Free Paper Session II — Trauma

2.1

Early Clinical Result of New Straight Proximal Humerus Nail (Multiloc Nail) in Proximal Humerus Fracture

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Introduction: Proximal humeral fracture is a common and challenging problem for trauma surgeon. Fixation with locking plate has been the popular choice for fixation, but problem of fixation failure and wound problem are not rare. A newly designed straight proximal nail is introduced to this territory since 2013 to tackle these problems. Use of such nail can achieve a minimal invasive fixation with improved bone purchase using the screw-on-screw technique. Also it has enhanced biomechanical stability as proven by biomechanical study. Besides, it has less cuff damage compared to traditional nail due to its medial entry point. We retrospectively reviewed our result of this implant.

Materials and Methods: This is a retrospective review of patients who had fixation of proximal humerus fracture with new straight proximal humeral nail (Multiloc nail). The demographics, quality of reduction, fracture union, shoulder range of movement, and related complication were reviewed.

Results: A total of 10 proximal humerus fracture cases were performed. Half of the cases were 3/4 part fracture while others were 2-part or proximal humerus fracture with extension to diaphysis. All cases achieved satisfactory reduction. The mean follow-up duration was 11 months. There was 1 case of infection and 1 case of proximal screw cutout. All other fractures healed with acceptable shoulder range of motion.

Conclusion: The newly designed straight proximal humeral nail with screw-on-screw technique is an acceptable choice of implant for proximal humerus fracture, with high union rate and satisfactory functional outcome.

2.2

Minimally Invasive Plate Osteosynthesis Using a Helical Plate for Metadiaphyseal Complex Fractures of the Proximal Humerus

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2.3

Case-control Study of Propensity Score–matched Monoblock Hemiarthroplasties Versus Cemented Modular Hemiarthroplasties for Geriatric Neck of Femur Fractures

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Introduction: The treatment choice between monoblock and modular hemiarthroplasties for displaced intracapsular neck of femur fractures in elderly patients still remains controversial. This study aimed to compare series of elderly with displaced neck of femur fracture treated with either a monoblock or a cemented modular hemiarthroplasty.

Materials and Methods: A total of 400 propensity score–matched patients with displaced intracapsular neck of femur fractures were retrospectively reviewed. They were divided into 2 groups (monoblock vs. cemented modular hemiarthroplasty) and their pre-morbid status, postoperative functional status, postoperative thigh pain, complications, and long-term survival were compared.

Results: The patients receiving modular hemiarthroplasties had better pre-morbid functional status, postoperative recovery, and ambulatory abilities. However, after propensity matching, there were no statistically significant differences in the postoperative ambulation status. There was less postoperative thigh pain in the modular group. There was no difference in revision rates, complications, and mortality between the groups.

Discussion and Conclusion: Cemented modular hemiarthroplasty for neck of femur fracture gives rise to less postoperative thigh pain in elderly. However, both monoblock and cemented modular hemiarthroplasties provide elderly patients with comparable ambulatory ability and low revision rate.

2.4

Fixation of Pelvic-acetabular Fracture Using Modified Stoppa Approach — Clinical and Operative Outcomes in a Major Trauma Centre of Hong Kong

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Introduction: The modified Stoppa approach has gained popularity over the past decade for fixation of complex pelvic-acetabular fractures. Being less invasive yet providing comparable exposure to the classic ilioinguinal approach, favourable results of this approach had been suggested in literature. Nevertheless, outcomes of this operative approach have yet to be reported or evaluated in this locality.

Materials and Methods: From October 2010 to May 2014, 18 patients with pelvic-acetabular fractures were fixed using modified Stoppa approach. Patient demographics, fracture patterns, operative parameters including use of additional window were studied. Radiographic results, complications, and clinical outcomes (Modified Merle d'Aubigné score) were evaluated.

Results: A consecutive series of 18 patients was evaluated. Their mean age was 41.4 years with mean follow-up duration of 30.9 months. Among them, 61.1% (n=11) suffered from pelvic fracture alone, 11.1% (n=2) had acetabular fracture, while the rest being a combination of both. Additional operating window was required in 50% of cases. Fracture union rate was 94.4%. Three complications were noted including 1 with superficial wound infection, 1 with post-traumatic osteoarthritis, and 1 had nonunion with implant breakage. Majority of patients had good functional outcome in terms of Modified Merle d'Aubigné score.

Discussion and Conclusion: Despite being a retrospective study with limited number of cases, this first local series on modified Stoppa approach showed satisfactory outcomes. In suitable pelvic-acetabular fractures, modified Stoppa approach is a safe and effective alternative to the classic ilioinguinal approach.

2.5 ***(Philippine Orthopaedic Association Ambassador Paper)***

Incidence of Angular Malalignment in Subtrochanteric and Proximal Shaft Femur Fractures after Intramedullary Nailing Using Sign Nails

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Objective: To determine the incidence of angular malalignment in subtrochanteric and proximal shaft femoral fractures treated with Surgical Implant Generation Network (SIGN) intramedullary nails.

Methods: The study used a retrospective cohort design. A total of 73 patients with either subtrochanteric or proximal femoral shaft fractures treated with SIGN nails from 1 January 2003 to 31 December 2012 were identified. Pre- and immediate post-operative radiographs were collected and angular malalignments were measured. Chi-squared analysis was used to compare the relationship between angular malalignment among different subgroups, degree of comminution, and related complications. The level of significance was set at 0.05.

Results: In all, 44% (22 of 50) of patients with subtrochanteric femur fractures had angular malalignment while 9% (2 of 23) proximal femoral shaft fractures were malaligned. Varus malalignment was most common in 24% (12 of 50) for subtrochanteric fractures. Subtrochanteric fracture location was a statistically significant independent factor leading to angular malalignment (p=0.002). Besides, 30% (16 of 52) of stable fracture patterns were malaligned, while 8 of 21 (38%) unstable fractures were malaligned. The relationship between the degree of comminution and angular malalignment was not significant (p=0.367). Also, 8% (4 of 50) of patients with subtrochanteric fracture location had iatrogenic medial cortex comminution after fixation with SIGN nails (p=0.013).

Conclusion: In summary, the incidence of angular malalignment after intramedullary nailing with SIGN nails was high at 44% in subtrochanteric femoral fractures and 9% in proximal femoral shaft fractures. Most of the angular malalignment were in varus at 24%. Subtrochanteric location is a significant factor for angular malalignment specifically in varus deformity. The relationship between the degree of fracture comminution and angular malalignment is not significant. Subtrochanteric location also posed the risk of iatrogenic medial comminution. The SIGN nail configuration and nail entry point may impose significant risk for angular malalignment.

Declaration: The authors made this research project without support financial or otherwise from any pharmaceutical or implant companies.

2.6

Improved Survival with a Standardised Multidisciplinary Protocol for Haemodynamically Unstable Pelvic Fractures

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Introduction: Haemodynamically unstable pelvic fracture carries a high mortality rate of up to 60%. Being one of the trauma centres in Hong Kong, we have been developing and modifying a protocol for unstable pelvic fracture since 1996, with continuous improvement in survival rate. In the most updated "3-in-1" damage-control protocol, 3 different sources of bleeding including bony, venous, and arterial bleeding are tackled by external fixation, retroperitoneal pelvic packing and angioembolisation, respectively in sequential order in the same operative session and theatre within the golden hour.

Methods: All patients with haemodynamically unstable pelvic fractures managed in our centre from 1 January 1996 to 31 December 2014 were retrospectively reviewed. The overall and adjusted survival rates during different phases of protocol modification were compared.

Results: A total of 189 patients were included. The overall survival improved from 27% in phase I (1996-2001) with external fixation alone, to 57% in phase II (2002-2008 June) with added angioembolisation, and to 69% in phase III (2008 July onwards) with the "3-in-1" protocol. The survival in phase III further improved to 76% in 2014. The adjusted survival rate of patients with concomitant injuries was also improved as shown in the modified W-score.

Conclusion: In haemodynamically unstable pelvic fractures, the use of standardised multidisciplinary "3-in-1" protocol results in improved survival. The 3 different techniques in our "3-in-1" protocol are not competitive but complementary to achieve haemostasis in unstable pelvic fracture.

2.7

Humeral Nail in Treatment of Humeral Fracture — Any Predictor of Good Outcome and How can We Improve the Outcome?

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Introduction: Intramedullary nailing has been increasingly used in humeral fracture. Impaired range of motion, shoulder pain, and weakness are known common complications after humeral nailing. We performed a retrospective review of our case series on the outcome of humeral nailing and found out methods to prevent the occurrence of complication.

Methods: Radiological results, range of motion, shoulder pain, and any complications occurred in cases of humeral nail performed in Prince of Wales Hospital were reviewed.

Results: A total of 35 patients received long nail and 12 of them were aged >70 years. In this case series, 16 cases involved proximal 1/3 humerus, 17 involved mid-shaft humerus, and 2 involved distal 1/3 shaft of humerus. All humeral fractures healed in a mean of 4.38 months. There were 2 cases of delayed union which the fractures healed by 10 months. We observed less stiffness of shoulder than expected as in the literature. The range of motion in terms of flexion and abduction was better in patients aged <70 years and cognitively normal ($p<0.05$). Moreover, in our case series, there were 3 cases of nonunion, 1 case of impingement as a result of fragment displacement, and 1 case of radial nerve injury.

Conclusion: We would review these complicated cases and find out ways to prevent the occurrence of complications.

2.8

Modern Dorsal Fragment-specific Plating System Provides a Good Alternative to Tackle Distal Radius Fracture with Dorsal Comminuted Intra-articular Fragments and has Minimal Complications

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Introduction: Plate fixation to comminuted intra-articular distal radius fracture can often be challenging. Conventional volar plating often cannot tackle the comminuted dorsal fragments. Modern dorsal plate design allows fragment and column-specific solution to these fragments.

Materials and Methods: Operations from January 2012 to December 2014 for fixation of AO type 23C fractures were included. Patients with other concomitant upper limb injury or unable to comply with postoperative rehabilitation were excluded. Medical records were retrospectively reviewed for complications and functions. Survey for satisfaction and the Disabilities of the Arm, Shoulder and Hand (DASH) score for patients with dorsal plating were charted.

Results: A total of 62 operations were included with 28 dorsal approach, 33 volar approach, and 1 combined dorsal and volar approaches. Significantly more C3.3 type fractures were done with the dorsal approach. Ranges of movement showed no significant difference between the dorsal approach or volar approach groups. Of the cases done with dorsal approach, at 6 months postoperation, the mean DASH score was 16.9/100, patient satisfaction score 8.2/10, and visual analogue scale pain score being 1.2/10. There was 1 case of extensor pollicis longus tendon rupture with each approach. There were 4 cases of implants removal for impingement in the dorsal approach group but did not significantly differ from the volar group.

Discussion and Conclusion: Dorsal approach to the distal radii fractures can handle fractures with more comminution with comparable complication rate and wrist stiffness to the volar approach alternative.

2.9

Minimally Invasive Full-length Spanning Plating of Femur: A Better Alternative for Treatment of Periprosthetic Femoral Fractures

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Femoral shaft fractures in patients with pre-existing implants (as known as periprosthetic fractures) pose a challenging problem. Conventional treatment with long-stem revision or direct open reduction and cable plating is associated with increased risk of nonunion, delayed resumption of full weight-bearing walking, and re-fractures at the end of the implants.

A modified approach with indirect reduction, bridge fixation with minimally invasive long spanning plating, covering the whole length of the femur, and early weight-bearing rehabilitation has been practised for the past decade. This study reviewed patients treated with this technique over the recent few years.

A total of 23 patients, aged 59 to 95 years, were treated with minimally invasive long spanning plating of the femur from 2012 to 2014. This review was conducted to analyse their pre- and post-morbid mobility, and complications at least 1 year after the fixation.

All patients were walkers before the fracture. A total of 10 patients achieved full weight-bearing soon after operation. At 3 months, 73% achieved full weight-bearing and by 9 months 89% of our patients achieved full weight-bearing. The remaining 2 patients were wheelchair-bound and required assistance to stand. All fractures healed within 6 months. No re-fractures were noted. Only 1 patient was complicated with wound infection requiring re-operation.

Minimally invasive long spanning plating of the femur is a safe and effective method which allows early return of weight-bearing with few complications, and provides prophylactic splintage to prevent re-fractures in the same femur.

2.10

Appropriate Choice of Plating for Posterior Malleolus — Computed Tomography Study of 122 Chinese Adult Subjects

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Introduction: Plating of posterior malleolus (PM) is a common procedure for fixation of PM fracture. However, the osteology of PM was seldom mentioned in literature. The whole width of PM cannot be used for plating because there is a groove over medial side for passage of tibialis posterior tendon (PTT). In this study we measured the width of PM available for plating by computed tomography (CT) and investigated any influence on plate selection.

Methods: A total of 122 adult patients with normal distal tibia CT films were recruited. The width available for PM plating, total width of PM, and the proportions of the width available for plating to the total width were obtained.

Results: Presence of groove was found in 120 patients, with width available for plating around 20 mm. The ratios comparing the width available for plating to total width of PM was 0.59.

Discussion and Conclusion: Appropriate sizing is essential in PM plating. From our study, the grooves for PTT were present in 98.4% of subjects, implying that this groove is an important anatomical consideration when applying the implant. During the operation, we can determine the correct size of the plate by comparing the relative size of the plate to the distal tibia using this ratio. Our CT study of 122 patients demonstrated the importance in understanding the anatomy in order to achieve effective plating of PM. It provided estimations for appropriate width of plate and the method to evaluate the correctness by comparing with the width of the tibia.

2.11

The New Minimally Invasive Surgery Approach for Displaced Calcaneal Fracture Fixation: Combined Arthroscopic- and Fluoroscopic-guided Close Reduction and Percutaneous Fixation

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2.12

A Study to Evaluate the Pattern and Types of Treatment of Tibial Plateau Fracture at BPKIHS (B. P. Koirala Institute of Health Sciences), Dharan, Nepal

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Introduction: Tibial plateau fractures occur due to combination of axial loading and varus / valgus applied forces leading to articular depression, malalignment, secondary post-traumatic osteoarthritis, and functional loss. This study was conducted to assess effect of these injuries.

Materials and Methods: This prospective study was conducted over a period of 2 years involving a total of 53 patients presented with tibial plateau fractures. Among these, 18 were excluded due to significant polytrauma and major limb injuries, and 4 did not give consent. The remaining 31 patients meeting the criteria were enrolled. Patients were evaluated using standard methods and treated. Two patients were lost during follow-up. Data were recorded and analysed using appropriate statistical methods at the end of study.

Results: Among these 29 patients, 21 were male. Their mean (± standard deviation) age was 35.07 ± 11.96 years. Right side was predominantly involved. In all, 55.2% had road traffic accident. Around 50% had Schatzker type 4 and 5 injuries. Besides, 65% were treated with open reduction and internal fixation. Other modalities were above-knee pop cast, cannulated cancellous screw, and Ilizarov fixation. Bone grafting was done in 2 cases. In all, 25 patients had excellent, 2 had good, 2 had fair, and none had poor result. One had common peroneal nerve palsy, 2 had wound infections, and no patient demonstrated early arthritic changes.

Discussion and Conclusion: Tibial plateau fractures treated with different modalities in our institute are associated with excellent and good functional outcome at the end of short-term follow-up.

2.13

Use of Medical Co-morbidities to Predict Complication and Mortality Rate Following Fragility Hip Fractures

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2.14

Early Failure of Internal Fixation for Trochanteric Hip Fractures — A Retrospective Review

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Introduction: Internal fixation with dynamic hip screw or cephalomedullary nail is the commonest treatment for trochanteric hip fractures. Unlike hemiarthroplasty, such patients are not commonly followed up for long period. Associated complications may be overlooked and may result in delayed presentation until severe joint destruction or remained undiagnosed while patients lose their mobility due to pain.

Methods and Materials: All hip fracture patients over 60 years treated with dynamic hip screw or cephalomedullary nail in 2013 to 2014 in United Christian Hospital were reviewed. Pathological fractures were excluded. Follow-up X-rays and complications were reviewed.

Results: A total of 714 hip fracture patients were included. In all, 474 (66%) patients had follow-up of more than 6 months. Of these, 46 (9.7%) had complications occurred within 1 year which warranted surgical revision. These included nonunion (n=26), avascular necrosis (n=8), early screw cutout (n=10), and rapid degeneration (n=2). Cephalomedullary nail had higher risk of complications (11.9% vs. 8.5%). The commonest complication in dynamic hip screw was nonunion (5.2%) followed by avascular necrosis (2.0%). For cephalomedullary nail, nonunion was also the commonest (6.0%) followed by early screw cutout (4.8%). Except for early screw cutout, most complications occurred at around 9 to 12 months.

Conclusion: Failures of internal fixation for trochanteric hip fractures are not uncommon, and most occurred at 9 to 12 months postoperatively. Adequate follow-up helps to detect these early and prevent unnecessary loss of mobility.

2.15

Relationship between Integrity and Stability of Syndesmosis of Ankle Joint — Cadaveric Biomechanical Study

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2.16

Mid-term Results with Radial Head Replacement — Queen Mary Hospital Experience

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Introduction: Metal radial head prosthesis is useful to stabilise elbow and forearm with traumatic instability in the setting of comminuted radial head fracture and complex elbow dislocation. Short-term results of radial head arthroplasty are promising. However, mid- and long-term results are scarcely reported.

Materials and Methods: The functional and radiographic outcomes of 32 implants in 31 consecutive patients treated in Queen Mary Hospital were retrospectively examined after a mean of 4.4 (range, 1.7-8.4) years between 2007 and 2013.

Results: Satisfactory mid-term outcome was achieved in the majority of patients according to the range of motion, stability testing, Mayo Elbow Performance Score, as well as Disability of Arm, Shoulder and Hand Scale score. Radiographic changes suggestive of loosening and osteoarthritis were common but they did not correlate with poor outcome. Major complication included 1 case of deep infection requiring radial head removal.

Discussion and Conclusion: Radial head replacement effectively restores elbow stability in acute trauma situations. Good result can be achieved early and sustained to the mid-term.

2.17 ***(Malaysian Orthopaedic Association Ambassador Paper)***

Outcomes of Internal Fixation for Acetabulum Fractures Done in Hospital Tuanku Ja'afar, Seremban, Malaysia

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Objective: Although acetabulum fractures make up a very small portion of skeletal trauma in our orthopaedic practice, its morbidity can be very disabling to the patient. The majority of acetabulum fractures we encounter are seen in younger individuals and are due to high-energy trauma. This study aimed to quantify the functional outcome of acetabulum fractures that have been treated with open reduction and internal fixation done in Hospital Tuanku Ja'afar, Seremban, Malaysia.

Study Design: Cross-sectional study.

Patients and Methods: A total of 23 patients undergoing open reduction and internal fixation (ORIF) for their acetabulum fracture in our centre were identified through operating theatre data from January 2009 to December 2012 and were enrolled in this study. Functional assessment was done using Harris Hip Score. Functional outcomes for at least 12 months postoperatively were measured and were categorised as having excellent, good, fair, or poor.

Results: In all, 13 (56.5%) had excellent, 1 (4.3%) had good, 6 (26.1%) had fair, and 3 (13.1%) had poor scores. None of the factors including patients' age, fracture pattern, days from injury to index surgery, and surgery duration had statistically significant influence on the functional outcome in terms of Harris Hip Score. There were also no statistical significance in terms of surgery duration between simple or associated fracture types.

Conclusion: None of the previous predictors that we thought could improve the functional outcome of acetabulum fixation were statistically significant.