

**Abstract Paper #1 - 1****Safe zone for extra-articular screw placement using the Stoppa approach****M. Al-Otaibi**

P. Guy

E. Harvey

R. Reindl

Surgical treatment based on precise diagnosis, choosing appropriate approach to each diagnosis and reduction, fixation techniques

Accepted approaches of posterior, anterior, extensile and intrapelvic approach. Limitations as heterotopic ossification and limited access to medial acetabular wall. In this study we identified safe zone in the inner pelvis, to allow extra-articular screw placement using the Stoppa approach. Advantages includes direct visualization of medial acetabulum wall, single approach to the inner pelvis, can be covered to ilio inguinal, can be used with lapartomy incision, reduced incidence of heterotropic ossification and no radiation. And disadvantages include neurovascular injury and learning curve.

Using pelvis Ct scans of specific protocol 3mm slices+1mm overlap reconstructed at 1mm a total of 199 access studied with reference values femoral head (largest) and inter sacroiliac distance at s1 root level. Computer assisted measurements include ischial spine to joint, mid sciatic notch to joint, obturator canal to joint (using simulated 4mm screw). Safe zone determined to be 11mm from mid sciatic notch, 5mm from obturator canal and according to femoral head size we found the distance from the ischial spine to joint will be 23 mm for femoral heads less than 47mm in diameter and 28 mm for femoral heads equal or greater than 47 mm.

**Abstract Paper #1 - 2****Hand Trauma in Shop Class****C. Beavis**

D.A. Classen

School injuries are a common source of preventable injuries. Students commonly participate in industrial arts, automotive or vocational education classes as part of their education. The environment and equipment used in these settings are potential sources of injury. The majority of injuries affect the upper extremity. There is little published to date considering shop class related injuries with no previous reports specifically discussing injuries to the hand. We reviewed the health records database at a pediatric and hand surgery referral hospital over a six-year period and identified thirteen patients between the ages of 12-18 who sustained injuries to their wrist or hand in shop class. Patient demographics, nature of injury, treatment and complications were reported. 69% of patients sustained at least one serious injury such as amputation, tendon or neurovascular injury. Table saws were responsible for 56% of injuries. The majority of patients had residual functional deficits at final follow-up. In conclusion, shop class is a setting with potential for serious hand injuries. Current injury prevention strategies should be reviewed with an emphasis on education and safety measures. Students, parents and school administrators should be aware of the risks associated with participation in shop class.

***\*\*Please note that this abstract was submitted and accepted for the 2002 CORA meeting however the author/presenter was unable to attend and the paper was not presented\*\****

**Abstract Paper #1 - 3****Intra-operative Diagnosis of Syndesmosis Injuries in External Rotation Ankle Fractures****R Jenkinson**

D Sanders

M Macleod

Purpose: This study compares intra-operative fluoroscopic stress testing, static radiographs, and biomechanical criteria, in diagnosing syndesmotic injuries in ankle fractures.

Methods: In 40 patients, preoperatively the treating surgeon indicated the need for syndesmotic fixation. Specifically, in Pronation-External rotation injuries, biomechanical criteria were applied. Intra-operatively the injured and non-injured (control) ankles were examined using fluoroscopic stress examinations. This was performed after lateral malleolar fixation and repeated after medial and syndesmotic fixation as required. When ligamentous instability (>1mm) was detected the treating surgeon would alter the treatment plan as required.

Results: Intra-operative fluoroscopy detected unpredicted syndesmotic injuries in 30 percent of cases. Surgeons were able to detect the minimum 1 mm side-to-side difference in each of these cases. In the unstable syndesmosis injuries, a side-to-side difference of 3.7mm on external rotation stress exam was found. Rigid medial fixation decreased radiographic clear space opening to 1.9 mm. In no case was rigid bimalleolar fixation sufficient to stabilize the syndesmosis injury.

Conclusion: Preoperative radiographs and biomechanical criteria are unable to satisfactorily predict unstable syndesmosis injuries. Rigid bimalleolar fixation improved but was not sufficient to stabilize syndesmotic injuries. Intra-operative stress fluoroscopy is a valuable tool for detection of unstable syndesmotic injuries.

**Abstract Paper #1 - 4****A Randomized Trial Comparing the Dynamic Hip Screw with Three Cannulated Screws for Fixation of Femoral Neck Fractures -Preliminary Results****D Sauder**

A King

K Yong-Hing

**A. Background**

We hypothesize that there is no difference in the outcome in femoral neck fractures treated with either a dynamic hip screw or three cannulated screws. A literature review revealed no good prospective study answering this question. A Cochrane review (2001) could not identify a superior implant.

**B. Methods**

Patients are randomized by envelope selection at the time of surgery after signing consent. The surgeon then performs the surgery with certain goals of fixation. Post operatively the patient is followed with X-rays at 6, 26, and 52 weeks. These are evaluated by the investigators for non-union, fixation failure, and avascular necrosis. The rates of these events are compared.

**Results**

Presently, 7 people have been entered. There are 5 in the cannulated screw group and 2 in the DHS group. There have been 2 failures in the cannulated screw group. The failures consist of non-union and fixation failure. It is still too early to discuss analysis, but I will discuss the early failures.

**Abstract Paper #1 - 5****Utility of lateral hip x-rays in decision making in sub capital hip fractures.****P Sequeira**

J Khobain

C Stone

F Noftall

B Barrett

This study was prompted by the recognition of several harmful consequences of the lateral hip x-ray. These are

- . Significant discomfort for the patient
- . Fracture stability is put at risk as the technologist hyper flexes the contra lateral hip
- . Unnecessary radiation exposure to the technologist, who must be in the room by the patient,
- . \$20.00 additional cost per x-ray

12 orthopaedic residents (PGY3-PGY5) and staff surgeons reviewed 32 sets of hip x-rays of femoral neck fractures on three separate occasions—(AP and lateral on two occasions and lateral once) Respondents were asked to give their treatment choice of either pinning or hemiarthroplasty.

The chance corrected measure of agreement was evaluated using kappa analysis. The lateral x-ray did not affect treatment decisions for either staff or resident surgeons. We conclude the lateral hip x-ray is unnecessary in sub capital hip fractures.

**Abstract Paper #1 - 6****Comparative Biomechanical Analysis of a Locking Condylar Plate and a Retrograde Intramedullary Nail for Supracondylar Femur Fracture Fixation****D. Garneau**

J Lamontagne

D Rancourt

**Objectives:** To compare the biomechanical properties in axial and torsional loading of a Locking Condylar Plate and a retrograde intramedullary nail under physiologic conditions. To determine the modes of failure of these two devices under axial loading.

**Design:** Four matched pairs of fresh frozen human femora were used. Radiographs and DEXA scanning was performed to evaluate bone quality and to screen for pathological lesions. In each pair, one femur was fixed with the Locking Condylar Plate and the other with a retrograde nail.

**Methods:** An identical one-centimeter gap osteotomy was created in the supracondylar region to simulate an AO/OTA 33-A3 fracture. The instrumented specimens were then mechanically tested in axial and torsional loading to determine construct stability. A three-dimensional displacement across the fracture site was recorded. Finally, all femurs were loaded to fracture under axial loading.

**Results:** Results of axial and torsional stiffness analysis suggest a biomechanical advantage for the Locking Condylar Plate. The plate showed statistically significant better rigidity in axial ( $p = 0.048$ ) and torsional loading ( $p = 0.031$ ) compared to the nail. The axial mode of failure occurred proximally for the plate and distally for the nail.

**Conclusions:** Devices with head locking screws provide angular rigidity and maximize fixation stability in osteopenic bone.

**Abstract Paper #II - 1****Cementless vs. Cemented Femoral Stems in Patients Over the Age of 70: A Retrospective Review****J DaSilva**

J Guerin

R Bourne

C Rorabeck

S MacDonald

R McCalden

Results of 341 cementless tapered stems in 304 patients were reviewed and compared to the results of 648 cemented stems in 598 patients to compare outcomes of these two implant types in the elderly. The minimum age for all patients at surgery was 70 years and mean age was 77 +/- 4.7. Average follow-up was 8 years +/- 3.8. Statistical analysis revealed the cementless group as significantly younger with an average age of 74 +/- 3.3, compared to 78 +/- 5.0 in the cemented group. Pre-operatively, the two groups tended to have similar Charnley classifications, however the cementless group did have higher Harris Hip Scores and SF-12 mental scores. This significant trend continued as the cementless group's Harris Hip Score at latest follow-up was 82 +/- 16 compared to 77 +/- 19, and SF-12 mental score was 60 +/- 7 compared to 49 +/- 8 at 10 years follow-up. After two years, in the cemented group there were 55 deaths (8.5%), and 23 revisions (3.5%), and in the cementless group there were 60 deaths (17.6%), and 3 revisions (0.9%). Cementless femoral implants in patients greater than age 70 have comparable outcomes to cemented implants with a lower rate of revision

**Abstract Paper #II - 2****OPTIMIZING CEMENT/PROSTHESIS BOND STRENGTH**

**R Korley**  
J MacKenzie  
R Gill

**Objective:** To compare the bond strength at the PMMA/prosthesis interface using two different implantation techniques

**Materials/Methods:** Cement was mixed as individual batches in a standard fashion for 90 seconds following which half of each batch was poured into 2 identical aluminum moulds. At 4 min one sample (PMMA precoated CoCr pin) was inserted into the first mould, while the second sample was applied with a thin layer of cement. At 8 min the second sample was inserted into the second mould. The cement hardened and the pins were removed with the cement from the moulds. After at least 24 hours of curing at 37°, the pins were pulled out using an MTS machine and the force was recorded in Newtons (N). Data was analyzed using paired students T-test.

**Results:** No difference in pullout strength using two different implantation techniques (31,550.5 vs 30,171 Newtons,  $p < 0.25$ ).

**Conclusions:** Bond strength of PMMA coated stems does vary as a function of insertion time. Applying a layer of cement 'early', before cementation, can negate this variation. Varying the time at which cement is applied to prostheses before implantation may help surgeons take advantage of the changing properties of curing cement, and therefore optimize stem fixation.

**Abstract Paper #II - 3****The Role of Regulatory T-Cells in Periprosthetic Osteolysis Following Total Hip Arthroplasty****S. Frost**

K Summers

B Singh

D Chess

R McCalden

R Bourne

C Rorabeck

S MacDonald

Osteolysis remains one of the most devastating complications following total joint arthroplasty. Osteolysis involves macrophages in response to phagocytosis of submicron wear particles. No authors have investigated the role of CD3 positive CD4 positive CD25 positive regulatory T cells ( $T_{REG}$ ) coordinating with macrophages. Evidence for involvement of regulatory T cells would contribute to our understanding of this complex biologic response to wear particles in the hip joint. 15 consecutive patients having revision total hip arthroplasty secondary to osteolysis were included. Intra-operative tissue samples were collected including peripheral blood (PB), synovial fluid (SF), synovial tissue (ST), and interface tissue (IT) between the failed component and the bone defect. Total lymphocytes were isolated from the 4 tissues in vitro, and then analyzed using fluorescent-tagged antibody cell sorting (FACS) for the presence and activation of  $T_{REG}$  cells.  $T_{REG}$  cells were significantly upregulated in the PB of revision hip patients compared to normal controls. In the (ST) and (IT), 57 % of isolated lymphocytes were  $T_{REG}$  cells. The presence of  $T_{REG}$  cells in the ST and IT were confirmed with immunohistochemistry. Further characterization of these  $T_{REG}$  cells are warranted as they play a role in the pathogenesis of osteolysis in loose total hip replacements

**Abstract Paper #II - 4****Effect of Cement on the Metabolic Profile of Human Osteoblasts****P Lavigne**

Q Shi

D Lajeunesse

J Fernandes

**Background:** Osteoblasts (Ob) are stimulated by wear debris, producing inflammatory mediators which affect the recruitment of osteoclasts, shifting bone homeostasis toward bone resorption. Tumor necrosis factor alpha (TNF- $\alpha$ ) is recognized as a dominant cytokine in aseptic loosening but the effect of cement on human Ob is not well described in the literature. Therefore, the objective of this study is to compare the effects of polymethylmetacrylate (PMMA) and TNF- $\alpha$  on human Ob.

**Methods:** Ob cell cultures were prepared from trabecular bone of osteoarthritic patients (n=9). Their metabolic activity was characterized by measuring osteocalcin (Oc), osteoprotegerin (OPG), prostaglandin E<sub>2</sub> (PGE<sub>2</sub>), IL-6, macrophage colony-stimulating factor (M-CSF) and soluble receptor activator of NF- $\kappa$ B ligand (sRANKL) in supernatants after Ob stimulation with PMMA or TNF- $\alpha$ .

**Results:** IL-6, PGE<sub>2</sub>, M-CSF and sRANKL production by Ob was increased significantly by both mediators used. PMMA decreased Oc and OPG release by Ob while TNF- $\alpha$  stimulated the production of OPG and had no effect on Oc. The ratio sRANKL/OPG was significantly increased with PMMA and TNF- $\alpha$ .

**Conclusion:** PMMA and TNF- $\alpha$  have comparable dual action on Ob, lowering their anabolic capacity and favouring production of bone resorption activators. This study confirms the important role of PMMA in implant loosening.

**Abstract Paper #II - 5****Femoral Cortical Porosity After Reaming and Intramedullary Canal Preparation in a Canine Model****K Syed**

EH Schemitsch

RR Richards

Purpose: To determine the effects of different techniques of femoral canal preparation on cortical porosity in a canine model.

Methods: Twenty-four dogs were randomly assigned to six groups for left femoral canal preparation. One group had reaming only while the other groups, in addition to reaming, had lavage, cement introduction, cement pressurization, lavage with cement introduction and lavage with cement pressurization respectively. The animals were sacrificed at 6 weeks. Samples were taken from both femora of each subject. Cortical porosity was measured from histological samples from the femurs.

Results: For each canal preparation method; proximal, middle, distal, inner, outer segments from the reamed femur demonstrated significantly higher cortical porosity ( $p < 0.05$ ), as compared to the unreamed side. Porosity was also significantly increased with reaming and cementing ( $P < 0.05$ ) in the middle and outer segments. Lavage and pressurization had no significant effect. Overall, reaming showed the greatest effect by increasing porosity seven-fold.

Discussion: The study showed that reaming plays a central role in increasing cortical porosity following femoral canal preparation. Additional aspects of canal preparation (lavage, cement introduction and pressurization) have only a marginal effect. These findings are consistent with previous studies and have implications for periprosthetic bone loss following total hip arthroplasty.

**Abstract Paper #II - 6****Computer Assisted Shoulder Hemiarthroplasty For Fractures Of The Proximal Humerus****RT Bicknell**

JA DeLude

LM Ferreira

GJW King

JA Johnson

KJ Faber

D Drosdowech

The objectives of this study were to develop a computer assisted shoulder hemiarthroplasty system, and to evaluate this system in an in vitro model. The goal of this system was to improve the accuracy of implant sizing and orientation for treatment of proximal humerus fractures, where the normal anatomical landmarks are not present. Preoperative CT scans of the uninjured humerus allowed determination of the relevant humeral characteristics to be reproduced in the injured shoulder and included humeral head size, offset, retroversion, inclination and height. These were determined using a coordinate system based on distal humerus landmarks and analyzed using custom-designed software. The in vitro study utilized six pairs (twelve) intact cadaveric shoulders. Each shoulder underwent a clinical determination of ROM/stability. Specimens were randomized to the computer-assisted system and the contralateral shoulder underwent a traditional hemiarthroplasty. Each shoulder underwent a standard surgical approach, with a simulated four-part proximal humerus fracture and utilized a modular hemiarthroplasty system. Post-operatively, each shoulder had its implant position evaluated and ROM/stability testing repeated. All measurements were achieved using an electromagnetic tracking system and a graphical interface. Outcome measures included accuracy of proximal humerus reconstruction and post-operative shoulder ROM/stability. This is a study in progress.

**Abstract Paper #II - 7****Methyl Prednisolone Acetate vs. Triamcinolone for the Symptomatic Treatment of Osteoarthritis of the Knee, a Randomized Controlled Trial****McCaffrey, M**F. Nofall,  
P. Rahman

**Introduction:** The use of intra-articular corticosteroids for the treatment of symptomatic OA of the knee is a common occurrence in the office of the orthopaedic surgeon. It is commonly believed that less soluble compounds at higher doses provide the greatest and longest lasting pain relief. This assumption has never been proven in the literature in a well-designed trial.

**Purpose:** The purpose of our study was twofold. First, to compare the pain relief and duration of action of the two most commonly used corticosteroid preparations at our institution. Second, to compare low dose treatment vs. high dose treatment of one of the preparations.

**Design:** Single blind randomized controlled trial

**Method:** The WOMAC was completed prior to injection and at three follow-up intervals. Patient age, age at onset, sex and BMI were also recorded.

**Results:** There was no statistically significant difference in the pain relief or duration of action provided when comparing preparations with different solubility's or when comparing dose of the same drug.

**Conclusion:** The solubility and dosage of corticosteroid preparations do not affect treatment outcomes.

**Abstract Paper #III - 1****Functional Bracing vs. Surgical Repair for the Treatment of Acute Achilles Tendon Ruptures****J. Adlington**

A. Kirkley, deceased

I. Jones

A. Zechevic

S. Griffin

D. Nawoczinski

G. McComis

K. DeHaven

A. Amendola

Purpose: To compare the functional outcomes of acute ruptures of the Achilles tendon treated with early range of motion following surgical repair or bracing

Methods: Multicentre retrospective cohort study. 12 subjects underwent functional bracing with early ROM, 12 age, gender, time from injury, and activity-matched subjects underwent surgical repair and early ROM. Subjects were assessed at minimum 2 years post-treatment by 1) clinical exam for ROM, calf circumference, Thompson test, 2) subjective questionnaire of symptoms, return to activity, complications 3) functional gait lab testing of walking, power-hop, single limb heel-rise. T-test to compare difference in means between groups.

Results: Statistically significant increase in dorsiflexion ROM in bracing cohort. No significant difference in functional performance measures between groups. No clinically significant differences between groups of any variable.

Conclusions: supports initiation of multi-centre randomized controlled trial to compare operative and non-operative treatment of acute Achilles tendon ruptures.

**Abstract Paper #III - 2****Biomechanical Comparison of Intramedullary Nail and Blade Plate Fixation for Tibiototalcalcaneala Arthrodesis****U. Al-fahd**

S. Roth

C. Whyne

D. Stephen

Providing stable initial fixation to achieve biological union in tibiototalcalcaneal arthrodesis can be challenging especially in osteopenic bone. The purpose of this study was to perform a biomechanical comparison of intramedullary nail and blade plate fixation in tibiototalcalcaneal arthrodesis.

Ankle and subtalar joint capsules were exposed for seven pairs of fresh frozen anatomic specimens. One ankle from each pair was instrumented with an interlocked intramedullary nail inserted retrograde across the subtalar and ankle joint while the contra-lateral hind foot was stabilized with a lateral cannulated blade plate. Specimen stability was tested in plantar/dorsiflexion and inversion/eversion to a maximum bending moment of 12Nm and in internal/external rotation to a maximum torque of 7Nm. Data was analyzed statistically using a paired t-test.

No significant differences were observed in the three loading configurations however; there was a trend towards increased stability with the plate in both the inversion/eversion ( $p=0.115$ ) and internal/external rotation ( $p=0.089$ ) loading configurations. Additionally, bone density was observed to have a negative effect on biomechanical stability in rotation for both constructs. While no significant differences were observed in stability between the two constructs, improved surgical techniques with adjuvant therapy like PMMA may improve stability of both constructs especially in osteopenic bone and that will increase fusion rate.

**Abstract Paper #III - 3****A Prospective Randomized Controlled Trial of \_-BSM in Displaced Intra-articular Calcaneal Fractures: A Study in Design****I Le**

R Buckley

**Objective:** To determine whether ORIF plus \_-BSM is superior or inferior to ORIF alone in the treatment of displaced intraarticular fractures of the calcaneus.

**Design:** Prospective Randomized Controlled Clinical Trial

**Setting:** Two tertiary health care centres. Foothills Hospital in Calgary, AB and QEII Health Sciences Centre in Halifax, NS.

**Subjects:** Skeletally mature patients with displaced intraarticular calcaneal fractures.

**Methods:** Randomization into two treatment arms: ORIF alone versus ORIF with \_-BSM. ORIF in both groups with lateral approach and lateral plate.

**Main Outcome**

**Measure(s):** Primary outcome measure is amount of post operative compression, shortening or angulation of fracture in follow up radiographs at discharge, 6 weeks, 3 months, 6 months and 1 year post op. CT scans obtained immediately post op and at 1 year. Secondary outcome measures include clinical evaluation of ROM, pain, time to heal, and return to work. Assessment of SF-36 and LEM Scores will also be obtained.

**Results:** Pending.

**Conclusions:** Pending.

**Abstract Paper #III - 4****A Retrospective Comparison of Percutaneous K-Wire Fixation and ORIF using the TriMed System for Complex, Intra - Articular Fractures of the Distal Radius****J Reed**

C Brauer

V Bowen

R Buckley

S Jana

**Objective:** To investigate the question, “Of two methods commonly used to manage complex distal radius fractures, which gives the best results?”

**Design:** Retrospective Cohort.

**Subjects:** 38 patients with complex, intra - articular fractures of the distal radius (AO Classification B and C) between the ages of 18 and 65, with minimum follow-up of 6 months.

**Interventions:** Patients were recalled for assessment by an unbiased, blinded, independent hand therapist. Physical Outcomes were measured along with Quality of Life Questionnaires. Radiographic outcomes were assessed.

**Main** Patient Rated Wrist Evaluation (PRWE).

**Outcome:**

**Results:** No significant difference was present in PRWE ( $p=0.37$ ) or DASH ( $p=0.78$ ) scores. Significant differences were found in flexion ( $p=0.0016$ ) and ulnar deviation ( $p=0.013$ ), with the group treated with percutaneous K – wires being superior in both categories. Near significant differences were noted in grip strength and supination, the K-wire group again being superior.

**Conclusions:** Definite conclusions cannot be drawn from this study due to its retrospective nature. This study has provided pilot data that will be used in a group size analysis for prospective work in this area.

**Abstract Paper #III - 5****The Relationship of Humeral Neck Shaft Angle To Rotation****T Tufescu**

G Johnston

Purpose: To document radiographic changes in humeral neck shaft angle(NSA) attributable solely to humeral rotation. Adoption of standardized radiographic technique will eliminate confusion between rotation and varus collapse as cause of decreased NSA.

Design: A pilot study was conducted using a saw-bone and photographs. The relationship derived from these results was studied in a cadaveric humerus and radiograph model.

Materials and Methods: A reference transepicondylar wire was drilled in 20 cadaveric humeri. These were mounted on a custom built rotating platform. Radiographs were taken at 10° intervals, through 180°. The NSA and articular head height(AHH) were measured, and their relationship was analyzed.

Discussion: The cadaveric data is currently being analyzed and will be available at CORA. The NSA varies greatly with rotation. From 30 – 70° of external rotation the NSA is stable and at its most acute point. **Saw-bone results suggest use of a standard radiograph in the mid portion of this range, approximately 45°, in prospective studies measuring the NSA.** A linear relationship was found between rotation and AHH. **Saw-bone results allowed creation of a formula based on this relationship to account for humeral rotation in retrospective radiographic studies.**

**Abstract Paper #III - 6****The Presence of a Lateral Osteophyte on the Acromion in Partial Bursal Sided Rotator Cuff Tears****A Varma**

P MacDonald

Rotator cuff tears have been debated to start on the joint vs. bursal side. Recent thought has been that they start on the joint side. *Methods:* In a retrospective study 83 arthroscopic rotator cuff repairs from January 2000- November 2002 were studied. Both the operative reports and pre-operative plain AP radiographs of the shoulder were reviewed. 7/8 partial bursal sided cuff tears pre-operative radiographs were reviewed. 11/75 randomly chosen films of the complete rotator cuff tears were also reviewed. *Results:* The incidence of partial bursal sided rotator cuff tears was 9.6% (8/83). All other tears (75/83) were complete rotator cuff tears. The presence of a lateral osteophyte on the acromion on pre-operative plain AP radiographs for partial bursal sided rotator cuff tears was 71% (5/7) vs. 9% (1/11) for complete tears. *Analysis:* Using a Fisher's exact test for 2x2 tables a p-value of 0.012 was obtained when comparing the presence of a lateral osteophyte on the acromion in partial bursal sided rotator cuff tears vs. complete tears. *Conclusion:* There is a significant difference between the incidence of a lateral osteophyte on the acromion on bursal sided cuff tears vs. complete cuff tears.

**Abstract Paper #III - 7****Biomechanical Comparison of a Unique Plate vs. a Standard Plate for Internal Fixation of Proximal Humerus Fractures in a Cadaveric Model****S Walsh**

R Reindl

E Harvey

G Berry

L Beckman

T Steffen

Fractures of the proximal humerus are a common problem encountered in the older, osteoporotic population. Multiple acceptable methods for internal fixation of these fractures exist, however many two-part fractures fail clinically into varus with the humeral head pulled away from the fixation by the rotator cuff musculature. Therefore, many proximal humerus fractures are treated non-operatively with the acceptance of possible malunion.

The current investigation evaluates a unique plate designed to treat fractures of the proximal humerus. The plate employs screws that thread into the plate creating a fixed angle device. This plate was tested versus a standard cloverleaf plate.

Five pairs of preserved, cadaveric humeri were dissected and plated with either the locking plate or standard plate followed by an osteotomy at the surgical neck. A servo-hydraulic testing machine was then used to pull on the rotator cuff musculature until failure was achieved.

A significant difference was found ( $p=0.007$ ) with the locking plate displaying greater holding capability on the humeral head. This fixation method may lead to greater clinical success in the treatment of two-part proximal humeral fractures.

**Abstract Paper #IV - 1****Local Control and Functional Outcome in Patients with Osteosarcoma Treated with a Novel Protocol of Limb-Sparing Surgery and Neoadjuvant Chemotherapy with Radiation****A. Abdeen**

N. Schachar

W. Temple

**Objective:** To quantify the differences in local tumor control and functional outcome experienced by patients with osteosarcoma treated with limb-sparing surgery, neoadjuvant radiation and chemotherapy as compared to those treated with limb-sparing surgery and neoadjuvant chemotherapy alone.

**Design:** Retrospective case-series

**Setting:** Calgary Health Region

**Subjects:** Patients treated for osteosarcoma of the extremity.

**Methods:** A chart review was performed followed by functional outcome testing.

**Main Outcome Measure(s):**

Local tumor recurrence, disease-free survival and re-operation rates were measured. Functional outcome was quantified using the Toronto Extremity Salvage Score, the Short-form 36 and the Musculoskeletal Tumor Society evaluation system.

**Results:** Local tumor recurrence in the radiation group was 6.7% and 20% in the non-radiation group. Kaplan-Meier disease free survival was equal in both groups. The SF-36 division averages were higher for the radiation group. For the radiation and non-radiation groups, the MSTS average score was 71% and 55%; the TESS average scores were 85.2% and 81.5% respectively.

**Conclusion:** There is a trend towards improved local tumor control and better functional outcome when radiation is added to the gold standard treatment of chemotherapy and limb sparing surgery in the management of extremity osteosarcoma.

**Abstract Paper #IV – 2****Botulinum Toxin and a New Animal Model of Muscle Weakness****D. Longino**

W. Herzog

C. Frank

**Objective:** To create and validate an animal model of muscle weakness for use in the study of osteoarthritis (OA).

**Design:** Animal model

**Subjects:** New Zealand white rabbits.

**Interventions:** Group 1 (n=11) received an intra-muscular injection of Botulinum toxin (BTX) into the quadriceps musculature of the hindlimb. Group 2 (n=5) consisted of uninjected controls. Comparisons in muscle strength between groups were made periodically for one to twelve weeks post injection.

**Outcome**

**Measures:** **1)** Maximal isometric knee extensor torque (IKET) obtained with a force transducer and femoral nerve cuff stimulators. **2)** Quadriceps muscle mass. **3)** Gait analysis of ground reaction forces (GRFs) using force platforms.

**Results:** Maximal IKET and muscle mass decreased in BTX-injected hindlimbs 2 to 12 weeks post injection. The mean decrease in maximal IKET was 64% at four weeks post injection ( $p < 0.01$ ). This was accompanied by a 34% decrease in muscle mass ( $p < 0.01$ ). Gait analysis demonstrated significant decreases in the vertical GRF component of hindlimb push-off.

**Conclusion:** BTX injection into the quadriceps musculature of the rabbit hindlimb produces functional and reversible muscle weakness. To our knowledge, this is the first time a model of isolated muscle weakness has been developed to investigate its potential effect on joint degeneration.

**Abstract Paper #IV - 3****Health Status and Functional Outcome in Surgically Treated Metastatic Disease of Long Bone and Acetabulum****M Talbot**

M Isler

D Normandin

D Ianuzzi

R Turcotte

Purpose: To objectively assess the benefits of surgery for bone metastases. This is the first prospective study to evaluate the impact of surgery on the quality of life and function of patients burdened by metastases to the appendicular skeleton.

Materials and Methods: Sixty-nine patients gave their informed consent to be followed prospectively. Patients were administered the SF-36, MSTS 1987, MSTS 1993 and TESS questionnaires pre-op, at 6 weeks and 3 months post-op.

Results: Average follow-up was 5,3 months with 71% of patients deceased at the latest follow-up. Thirty-three patients had a pathological fracture and 35 had an impending fracture. IM Nailing was performed in 36 patients, prosthetic replacement in 22 and various other methods of stabilization in the 13 other cases. Complications occurred in 20% of patients. There was a statistically significant improvement in the MSTS 1987 , MSTS 1993 and TESS. Pain control was improved as well. SF-36 physical component scores improved significantly at 6 and 12 weeks.

Conclusion: Our data shows that surgical treatment of metastatic disease to long bones improves functional status and quality of life in a relatively short time frame. This study suggest interesting benefits in the well-being of patients treated surgically for bone metastases.

**Abstract Paper #IV - 4****Correlation between Radiographic Findings and Disability in Lumbar Discectomy Patients****A Campbell**

D Yen

In patients with herniated nucleus pulposus, the relationship between disability and radiographic findings is unclear. To analyze this relationship, seventy four consecutive candidates for lumbar discectomy were evaluated in a prospective cohort study. All patients had a diagnosis of sciatica which was confirmed radiologically by CT or MRI. A standard lumbar discectomy was performed. Disability was assessed using a validated questionnaire both preoperatively and at two years following surgery. The space available for the neural elements (SNE) was measured on all pre-operative scans and used as a radiological indicator of disc size and degree of neural impingement. Eight candidates opted for conservative treatment and therefore received only a preoperative disability score. Five patients had incomplete data and were removed from the final analysis. Sixty one individuals had complete radiological, preoperative and two year follow up data for review. Statistical analyses of the compiled data revealed no apparent relationship between SNE and disability preoperatively or at two years follow up