

Award Paper Session

AP01

The Results of Contralateral C7 Spinal Nerve Transfer in Unilateral Brachial Plexus Palsy Patients — A 28 Years' Experience

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AP02

5-Year Longitudinal Magnetic Resonance Imaging Follow-up of a Population-based Cohort of Subjects with Ossified Yellow Ligament: A Natural History Study

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Introduction: Ossified yellow ligament (OYL) causes the majority of thoracic myelopathy. This study presents longitudinal follow-up of these individuals to assess changes related to disease progression and risk factors for such progression.

Methods: In a population-based study of 1864 southern Chinese volunteers using magnetic resonance imaging (MRI), 114 individuals were identified to have OYL. The MRI parameters assessed included the size of OYL, levels of involvement, OYL morphology, whether the OYL crossed midsagittal region, and the presence of degenerated discs. Both baseline and 5-year follow-up MRIs were read by 2 observers blinded to clinical information and any differences were settled by consensus.

Results: Size progression was defined as bigger OYL size in the follow-up MRI than that in baseline MRI. In all, 70% T9/10 and 62% T10/11 OYLs had size progression ($p < 0.05$). Majority of de-novo OYL (new OYL formed only in the follow-up scan) developed in T8/9 to T11/12. They were observed in 70% of segments who had body mass index of 30 to 40 kg/m² ($p = 0.02$), otherwise no other risk factors could be found.

Discussion: This is the first and only population-based series addressing the natural history of OYL. Myelopathy commonly occurs in the lower thoracic region and this study showed that most of the lower thoracic OYLs progressed in size. Knowing the natural history of OYL at 5-year follow-up, preventive measures such as weight reduction, close monitoring for myelopathy development, and perhaps early operation for lower thoracic OYL may be necessary.

AP03**Fatty Acid Binding Protein 4 as a Biomarker in Knee Osteoarthritis****CH Yan, T Li, CF Zhang, KY Chiu***Department of Orthopaedics and Traumatology, The University of Hong Kong, Hong Kong*

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AP04**Exacerbated Structural Impairments of Subchondral Bone and Articular Cartilage in Knee Osteoarthritis Patients with Hypertension****Y Chen,¹ WW Zhao,¹ FKL Leung,¹ X Cao,² W Lu¹**¹*Department of Orthopaedics and Traumatology, The University of Hong Kong, Hong Kong*²*Department of Orthopaedics, Johns Hopkins University, United States*

Subchondral bone loss increases cartilage damage in women following menopause, and in animal models with combined osteoarthritis (OA) and osteoporosis. Hypertension is associated with bone loss. Thus, we aimed to investigate microstructural changes in subchondral bone and cartilage in knee OA patients with hypertension.

Knee OA patients (n=102) undergoing arthroplasty were divided into non-hypertensive (n=48) and hypertension (n=54) groups according to hypertensive status. Tibial plateaus removed during operation were evaluated using micro-computed tomography (micro-CT), histology, and immunohistochemistry. Patients' clinical data were analysed.

The micro-CT analysis revealed that subchondral bone in hypertension group was lower in bone volume fraction (BV/TV), trabecular number (Tb.N), bone mineral density (BMD), and higher in structure model index (SMI) than non-hypertensive group. Significant associations were found between hypertensive status and BV/TV, Tb.N, and SMI after adjustment for age, gender, body mass index, and mechanical alignment. Histology showed higher Osteoarthritis Research Society International (OARSI) scores in hypertension group. Tartrate-resistant acid phosphatase staining detected larger number of osteoclasts in hypertension group. Immunohistochemistry revealed lower number of osterix + osteoprogenitors and osteocalcin + osteoblasts in hypertension group. Significant correlations were found between structural and remodelling parameters at subchondral bone and furthermore, between subchondral bone structural parameters and cartilage OARSI scores.

Subchondral bone and cartilage demonstrate exacerbated structural impairments in knee OA patients with hypertension. Changes in bone structure are associated with hypertensive status and, with cartilage degradation. Our results suggest that hypertension may induce exacerbated impairments in subchondral bone, and thus aggravate cartilage degradation in knee OA.

AP05

Cementless Acetabular Component without Using Supplemental Screws — Immediate Full Weight-bearing has no Adverse Effect with a Minimum 10-Year Follow-up

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Introduction: Total hip arthroplasty using cementless acetabular component had excellent survivorship. It is controversial whether supplemental screw fixation is mandatory and immediate weight-bearing should be allowed. This study aimed at reviewing the clinical and radiological outcomes of patients receiving cementless acetabular component without supplemental screws with a minimum of 10-year follow-up.

Materials and Methods: This is a prospective study of patients using the same model of cementless acetabular component without supplemental screws from June 1999 to March 2003. Immediate full weight-bearing walking exercise was allowed. The degree of lateral opening angle and migration of the acetabular component were compared in the early postoperative period and in the last follow-up.

Results: A total of 70 hips in 58 patients had a minimum of 10-year follow-up (mean \pm standard deviation, 13.2 ± 1.3 years). There was no revision of acetabular cup. The mean lateral opening angle was 47.2 ± 7.3 degrees in the early postoperative radiographs (range, 27-70 degrees) and 47.8 ± 7.5 degrees in the final follow-up radiographs (range, 28-71 degrees). The mean change in the lateral abduction angle was 0.6 ± 1.9 degrees (range, -3 to 7 degrees). The vertical distance decreased by a mean of 0.1 ± 1.9 mm (range, -3.0 to 3.0 mm), and the horizontal distance decreased by a mean of 1.3 ± 1.6 mm (range, -3.0 to 3.0 mm).

Conclusion: Immediate weight-bearing walking did not result in the migration of the cementless acetabular component without screw fixation.

AP06

6-Minute Walk Test: A Simple Objective Test in Screening and Monitoring of Spinal Claudication: Prospective Study on 1182 Patients

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Introduction: The diagnosis, disease severity, and outcome assessment of spinal claudication depend on patient's subjective report. Simple quantitative test is lacking. The present study used 6-minute walk test (6MWT) to solve these problems.

Methods: Patients suspicious of spinal claudication were prospectively tested on standing and walking ability. Time when symptom became intolerable constituted the tolerance time. They were tested on distance (6MWD) they could maximally walk on level ground in shuttle between a 15-metre distance in 6 minutes, and screened for standing and walking instability with Tinetti score. Patients undergoing surgery were monitored.

Results: Since 2004, 1182 patients were included. The age-matched 6MWD correlated with 20-minute standing tolerance well with sensitivity and specificity of >0.7 . Using receiver operating characteristic curve, the 6MWDs that distinguished 20-minute claudication tolerance in different age-groups were 392 metres (41-50 years), 377 metres (51-60 years), 330 metres (61-70 years), 267 metres (71-80 years), and 236 metres (81-90 years). For those who underwent surgery, their standing and walking tolerance significantly improved in first 3 months but not later. The balance and gait score improved significantly only 3 months postoperatively. The 6MWD increased significantly at both 3 and 6 months postoperatively, implying that 6MWD was more sensitive in picking up changes.

Discussion and Conclusion: The 6MWT is a simple, practical method in screening for spinal claudication. The age-matched 6MWD for incapacitating claudication was found. The test can also provide useful quantitative data for disease progression and treatment outcome monitoring.

AP07

Can We Predict Skeletal Maturity and Curve Progression in Idiopathic Scoliosis by a New Simplified Thumb Ossification Composite Index?

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Introduction: Accurate skeletal maturity assessment is important for clinical management of idiopathic scoliosis (IS). Commonly used methods are still inadequate or too complex for rapid clinical use. This study aimed to evaluate whether a new Thumb Ossification Composite Index (TOCI) staging could correlate well with skeletal maturity parameters and predict curve progression in IS.

Methods: This study involved a prospective series of immature IS girls and they were followed up at 6-monthly intervals longitudinally till skeletal maturity. Anthropometric data, peak height velocity (PHV), Cobb's angle (CA), and computed angle velocity (AV) were recorded. A new TOCI skeletal maturity staging was registered and compared with digital skeletal age (DSA) score. Inter-observer reliability was tested. Logistic regression analysis was used to evaluate the risk of curve progression at each TOCI stage versus CA.

Results: Of the 127 IS girls (mean age, 11.3 years) with initial mean CA of 24.1 degrees, 66% (n=84) with curve progression of >5 degrees had mean AV at onset of curve acceleration phase (CAP) of 13.5 degrees/year. The PHV occurred at TOCI stage 5 and highly correlated with DSA score ($r=0.91$, $p<0.01$) and CAP ($r=0.90$, $p<0.01$). Logistic regression analysis showed that patients with >30-degree CA and TOCI stage ≤ 5 had 90% risk of progression to surgical magnitude (>50 degrees) at maturity. The TOCI also showed excellent inter-rater reliability between 3 orthopaedic surgeons (intraclass correlation coefficient [ICC]=0.97 [0.96, 0.98]) and 3 non-medical raters (ICC=0.93 [0.89, 0.96]).

Conclusion: The TOCI staging system correlated well with skeletal maturity parameters and could predict curve progression in IS at early stages. Its simplicity and high reliability have good potential for application in busy clinical settings.

AP08

Re-operation after Magnetically Controlled Growing Rod Implantation: A Review of 30 Patients with Minimum 2-Year Follow-up

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AP09

Improving Low Bone Mass in Girls with Adolescent Idiopathic Scoliosis Using Calcium and Vitamin D Supplementation — A Randomised Double-blinded Placebo-controlled Trial

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Introduction: Adolescent idiopathic scoliosis (AIS) is a prevalent 3-dimensional spinal deformity associated with osteopenia. This study aimed at evaluating the therapeutic effect of oral calcium + vitamin D (Vit-D) supplementation for low bone mass in skeletally immature AIS girls.

Materials and Methods: This was a randomised double-blinded placebo-controlled trial recruiting 330 AIS girls (aged 11-14 years) with femoral neck areal bone mineral density (aBMD) Z-scores of <0 and Cobb's angle of >15 degrees. They were randomly allocated to group 1 (placebo), group 2 (600 mg calcium + 400 IU Vit-D3/day), and group 3 (600 mg calcium + 800 IU Vit-D3/day). The treatment period was 2 years. At baseline (T0) and 24 months (T1), dual-energy X-ray absorptiometry (DXA) and high-resolution peripheral quantitative computed tomography (HR-pQCT) were performed to evaluate bone status. Analysis of variance and generalised estimating equations were used for analyses.

Results: A total of 270 (81.8%) subjects completed the study. Differences in changes across the treatment period in femoral neck aBMD, bone mineral content, and mean volumetric BMD (vBMD), trabecular vBMD, trabecular bone volume fraction, trabecular number, and trabecular separation of the non-dominant distal radius between groups indicated therapeutic anabolic bone effect with calcium + Vit-D supplementation.

Discussion and Conclusion: The results indicated that treatment with 600 mg calcium + 400/800 IU Vit-D3 was effective for treating low bone mass in AIS subjects. Given the suboptimal 25(OH)Vit-D levels and the association between AIS and low bone mass, Vit-D status and bone density and quality should be assessed and be followed as needed with calcium + Vit-D supplementation for all AIS subjects.

AP10

Cost-benefit Analysis of Intra-articular Injection of Tranexamic Acid in Total Knee Arthroplasty

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Introduction: Recent studies reported that intra-articular administration of tranexamic acid (IaTXA) in total knee arthroplasty (TKA) reduced transfusion rate, but the optimal regimen is not yet established. This study aimed to provide a cost-benefit analysis of our regimen.

Materials and Methods: The inclusion criterion was patients undergoing unilateral primary TKA with the diagnosis of primary osteoarthritis, and exclusion criteria were patients with contra-indication of IaTXA. The patients were included into 2 groups: patients with IaTXA from July 2014 to June 2015 (TXA group: 1 gm TXA was directly injected into knee joint) and those without IaTXA from July 2013 to June 2014 as historical control (non-TXA group). All TKAs were conducted by same surgical team with standardised techniques and perioperative management. Demographics and perioperative parameters were collected for comparison. The primary (transfusion rate) and secondary (thromboembolism complications and cost) outcomes were compared between TXA and non-TXA groups.

Results: A total of 375 patients were included in this study, including 190 in TXA group and 185 in non-TXA group. Both groups were comparable in demographics and perioperative parameters. The TXA group had statistically significantly lower transfusion rate (9.4% vs. 34.6%, $p=0.005$). No thromboembolism complications were observed in both groups. This led to saving HKD\$238.31 per patient based on transfusion cost alone after accounting for the cost of TXA.

Discussion and Conclusion: It showed that our regimen of IaTXA could reduce transfusion rate, and was cost-saving without increasing complications of thromboembolism.