comparison of the long gamma nail with the sliding hip screw for the treatment of AO-OTA 31-A2 Fractures of the Proximal Part of the Femur***

IM nail believed superior for extra-capsular fractures with sub-trochanteric extension (31-A3), but controversy regarding extra-capsular NOF# with comminution involving the lesser trochanter (31-A2). Unblinded RCT with n=100 in IM nail group, and n=110 in DHS group, with FWB mobilisation allowed post-op. Underpowered by 10 in the IM-nail group. 12 months follow-up.

No difference in re-operation rate due to cut out of hip screw, nor length of stay, nor mortality, nor QALY score *after controlling for pre-operative mini-mental test score*. MMT known to be independent predictor for these outcomes. Each group of patients dropped one level of mobility and one level of residency.

**Furia J et al (2010, JBJS 92-A; 846-54)**

***Shock wave therapy compared with intramedullary screw fixation for non-union of proximal fifth metatarsal metaphyseal-diaphyseal fractures***

Retrospective cohort study: shockwave group n=23, surgical group n=20. Non-union defined as lack of radiographic union at 6 months **and** pain at fracture site. Both performed under GA; shockwave group had 2000-4000 pulses at 26kV, corresponding to energy flux density of 0.35 mJ/mm<sup>2</sup> – mobilised FWB in BK-cast for 4-6 weeks. Surgery group fixed with countersunk screw and mobilised NWB 2 weeks in backslab, and then further 2-4 weeks TTWB in walking boot. 2 different shockwave machines used, and two screw diameters used.

In shockwave group 20 of 23 healed at 3 months, and 21 healed at 6 months. In surgery group, 18 of 20 healed at 3 and 6 months. One complication of petechiae in shockwave group, which resolved within 24 hours spontaneously. 11 complications in surgical group: refracture (1), cellulitis (1), symptomatic hardware requiring removal of metal (9). Equal return to sporting activities and heavy labour occupations, in these individual sub-groups.

**Kim et al (JBJS, 2010; 92A (1) 1-6)**

***Should an Ulnar Styloid Fracture be fixed following volar plate fixation of a distal radius fracture?***

n=138, retrospective study of patients with displaced distal radius fracture treated by ORIF volar locked plate. Analysed by means of ROM and Mayo Wrist Score/DASH score for subgroups with no ulnar styloid fracture, base fracture or tip fracture, and by undisplaced or displaced (>2mm). No significant difference in outcome measures.

**Berkes M et al (2010, JBJS 92-A; 823-8)**

***Maintenance of hardware after early post-operative infection following fracture internal fixation***

Retrospective review at 3 level-I trauma centres of all 123 cases with post-op wound infections and positive cultures at debridement, over a 2 year period. Infections within first 6 weeks of fixation, and treated by operative debridement and targeted antibiotic suppression (duration not recorded). Success defined as bony union with retained hardware, or removal of hardware after bony union.

Success in 87 cases (71%), but 31% (1 in 3) subsequently required removal of metal due to infection recurrence. 36 failures: amputation (7), death (1), persistent infection (1), non-union (27). Associated with failure was use of an IM-nail, smoking, Pseudomonas culture. Interestingly diabetes not a significant risk factor for failure. *Therefore in the presence of early proven deep infection, debridement, targeted antibiotic suppression and hardware retention can be attempted, especially if patients selected to exclude certain risk factors.*

**Das De et al (JBJS, 2010; 92A (1) 679-686)**

***A rational approach to management of alendronate-related subtrochanteric fractures***

26 low velocity subtrochanteric fractures of a 6 year period, in 20 patients (6 had bilateral fractures). 12 of 20 patients were taking alendronate (for >4 years). Characteristics: transverse or slight oblique fracture line, lateral cortical thickening, and minimal comminution.

Pre-existing ellipsoid thickening of the lateral femoral cortex associated with pain should prompt investigation for occult fracture and prophylactic fixation on contralateral side. Stop bisphosphonate and re-assess osteoporosis risk with bone densitometry and FRAX score – teriparatide may be a suitable alternative agent if required.

**Isaacs et al (CORR, 2010; 468, 3384-3392)**

***Femoral Insufficiency Fractures Associated with Prolonged Bisphosphonate Therapy***

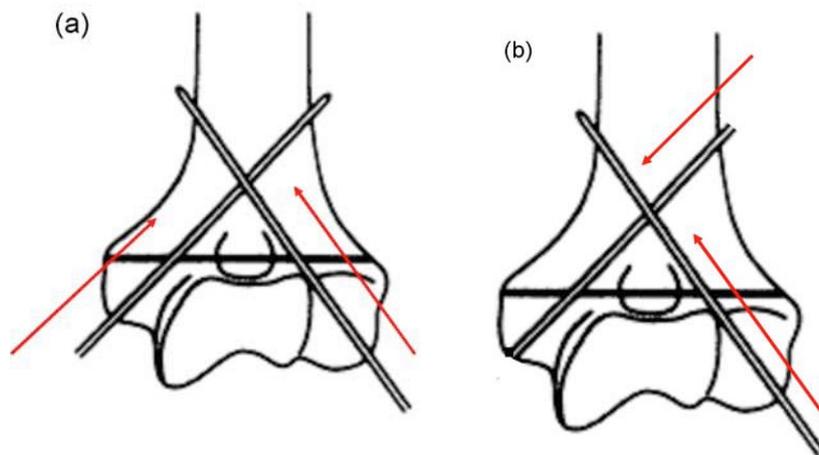
Comparison of low energy subtrochanteric and femoral fractures, over 65 without underlying cancer: pre-bisphosphonates (1995-1997) n=38, post (2007-2009) n=79. Only 55% of pre-group included as imaging available (i.e. 21 patients). In the pre-group there were no patients with an insufficiency type fracture on imaging.

In the post-group, 53 of the 79 patients on long term bisphosphonates, and there were 41 patients with a characteristic insufficiency pattern. All of the 41 insufficiency type fractures were taking bisphosphonates for average 7.1 years. The 12 patients on bisphosphonates without an insufficiency fracture were only taking for an average 3.2 years. 71% of the 41 insufficiency fractures had a prodrome of groin, thigh or knee pain, and nearly half (44%) had bilateral insufficiency femoral fractures on x-ray.

Is there a difference between alendronate (taken by 40 of the 41 with insufficiency fractures) and risedronate? Study only looks at relative risk of bisphosphonates, and not absolute risks. Need to further investigate limiting bisphosphonate use to 5 years, and assessing any patients for insufficiency who complain of prodromal symptoms – prophylactically treating insufficiency, and stopping bisphosphonates or switching to alternative agents.

**Queally et al (Injury, 2010; 41: 568-571**

***Dorgan's lateral cross-wiring of supracondylar fractures of the humerus in children: A retrospective review***



For the treatment of displaced supracondylar fractures of the humerus in children, crossed wires have been shown to have better biomechanical stability with published failure of fixation of 0%, compared with 1% in lateral parallel wires. Diverging wires are considered another option. However, with crossed wires there is a reported iatrogenic ulnar nerve risk of 3% compared with <1% using lateral wires only. This is an alternative technique (Figure b) using crossed wires from the lateral side only – the orthograde lateral wire does *not* pierce the medial cortex.

Retrospective review of 43 patients over 10 years, with a mean 3 year follow-up. Zero ulnar nerve injuries, zero failures of fixation, and no significant change in Bauman's angle. No loss of function reported. No comparison / control group.

**Stufkens S et al (JBJS 2010, 92-A; 279-86)**

***Cartilage lesions and the development of osteoarthritis after internal fixation of ankle fractures: a prospective study***

Swiss case series of 109 of 288 patients willing & surviving patients who had pre-ORIF arthroscopy after ankle fracture. Bias of selecting group of patients who had fewer medical problems and mobility. Mean follow-up 13 years, with age range of 16-76. No cases of co-

existent inflammatory arthropathy, and excluded one patient with pre-fracture ankle disease and 2 patients with inadequate reduction post-ORIF.

Only 1 in 5 patients had no cartilage lesions. Of those with lesions, 4 of 5 had injuries on more than one articular surface. 3-fold increase in significant arthritis (Kannus radiographic score <90) and disability (AOFAS <90) associated with cartilage lesions on the tibia and talus, but not fibula (25% frequency). Overall post-traumatic arthritis incidence of 40% at 13 years.

50% cartilage depth lesions occurred more frequently on the medial malleolus (22%) and posterior tibial plafond (12%), and were associated with 5-fold increase in disability and arthritis. The rest of the tibial plafond were rarely affected (only 4%) and not associated with increased risk of arthritis or disability. Talar dome lesions were associated with a 4-fold increase in disability and 2.5-fold increase in arthritis - though the posterior dome was never injured.

**Wahnert D et al (JBJS 2010, 92-A (6); 442-52)**

***Internal Fixation of Type C Distal Femoral Fractures in Osteoporotic Bone***

Comparison of 12mm diameter 360mm long Stryker T2 femoral nail, Stryker T2 Supracondylar Nail and Synthes Distal Femoral Nail, with the Stryker AxSOS 310mm 14-hole angular stable plate. Compared in artificially created 33-C2 fractures in cadaveric bone and artificial bone (mimicing mild osteoporosis in terms of density), on a hydraulic material testing machine.

AxSOS plate gave greatest torsional stiffness, but the supracondylar nail achieved 88% of this. Axial stiffness was greatest in the supracondylar nail, followed closely by the distal femoral nail and the T2 femoral nail. The plate could only provide 40% of the axial stiffness of the supracondylar nail. In terms of cycles to axial failure the supracondylar nail was best (6212 cycles), followed by the AxSOS plate (3504 cycles). The DFN (2504 cycles) and T2 femoral nail (2090 cycles) were weaker than the plate.

Suggestion that for bed bound patients where torsional stability is more important, the plate may be chosen. However for weight-bearing patients, the Supracondylar nail is a better choice.

**Guo et al (JBJS 2010, 92-B (7); 984-88)**

***A prospective randomised trial comparing closed intramedullary nailing with percutaneous plating in the treatment of distal metaphyseal fractures of the tibia***

For closed and Grade 1 open fractures of the extra-articular distal metaphysis of the tibia with a distal fragment of at least 3 cm (Type 43-A fractures). Stryker S2 nail (n=44), and Synthes LCP plate (n=41). *No difference in time to union, pain, function, alignment or AOFAS scores.* More superficial wound complications in plating group, but did not achieve significance. Implant removal harder in locking plate group, with 1 in 3 having problems with stripping of hexagonal recess in locking screws. Shorter surgery and reduced radiation time with IM nail.

**Johnston AT et al (JBJS, 2010, 92-B (7); 989-93)**

***Changes in long-term mortality associated with fractures of the hip***

Use of Scottish Hip fracture audit database from 1998 to 2005, and General Register Office of deaths. Compared with interim life tables for non-fracture group, from the Office of National Statistics (Scottish Government). Pathological fractures from primary or metastatic cancer excluded.

30479 hip fractures in 29134 patients assessed. Nearly 80% of fractures were in women. At 1 year, mortality 30% with half of these deaths occurring within 2 months of fracture. Worse mortality in men with only 10% 5-year survival in 85+ age group, compared with 20% 5-year survival in women. In 65-85 age group only 40-60% 5-year survival – this increase risk of mortality persists up to 8 years. Extra-capsular fractures and sequential bilateral hip fractures conferred increased mortality.

**Epstein H (JBJS 1961, 43-A (8); 1079-1098)**

***Posterior Fracture-Dislocations of the Hip***

<b>1</b>	<b>dislocation with or without a minor fracture</b>
<b>2</b>	<b>dislocation with a large single fracture of posterior acetabular rim</b>
<b>3</b>	<b>comminuted fracture of acetabulum rim.</b>
<b>4</b>	<b>fracture of rim and floor of acetabulum</b>
<b>5</b>	<b>dislocation with fracture of femoral head.</b>

n=55 Type 2-5 injuries - 16 closed reduction and 34 ORIF. Of the open reductions: 17 early primary ORIF, 6 delayed primary ORIF, and 11 secondary ORIF. Average follow-up 40 months. When joint open, intra-articular fragments found in almost all cases (often when not seen on x-ray). Better subjective scores for open reduction compared with closed reduction from removal of these fragments. Furthermore, primary open reduction deemed better than secondary open reduction after failed closed reduction - additional insult of closed reduction with intra-articular fragments still present between femoral head and acetabulum?

**Starman J et al (CORR 2010, 468;1669-1675)**

***Proximal Tibial Metaphyseal Fractures with Severe Soft Tissue Injury***

Retrospective, non-randomised subgroup analysis of LEAP study group with open proximal tibial fractures. Limb salvage (n=38), and amputation (n=22) performed. No difference in overall functional scores (physical & psychosocial Sickness Impact Profile SIP) or return to work at 2 years follow-up. However significant confounding factors even in this small population study: age <35 and education level both effected functional outcome and return to work. Limb salvage procedures showed a trend towards more complications, but also patients could walk faster at 2 years than those with amputations.

Comparing plate fixation (n=16) with external fixation (n=19), there were no significant differences in functional or clinical scores. However lower non-union rates with plate fixation were off-set by higher infection rates!

**Gurkan V et al (JBJS 2011, 93-B (7);975-9)**

***Long-term results of conservative treatment of Sanders type 4 fractures of the calcaneum.***

83 calcaneal fractures (64 patients) managed non-operatively with average follow-up of 51 months (4.25 years). Initial closed reduction using technique described by Omoto (1983) – manual compression of medial and lateral aspects of calcaneus with the patient prone and sedated, and placed in a long-leg cast with knee flexed to 70° and the ankle in full equinus. Then a CT was taken to verify they were Sanders type 4. Admission to monitor swelling – oedema treated with elevation, cold compression and IM diclofenac b.d. Repeat reduction at 5 to 7 days, but with ankle placed in semi-equinus (20°). Cast changed to BK-POP at 4 weeks to allow knee movement, and removed at 8 weeks. Patients allowed to PWB at 12 weeks, and FWB at 16 weeks, using arch supports.

12 plaster complications (7%). 100% union rate at 3 months (on repeat CT), and only 12 (19%) could not return to work. Mean AOFAS score of 72 (satisfactory) on last follow-up. 16 had normal ROM (19%), and 75 had evidence of arthritis (90%)

**Costa M et al (JBJS 2011, 93-B (10); 1405-1410)**

***Does cementing the femoral component increase the risk of per-operative mortality for patients having replacement surgery for a fracture neck of femur?***

Review of National Hip Fracture Database over 1 year period. Assessed 16,496 patients who had surgical treatment with either THR or hemiarthroplasty. Mean age 84, with a 3:1 female to male ratio. Overall mortality rate prior to discharge was 6.7%, with an adjusted odds ratio 0.83 for cemented vs non-cementing. Indicating subtle smaller risk of in-hospital death for cemented prostheses.

However there is likely patient selection bias for choosing to cement, which cannot reliably be guaranteed to be accounted for by the regression statistical methods used to adjust for confounding factors. This is not a randomised study.

**Hedbeck J et al (JBJS 2011, 93-A; 445-50)**

***Comparison of bipolar hemiarthroplasty with total hip arthroplasty for displaced femoral neck fractures***

Comparison of displaced intra-capsular fracture in elderly population who were independently mobile (with or without walking aids) in the absence of cognitive impairment, OA or RA. Randomised if suitable for surgery within 48 hours to cemented bipolar (n=41) or THR using the same Exeter stem (n=42).

Looking at erosion as defined by Baker (0 = none, 1 = cartilage narrowing, 2 = bone erosion, 3 = protrusion), only 5 of 37 (14%) showed grade 1 erosion by 4 years. Erosion did not relate to reduced function or more pain. No dislocations in either group. Harris Hip scores better at 4 years with THR (87 vs. 79). Quality of life survey favoured THR also. THR preferred in treating elderly who are normally independently mobile with a long life expectancy.

**Mallee Wouter et al (JBJS 2011, 93-A; 20-28)**

***Comparison of CT and MRI for diagnosis of suspected scaphoid fractures***

1 in 6 patients with ASB-tenderness following injury and normal x-rays actually have a scaphoid fracture (Jenkins, Injury 2008), and up to 84% have unnecessary cast immobilisation. Previously MRI reported to have 98% sensitivity and 100% specificity, compared with CT sensitivity 90% specificity 85% - with CT images ideally made in the plane of the long axis of the Scaphoid. Previous studies favouring MRI have always been non-comparative cohorts.

Patients presenting with acute wrist injury from a fall (<24 hours) and over 18 included, if no history of concurrent wrist fracture, old scaphoid injury or RA. 40 patients enrolled with negative scaphoid x-rays, and had both CT and MRI within 10 days of injury to assess for *occult* fracture. MRI in a 1Tesla machine with T1 and STIR coronal slices of 3 mm thickness and 0.6 mm gap. CT scan of 0.5 mm thick slices in plane of long axis of scaphoid. Standard used to confirm true fracture based on scaphoid x-rays at 6 weeks looking for an abnormal lucent line.

**SooHoo NF et al (JBJS 2009; 91-A:1042-9)**

***Complication rates following open reduction and internal fixation of ankle fractures***

57,183 adults who underwent ORIF over an 11 year period of isolated ankle fractures, who resided within the state of California included, to ensure most complications requiring hospitalisation were included. 90 day complications: PE 0.3%, infection requiring admission 1.4%, revision 0.8%, BKA 0.2%, mortality 1%. No difference in fracture configuration, but higher complications in open injuries (x4), complicated diabetes (x2.3), PVD (x1.7), age over 75 (x1.7). Specifically rates for amputation were 4 times higher in patients with complicated diabetes & PVD, while rates for infection were 8-times higher.

The rate of revision surgery to ankle replacement or fusion by 5 years was 1%. However, this was higher in certain sub-groups: complicated diabetes (x5), PVD (x2), open injuries (x4). However, the intermediate 5 year data must be taken with a pinch of salt, as the methodology could not distinguish laterality.

**McQueen M et al (JBJS 1996, 78-B;99-104**

***Compartment Monitoring in Tibial Fractures - the pressure threshold for decompression.***

All tibial shaft fractures (open or closed) over a 2 year period with 15 months follow-up had continuous anterior compartment pressure monitoring during and after surgery. No complications associated with pressure monitoring.

Using a minimum compartment perfusions pressure (diastolic pressure - compartment pressure) of 30mmHg as threshold for fasciotomies. Only 3 of 116 patients required fasciotomies. There were ZERO missed compartment syndromes showing any sequelae of ischaemic contractures or permanent neuromuscular insult. No difference in absolute compartment pressures comparing open vs. closed fractures, or fractures treated by IM Nail vs. External Fixator.

A differential compartment perfusion pressure of 30mmHg is a safe cut off for prophylactic fasciotomies. Using absolute compartment pressures will result in unnecessary fasciotomies and associated morbidity.

**Jameson S et al (JBJS 2012, 94-B; 1557-66**

***Patient and implant survival following 4323 THR for acute femoral neck fracture***

7 year assessment of NJR from 2003 to 2010 looking at 4323 THRs performed for acute NOF# (without acetabular injury). 5-year revision rate and 90-day mortality only 3.2% - but looking at a general healthier population (independently mobile with 1 stick outdoors, medically fit and without cognitive impairment - NICE). Independent predictors for revision included: age <75, uncemented (or reverse hybrid) prosthesis.

Head size, approach, bearing and consultant volume/experience had little significant effect. Increased 90-day mortality associated with patients ASA 3+ and over 75 years. Cementation did not affect mortality.

**Chechik O et al (Injury, 2011, 42; 1277-82)**

***The effect of clopidogrel and aspirin on blood loss in hip fracture surgery***

Comparison of blood loss and morbidity on NOF# patients having early surgery - clopidogrel (n=29), aspirin (n=22), dual antiplatelet (n=15), none (n=22). Wide variation in timing of surgery, with clopidogrel group having surgery at 59 hours +/- 36, and non-clopidogrel group at 40 +/- 23 hours (i.e. nearly one day later). Noted increased blood loss in patients on clopidogrel or dual therapy, and increased transfusion rates in dual therapy group. Hospital length of stay and operative time not affected. Blood loss may be due to larger haematoma post-injury but pre-surgery. Only 2 patients had leaking wounds, and were in the clopidogrel group.

**Matre K et al (JBJS 2013; 95-A(3):200-208)**

***TRIGEN INTERNAT Intramedullary Nail versus Sliding Hip Screw (+/- Trochanteric Stabilisation Plate)***

Prospective multi-centre RCT on pain, function and complications in 684 patients (over 60) with intertrochanteric or subtrochanteric fracture with 1 year follow-up. Adequately powered for 5% pain difference and 1 day reduction in hospital stay. Underpowered for re-operation rate. Despite randomisation more DHS patients had cognitive impairment, and more IM Nail patients did not come from their own home.

Minor (4 point VAS) pain difference at day 5 post-op favouring IM Nail, but lost by 3 months - note only a 10-point difference is accepted as being clinically relevant. No difference in timed up & go test (or inability to even perform the test - 55% in both groups) at day 5 post-op. Similar lengths of stay, procedure time. 80ml more blood loss in DHS group and close to 10% more blood transfusions. Long-term no difference in HHS or quality of life scores.

There were three times as many technical or intra-operative implant-related issues with the IM Nail, but no significant difference in terms of requiring early return to theatre. No difference in early mortality, major or minor surgical complications or late revision. No differences looking at infection, cut-out, non-union or poor reduction; interestingly there were more fractures around the implant associated with the IM Nail - but significance not tested. 12 month mortality equal.

When subgroup analysis comparing intertrochanteric and sub-trochanteric fractures performed, the lack of any meaningful difference between the IM Nail and the DHS remained.

**Duckworth A et al (JBJS Am 2014; 96:67-72)**

***Nonoperative management of displaced olecranon fractures in low-demand elderly patients***

43 closed-displaced (>2mm articular incongruity) olecranon fractures over 13 year period, who did not have surgery. Sample population mean age  $76 \pm 12$  (SD), with 84% involving low energy mechanisms (e.g. fall from standing height). 65% treated in AE-cast for 4 weeks, and 35% in collar & cuff. Short-term result: 72% good/excellent Broberg & Morrey score (>80/100),  $160^\circ \pm 5^\circ$  forearm rotation arc and  $109^\circ \pm 24^\circ$  flexion arc. Long-term result (23 survivors): 91% satisfied (1 reported stiffness, and 1 pain), 87% pain free, 17% (4) reported weakness or inability to push off when rising from chair. Non-union not a factor in predicting outcome (DASH score), but patients treated in plaster had significantly better scores.

**Venkatesan M et al (BJJ 2014, 96B (1); 88-93)**

***Survival analysis of elderly patients with a fracture of the odontoid peg***

32 patients aged over 65 with isolated peg fractures without neurologic deficits. Only 2 patients treated with surgery (C1-2 fusion), and 4 with halo vest. 93% the cause was a low-velocity fall. Overall mortality at 1 year was 37.5%. No difference between conservative treatment in collar or surgical intervention (Halo & fusion). This injury has a poorer prognosis than a hip fracture.

**Hull P et al (BJJ 2014, 96B (3); 379- )**

***Delayed debridement of severe open fractures is associated with a higher rate of deep infection***

Retrospective case review of 459 fractures (364 patients) with any compound fracture. Assessment of ambulance call to 1<sup>st</sup> antibiotic time and 1<sup>st</sup> surgical KTS for debridement. Patients given cefuroxime for low grade and combination gent/metro/pen for high grade. Pencillin allergic received clindamycin or vancomycin as alternative. Primary outcome defined as deep infection requiring *unplanned* repeat surgery – 98% subsequently culture positive.

Mean time to 1<sup>st</sup> abx 2.47 hours, mean time to surgery 10.2 hours and overall infection rate 10%. Age, gender, mechanism (penetrating vs. blunt), ASA, ISS, time to antibiotic all **not** significant. Odds ratio of 2.44 for tibial vs. non-tibial sites. Presence of gross contamination increased odds ratio by 3 for deep infection. High grade (IIIB & IIIC) twice the odds of infection as low grade (II & IIIA). Linear regression controlling for grade, site and contamination showed. 3% linear increased risk of infection for every single hour delayed – even waiting 6 hours results will increase odds of deep infection by a 21%.

**Griffin D et al (BMJ 2014;349:g4483 doi: 10.1136/bmj.g4483)**

***Operative versus non-operative treatment for closed, displaced, intra-articular fractures of the calcaneus: randomised controlled trial (UK HeFT)***

Multi-centre RCT comparing acute displaced intra-articular calcaneal fractures treated by ORIF using a lateral extensile approach (n=73) vs. conservatively (n=78). No difference in Kerr-Atkins score (1<sup>o</sup> powered) or AOFAS score (2<sup>o</sup> under powered). Follow-up period 2 years. Surgical group early ROM, but with 6 weeks NWB and 6 weeks PWB. Conservative group had same protocol but with addition of removable splint. Similar BMI and smoking status in each group; bulk of patients Sanders 2 and 3. In addition to questionnaire scores, there was no difference in ankle / subtalar ROM, heel width, walking speed or gait analysis factors. Far fewer overall number of complications in non-operative group. At 2 years, 3 patients in non-operative group had required sub-talar fusion, with none in surgical group.

## Basic Sciences

**Lidwell OM (1982, BMJ, 285; 10-14)**

***Effect of ultraclean air in operating rooms on deep sepsis in the joint after total hip or knee replacement: a randomised study***

Multi-centred RCT with three arms: positive pressure theatre (n=4133), ultra-clean (n=1789) theatre, and ultra-clean with body-exhaust suits (n=2133). Ultra-clean defined as laminar flow where <10 particles containing bacteria per cubic meter. Follow-up median 2.5 years. Also looked at prophylactic antibiotics (at induction or in cement) in a non-randomised manner.

Overall septic joints in ultra-clean vs. positive pressure theatres was 2.6 : 1. Subgroup analysis: with body exhaust suite this ratio rose to 4.5 : 1, while with conventional clothing reduced to 2 : 1. Overall use of antibiotics reduced incidence of septic joint by 2.5 times. Concurrent use of ultra-clean theatre, body suits and prophylactic antibiotics reduced deep infection rate by 14-fold!

**Savarino L et al (2010, JBJS 92-B (4); 634-8)**

***The potential role of metal ion release as a marker of loosening in patients with total knee replacement***

Cohort study of 59 patients with painful TKRs – excluded patients with bilateral TKR, or any other metal foreign body, as well as those with renal failure. Group 1 had stable painful prostheses (n=24), group 2 had septic/aseptic loosening or malrotation (n=35), group 3 were healthy blood donors with no metalwork (n=41). Single testing, but followed up group 1 patients for 2 years to ensure did not develop evidence of failure. Serum blood used and tested using absorption spectrometry.

No difference in *serum* aluminium, titanium or cobalt. Only serum chromium ions elevated in unstable, loose prostheses, when compared with healthy controls or stable TKRs. Sensitivity of serum chromium ion level in diagnosing implant loosening 74%, specificity 91%, +ve predictive value 88%, -ve predictive value 80%.

**Nasell H et al (JBJS 2010, 92-A (6); 1335-42)**

***Effect of Smoking Cessation Intervention on Results of Acute Fracture Surgery***

RCT comparing 6 weeks smoking cessation programme with nicotine replacement (n=49) vs. no intervention (n=55). Halved complication rate for any 1 complication from 38% to 20% in all patients having fracture surgical fixation. Most common complication being superficial infection or plaster complications. Similar to LEAP study which showed smokers double risk of infection, and 4-times risk of osteomyelitis after open tibial fracture.

**Nawabi D et al (2010, JBJS 92-B (4); 496-9)**  
***Vitamin D Deficiency In Patients With Osteoarthritis Undergoing Total Hip Replacement***

Vitamin D deficiency defined by serum level < 2.5 nmol/l (insufficiency < 40 nmol/l). 30% in elderly 65+ population are vitamin D deficient, and 85% in over 85s. Cohort study of 62 patients undergoing THR - measured Vitamin D level (25-hydroxycholecalciferol) pre-operatively and 6 months post-op. 15 patients had Vit-D insufficiency and 47 sufficient.

Vitamin D insufficient group had 10 point lower Harris Hip Score (HHS) pre-operatively (unsure if significant p=0.018, but overlapping whisker plot). No difference in post-operative HHS. Patient HHS > 90 (excellent) were compared with scores <90. Excellent scores associated with significantly higher Vit-D level, but even the HHS<90 group had a mean Vit-D level above the threshold for Vit-D insufficiency. Many confounding issues related to seasonal variation, and activity variation. No cause and effect relationship proved.

**Marecek G (2013, J Am Acad Orthop Surg 21 (11); 696706)**  
***Driving after orthopaedic surgery***

Typically, impairment in driving ability is measured by changes in the time needed to perform an emergency stop.

- Braking function returns to normal 4 weeks after knee arthroscopy
- 9 weeks after surgical management of ankle fracture
- 6 weeks after the initiation of weight bearing following major lower extremity fracture
- Patients may safely drive 4 to 6 weeks after right total hip arthroplasty or total knee arthroplasty.

Patients should not drive with a cast or brace on the right leg. Upper extremity immobilization may cause significant impairment if the elbow is immobilized; however, simple forearm casts may be permissible

**Goodwin D (2013, Orthopaedics 366(6); 469-74)**  
***Driving After Orthopaedic Surgery***

Table	
Suggested Guidelines for Returning to Driving after Orthopedic Surgery	
Procedure	Time from Surgery
Knee arthroscopy (excluding ACL)	4 wk
Right ACL reconstruction	4-6 wk
Left ACL reconstruction	2 wk
Bunion surgery	6 wk
Lower-extremity fracture (diaphyseal)	12 wk
Lower-extremity fracture (periarticular)	18 wk
Right ankle fracture	9 wk
Right TKA	10 d-8 wk
Right THA	6-8 wk

*Abbreviations: ACL, anterior cruciate ligament; THA, total hip arthroplasty; TKA, total knee arthroplasty.*

## Paediatrics

### **Herzenberg J et al (Journal of Paediatric Orthopaedics 2002 22; 517-521) *Ponseti versus traditional methods of casting for idiopathic Clubfoot***

Comparison of a series of 27 patients (34 feet) treated using Ponseti method, with 34 feet matched in severity and bilaterality that were treated with standard serial short leg casting for just 3 months. Ponseti technique included initial manipulation within 2 weeks of birth bringing forefoot into abduction with counter-pressure on neck of talus (avoiding pressure on calcaneus or forced pronation). Weekly review and long leg casting followed by percutaneous Achilles tenotomy if persistent equinus at 4-8 weeks despite 60 degrees abduction. Tenotomies left in cast for further 3 weeks, but long term slinting protocol: 23 hours/day foot abduction orthosis (70 degrees on affected side) for 3 months, and thereafter night splinting for 2-4 years. Nearly all had minimum 1 year follow-up, with endpoints being the need for open release, and the range of ankle dorsi and plantar flexion.

In Ponseti group 91% require percutaneous Achilles tenotomy, but only 1 failure requiring open poster-medial release *relating to non compliance with regime*. In control group 32 of 34 (94%) required an open release. Of the remaining two "successes", one needed tendon lengthening before age 2. Range of motion was significantly better with Ponseti technique: dorsiflexion 32° vs. 8° and plantar flexion 50° vs. 29°.

### **Dauids J et al (JBJS 2010, 92-B (7); 1006-12) *Removal of deep extremity implants in children***

Retrospective series of 801 children over a 17 year period, whose deep implants were removed a minimum of 6 months after implantation. Only 80 (10%) were unplanned; 70% were in children with neuromuscular disorders. 12.5% or 1 in 8 had a complication – there was equal divide between major (fracture, implant breakage, infection) and minor complications (wound healing or haematoma). Interestingly there was minimum blood loss, and removal of implant was 95% successful in improving pain if this was the reason for removal.

Four factors deemed significant for predicting a complication: a complication on initial surgery, non-elective indication for removal, neuromuscular disorders with seizures or in children who could not walk (weaker bone). If all 4 factors present, a complication was 15-times more likely.

### **Dinham J (JBJS 1975, 57 (1); 69-71) *Popliteal cysts in children. The case against surgery.***

The natural history popliteal cysts in children: 51 of 70 resolved at a mean 20 months. 21 of 50 surgically resected cysts recurred after a mean 7 months. Most popliteal cysts in children disappear spontaneously, and operation without very good reason is unjustified.

**Salenius P & Vankka E (JBJS 1975, 57-A (2); 259-61)**

***The development of the tibiofemoral angle in children***

X-ray calculation of tibiofemoral angle at the knee based on 1480 x-rays at different ages in children. At birth a profound 15° varus exists, which gradually corrects to neutral alignment at age 2. This leads to an over-correction and profound valgus of 10° by age 3, which slowly corrects to the physiological valgus of 5° by age 7 and is maintained thereafter in adolescence.

**Inglis M et al (BJJ 2013, 95-B(9):1285-9)**

***Synthetic versus plaster of Paris casts in the treatment of fractures of the forearm in children: a randomised trial of clinical outcomes and patient satisfaction.***

Prospective RCT comparing MUA and POP cast (n=89) vs. MUA and Scotch cast (n=110). No difference in age or sex. Unvalidated questionnaire showed better satisfaction with Scotch cast. Lower cast and padding index with POP, however no difference in re-displacement rate. Overall POP cast needed more care in terms of reinforcement or replacing due to softening.