Free Paper Session V — Adult Joint Reconstruction I

5.1

Visible Glove Perforation in Total Knee Arthroplasty: Risks and Consequences

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Introduction: The risk of superficial surgical site infection (SSI) and periprosthetic joint infection (PJI) after glove perforation is not evident. This study aimed to identify risk factors for glove perforation in primary total knee replacement (TKR) and the risk of subsequent superficial SSI and PJI.

Materials and Methods: Results of visible glove perforation of the surgeons during TKR were reviewed. A case-control analysis was performed on the preoperative and operative variables to identify predictive risk factors for glove perforation. Rate of SSI and PJI were compared between perforation and non-perforation groups.

Results: A total of 1226 primary TKRs from 2011 to 2014 were reviewed. In all, 55 knees had visible glove perforations. The operation perforation rate was 4.5%. Risk factors identified were body mass index (BMI) of >30 kg/m^2, bilateral surgery, operating time of >120 minutes, and non-trainee surgeons. Superficial SSI was significantly higher in glove perforation group (9.15% vs. 0.5%). Periprosthetic joint infection was not significantly different (1.8% vs 1.1%). There was 15-times increase in the risk of superficial SSI independent of BMI and operating time.

Discussion and Conclusion: Visible glove perforation in TKR is associated with several risk factors. The risk of superficial SSI is higher after perforation. However, prompt treatment of superficial SSI may result in insignificant increase in the risk of PJI in perforated cases.

5.2

Blood Management Protocol in Total Knee Replacement: An Effective Way to Reduce Blood Wastage and Unnecessary Transfusion

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Introduction: Total knee replacement may lead to significant bleeding. Blood transfusion rate varies from 10% to 90%. However, allogenic blood transfusion is not without complications. Our study aimed to compare the results of patients undergoing total knee replacement before and after introduction a blood management protocol.

Materials and Methods: A total of 97 consecutive patients were in no-protocol group and 96 patients in protocol group. With protocol, only type and screen was performed when preoperative haemoglobin level was <11 g/d; cross-match was performed if multiple red cell antibodies were identified preoperatively or if blood transfusion was required postoperatively. No blood transfusion was performed unless the postoperative haemoglobin level at day 1 was <8 g/dL or the patient was symptomatic.

Results: There was no difference in age, sex ratio, and preoperative haemoglobin level between 2 groups. The postoperative haemoglobin drop was 2.7 g/dL in no-protocol group and 2.52 g/dL in protocol group without significant difference. The transfusion rate of no-protocol group was significantly higher (10.31% vs. 3.13%, $p<0.05$). The cross-match rate was 3.13% in protocol group versus 100% in no-protocol group; respective cross-match–transfusion ratio was 1:1 versus 9.7:1. There was no infection, cardiovascular and cerebrovascular complications, as well as mortality in both groups.

Conclusion: The protocol is effective in reducing unnecessary allogenic blood transfusion and wastage of unused blood without increase in postoperative complications.

5.3

Anatomical Head Mono-bloc Ceramic-on-ceramic Total Hip Arthroplasty — Our Series and Short-term Outcome

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Introduction: Total hip replacement has been ever evolving with newer materials and design concepts. This has markedly improved the stability and longevity of the implant. Mono-bloc anatomical head ceramic-on-ceramic implants (Deltamotion hip system, Depuy, J&J) were recently been made available. It has been postulated that they have longer survivability with less wear rates. We present a short-term follow-up study of anatomical head ceramic-on-ceramic total hip arthroplasty.

Materials and Methods: A total of 25 patients with 34 hips were included in the study. The study was conducted from November 2012 to January 2014. The mean age of the patients was 62 years and their mean follow-up period was 15 months. Postoperative complications, mortality rate, functional outcome using Harris Hip Score, time to return to normal activities, as well as radiographic evidence of implant alignment and loosening were studied.

Results: The mean (± standard deviation) Harris Hip Score at 1 month was 72 ± 7, at 3 months it was 82 ± 6, and at 15 months it was 92 ± 6. Mobilisation was started on the first postoperative day. Their mean duration of hospital stay was 3.5 days, and their mean time taken to return to daily activities was 28 days (range, 24-33 days). No loosening or infection of the implants was observed. No squeaking or implant fracture was noted.

Discussion and Conclusion: Ceramic-on-ceramic mono-bloc anatomical head acetabular prosthesis is a good implant in primary total hip arthroplasty. However, longer follow-ups with large multicentric trials are required.

5.4

Benefits and Risks of Unicompartmental Knee Replacement Versus Total Knee Replacement: A Matched Comparison

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Introduction: Total knee replacement (TKR) is not without risk. Although stroke, myocardial infarction, thromboembolism, blood transfusion, admission to critical care, and mortality are more common in TKR, unicompartmental knee replacement (UKR) comprises only 3% to 8% of knee arthroplasties. Should UKR be encouraged or eliminated? This study aimed to establish the role of UKR by evaluating the benefits and risks of UKR versus TKR.

Materials and Methods: All UKRs performed in our institute from 2011 to 2014 were reviewed. Comparative analyses were performed on preoperative, operative, and postoperative parameters. Primary TKR performed in the same period was chosen as control group with 1:1 matching for age, sex, body mass index, and preoperative range of motion (ROM).

Results: There were 46 UKRs which comprised 3.3% of all knee arthroplasties in our institute. The mean follow-up time was 12.8 months (range, 4-38 months). All operative parameters favoured UKR (operating time 76 vs. 91 minutes; wound size 7.5 vs. 12.4 cm; haemoglobin drop 0.75 vs. 2.46 g/dL). Postoperative parameters also favoured UKR (deep vein thrombosis rate 4.3% vs. 23.9%; length of stay 5.4 days vs. 7.0 days). There was also better ROM at 6 months in UKR (116° vs. 109°). No infection or mortality was found in both groups.

Discussion and Conclusion: Because of less operative risk and faster rehabilitation, this study suggested that UKR is a better choice than TKR for old or unfit. The limitations of UKR included narrow selection criteria, lower margin of surgical error, and higher revision rate.

5.5

Mortality after Primary Total Knee Replacement in a High-volume Hospital

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Introduction: There were more than 2000 total knee replacements (TKRs) per year in Hong Kong and more than 10,000 patients on waiting list. But how safe is TKR? This study aimed to review the mortality of primary TKR in Hong Kong and to identify risk factors of mortality in a high-volume hospital.

Materials and Methods: All primary TKRs performed in the Hospital Authority (HA) and Yan Chai Hospital (YCH) from 2011 to 2014 were reviewed. Case-control analysis was performed for risk factors of TKR mortality in YCH.

Results: There were 6588 TKRs in HA and 1320 knee arthroplasties in YCH (including 1095 unilateral TKR, 89 bilateral TKR, and 47 unicompartmental knee replacement). The mean follow-up time was 12.8 months. The respective 30-day, 90-day, and 1-year mortality were 0%, 0.08%, 0.34% for YCH and 0.1%, 0.2% and 0.7% for HA. For YCH, operation-to-death interval was 21 months. Their mean age at death was 78 years. Main causes of death were malignancy (50%). Predictors of mortality included age, ASA class 3, and preoperative range of motion. Hospital surgery volume, co-morbidities, and deep vein thrombosis were not found to be significant.

Discussion and Conclusion: Mortality rate after TKR was low in HA and even lower in YCH. This may be reflecting the low mortality in general population. The contribution of pre-admission clinic with fast-track rehabilitation to the lower mortality in our institute is to be further explored. Patients of older age or poorer pre-morbid state are to be optimised and counselled of the higher mortality rate before operation.

5.6

Long-term Survival of Total Hip Replacements in Patients under the Age of 40 Years

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Introduction: Total hip replacements (THR) performed in younger patients is a matter of concern as the outcome is variable. We have evaluated the survival of the THR for patients <40 years performed in our institution in the last 20 years.

Materials and Methods: All primary THR performed on patients <40 years between 1995 and 2014 were retrospectively analysed. A total of 78 THR in 60 patients were reviewed and survival analysis was performed according to the implant groups: all cemented, hybrid (cementless acetabulum, cemented stem), reverse hybrid (cemented acetabulum, cementless stem), and all cementless.

Results: The mean age of patients at surgery was 32.57 years. The main causes for THR were avascular necrosis (45%), ankylosing spondylitis (22%), and inflammatory arthritis (13%). Taking revision as end point, the overall survival was 72.8% at 19 years. There were 27 cemented THR with a survival of 81.3% at 17 years, 28 cementless THR with a survival of 87.7% at 19 years, 11 hybrid THR with a survival of 100% at 13 years, and 12 reverse hybrid THR with a survival of 87.5% at 19 years. The reasons for revision were infections (2/12) and aseptic loosening (10/12).

Discussion and Conclusion: Cemented, cementless, and reverse hybrid THR had similar survival at more than 17 years, whilst hybrid THR appeared to have better survival at 13 years. However, the follow-up was shorter and the number was smaller.

5.7

Bilateral Simultaneous Total Knee Replacement Versus Unilateral Total Knee Replacement in a High-volume Hospital

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Introduction: Bilateral simultaneous total knee replacement (BTKR) has been performed for many years but there is still controversy about safety and morbidity. We performed a matched comparison of the results of BTKR and unilateral total knee replacement (UTKR).

Materials and Methods: Records of the patients who underwent BTKR and UTKR from October 2011 to October 2014 in Yan Chai Hospital were reviewed and matched comparison was performed.

Results: A total of 89 patients in each group were compared. Preoperatively, BTKR group had poorer range of movement (102° vs. 110°) and Knee Society Score (45 vs. 53). Postoperatively, BTKR group had higher total drain output (398 mL vs. 193 mL), higher haemoglobin drop (3.7 g/dL vs. 2.2 g/dL), and higher transfusion rate (21.3% vs. 1.1%). Major complication rate (2.2% vs. 0%), transfusion amount (2.2 units vs. 2.0 units), and postoperative range of movement and scores were similar in both groups. The BTKR group had shorter length of stay per knee (4.8 days vs. 6.5 days).

Discussion and Conclusion: Low cardiovascular risk patients, high-volume surgeons, intra-operative navigation system, and fast-track rehabilitation programme are all essential in BTKR. It is a safe surgery in selected patients performed in high-volume hospital with fast-track programme. It is cost-effective to patients, hospital, and society with good clinical outcome.

5.8

Early Experience of Total Hip Arthroplasty with Direct Anterior Approach

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Introduction: Direct anterior approach for total hip arthroplasty is gaining popularity in recent years. We report our early experience.

Methods: A total of 5 hips in 5 patients received cementless total hip arthroplasty through direct anterior approach from December 2014 to June 2015. Standard operative table was used. In 4 hips, Trident cup and Secur-Fit stem (Stryker) were implanted using standard instruments. In the other hip, Pinnacle cup and Corail stem (DePuy) were implanted using offset instruments. Operating time, blood loss and complication, narcotic consumption and rehabilitation parameters, as well as component alignment were reviewed.

Results: The mean operating time was 170 minutes. The mean intra-operative blood loss was 1.3 L. The mean haemoglobin drop was 3.6 g/dL at postoperative day 1. The mean transfusion requirement was 1.2 units of packed cells. The mean daily morphine consumption on postoperative day 1 and 2 were 11.6 and 4.3 mg, respectively, whereas the mean time to use frame and stick independently was 7.7 and 17.8 days, respectively. The mean time for Time-Up-and-Go Test at weeks 4 and 12 postoperation was 14.5 and 12.7 seconds, respectively. For component alignment, the mean acetabular cup opening angle and anteversion were 42.8 degrees and 23.2 degrees, respectively. The mean stem alignment was 1.3 degrees valgus. Shorter operating time was observed in cases later in the series.

Conclusion: Our early experience of direct anterior approach for total hip arthroplasty demonstrated learning phenomenon for operating time.

5.9

Early Results of Local Bicompartmental Knee Arthroplasty

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Introduction: Co-existing medial compartment and patellofemoral joint osteoarthritis of the knee with sparing of the lateral compartment is not uncommon in Hong Kong. Surgical treatment with total knee arthroplasty, sacrificing the normal lateral compartment, has been the popular choice in these patients. However, this alters the normal kinematic of the native knee joint. An alternative option is bicompartmental knee arthroplasty, which preserves the ligaments, bone stock, and normal kinematic. The early local results of this treatment method were reviewed.

Materials and Methods: Prospective cohorts of 4 patients with modular unlinked bicompartmental knee arthroplasty were reviewed within the first 6 months.

Results: These 4 patients were all female with a mean age of 58.3 years. All patients experienced improvement in knee pain after the operation. The mean Knee Society knee score improved from 44 to 93 and the mean function score improved from 53 to 79. The level-ground exercise tolerance improved from a mean of 18 minutes to 60 minutes. One patient required walking aid due to contralateral knee pain. All patients need handrail for stair walking before operation and 6 months after operation. No complication was observed.

Discussion and Conclusion: Modular unlinked bicompartmental knee arthroplasty provided good pain relief and improvement in level-ground walking. However, no improvement in stair walking was noted at 6 months after operation.

5.10 ***(British Orthopaedic Association Ambassador Paper)***

Outcomes after Distal Femoral Osteotomy: A Multicentre Cohort Study

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Introduction: Symptomatic unicompartmental arthritis of the knee in the presence of distal femoral metaphyseal deformity may be treated with distal femoral osteotomy (DFO). This multicentre patient cohort is larger than any published series in the current international literature.

Methods: Patients were operated on at 3 participating centres. Standing long leg radiographs were used for deformity analysis pre- and post-operatively using digital planning software. Patients were evaluated using the Oxford Knee Score (OKS), Knee Injury and Osteoarthritis Outcome Score (KOOS), EuroQol Group's EQ5D, and visual analogue scale (VAS) for pain and satisfaction. These were repeated at 6 months and annually postoperatively.

Results: A total of 108 DFOs were performed in 104 patients (59 men, 45 women, 4 bilateral cases) between September 2002 and July 2014. Their mean age at surgery was 44 years (range, 19-71 years) and their mean follow-up period was 2.3 years (0.5-12 years). In all, 97 knees underwent surgery for a valgus deformity (80 medial closing wedge, 17 lateral opening wedge) and 11 for a varus deformity (9 lateral closing wedge, 2 medial opening wedge). In valgus knees, the mean correction was from a tibiofemoral angle of 5.3° valgus to 2.3° varus, Mikulicz point from 71.3% to 38.4%, and lateral distal femoral angle (LDFA) from 84.6° to 92.2°. Outcome scores increased at all time points postoperatively. At mean follow-up, there was mean improvement in OKS of 10.7 points ($p<0.001$), KOOS being 25.1 points ($p<0.001$), and VAS pain score being 33.7 points ($p<0.001$). Overall complication rate was 9.3%, with 5 (4.6%) osteotomies undergoing revision surgery (4 revision corrections and 1 conversion to arthroplasty).

Conclusion: While being technically demanding, DFO offers patients improved outcomes in the early- to mid-term.

5.11 ***(Indian Orthopaedic Association Ambassador Paper)***

Ligament Reconstruction / Advancement for Management of Instability due to Ligament Insufficiency during Total Knee Arthroplasty

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Introduction: This study aimed to assess the results of ligament reconstruction / advancement for management of ligament insufficiency during total knee arthroplasty (TKA).

Materials and Methods: We retrospectively reviewed the results of ligament reconstruction / advancement for management of instability due to ligament insufficiency during TKA between January 2001 and January 2008. Collateral ligament reconstruction / advancement was done in 15 patients. Wherever ligament advancement was not possible (mid-substance tear) ligament reconstruction was done using the hamstring tendon. Knee Society Scores were calculated and Kaplan-Meier survival analysis was done.

Results: The mean follow-up period was 6.2 years. No patient developed instability until the last follow-up, except 1 who required revision due to instability at 6 years after primary surgery.

Conclusion: Ligament reconstruction / advancement during TKA is a viable option to address instability due to ligament insufficiency.

5.12

The Radiological Accuracy after Primary Total Knee Arthroplasty — A Single Surgeon's Series

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Introduction: It is uncertain whether similar radiological outcomes can be achieved with different instrumentation systems after total knee arthroplasty (TKA). We compared the accuracies of limb alignment and components position between different TKA instruments, with special interest in the anterior versus medial tibial cutting guides.

Materials and Methods: A single surgeon series of primary TKA performed between 2011 and 2015 was reviewed. A total of 126 knees in 109 patients (90 female, 19 male) were included in the analysis. Pre- and post-operative lower limb mechanical axis, femoral and tibial components position in the coronal and sagittal planes were measured on the radiographs. Total knee arthroplasty instrumentations were classified into 2 groups based on the orientation of the tibial cutting guide: anterior (n=72) and medial (n=54). Scale data were analysed using independent-samples t test and nominal data were analysed using Chi-squared test.

Results: The mean (± standard deviation) age of patients was 69.3 ± 8.8 years. The mean operating time was 65 ± 14 minutes. Medial tibial cutting guides resulted in more valgus postoperative lower limb alignment and tibial component position compared with anterior guides (p=0.032 and 0.024, respectively). However, there was no difference in terms of the incidence of radiological outliers (>±3° of the desirable alignment) in all measurements between the 2 groups.

Discussion and Conclusion: Total knee arthroplasty with medial tibial cutting guides resulted in more valgus postoperative alignment and tibial component position, although the difference was small and may not translate into clinical significance.

5.13

3-Dimensional Acetabular Morphology of Chinese Population

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Introduction: The ethnic difference in hip pathology may suggest distinct anatomy of the Asian hips. We studied the 3-dimensional (3D) acetabular morphology in Chinese population, which would provide useful information on the aetiology of hip arthritis and the design of total hip arthroplasty (THA) prostheses.

Methods: Volumetric computed tomography pelvis data of 94 subjects (188 hips) without hip symptoms were utilised for 3D construction. The acetabular parameters, including acetabular anteversion angle (AVA), acetabular abduction angle (ABA), acetabular depth (AcD), acetabular width (AcW), depth-to-width ratio (AcD/AcW), acetabular diameter (AcDi), and anteroposterior acetabular arc angle (AAA) were measured and calculated on each subject.

Results: There were 54 female and 40 male subjects. Their mean age was 31.6 years. Their mean (± standard deviation) AVA, ABA, AcD, AcW, AcD/AcW, AcDi, and AAA were 20.8° ± 6.2°, 39.3° ± 13.1°, 18.4 ± 2.0 mm, 46.0 ± 3.0 mm, 40.0 ± 4.0, 47.5 ± 3.5 mm, 154.1° ± 11.2° in females, and 17.8° ± 6.0°, 42.7° ± 17.6°, 20.2 ± 2.1 mm, 51.1 ± 3.1 mm, 39.5 ± 4.0, 52.9 ± 3.8 mm, 153.1° ± 11.2° in males. Female acetabula were significantly more anteverted ($p<0.05$) and smaller than males. When compared with the Caucasian data, Chinese acetabula were smaller and shallower.

Discussion and Conclusion: A shallow acetabulum may be the cause of low incidence of pincer-type femoroacetabular impingement and primary osteoarthritis. It may also call for the need of special Asian prostheses in THA.

5.14

Effect of Tourniquet Use on Blood Loss and Postoperative Function in Total Knee Arthroplasty

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Introduction: The effectiveness of tourniquet in total knee arthroplasty in reducing blood loss and their influence on the postoperative course remain unclear. We performed a prospective randomised controlled trial to clarify its effect.

Methods: A total of 24 patients undergoing total knee arthroplasty were randomly allocated to 3 groups regarding the application of tourniquet: from skin to cement hardening, only during cementation, and from skin to skin. Postoperative lower limb mechanical axis and individual component position were measured on radiographs. Blood loss and changes in serological indicators of soft tissue damage were monitored perioperatively. Thigh pain, knee pain, limb swelling, and rehabilitation progress were also recorded.

Results: The mean (± standard deviation) age of the patients was 72 ± 7.5 years. There was no difference in terms of patients' preoperative demographic data between 3 groups. The mean tourniquet time in 3 groups was 34 ± 6.6, 8.5 ± 0.7 and 65.8 ± 25.8 minutes, respectively ($p=0.014$). There was no significant difference in intra-operative blood loss, drain output, change in haemoglobin and haematocrit, thigh and knee pain, thigh and leg swelling, change in C-reactive protein, and lactate dehydrogenase level between 3 groups. The only difference was found in postoperative increase in creatine kinase on day 1 and day 2. There was also no difference in terms of the lower limb mechanical axis and position of individual components on postoperative radiographs.

Conclusion: Early results did not show any significant difference in majority of the parameters between different tourniquet application methods.

5.15

Total Knee Arthroplasty for Primary Knee Osteoarthritis: Changing Pattern over the Past 15 Years

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Objective: To review the epidemiology of total knee arthroplasty (TKA) for primary knee osteoarthritis and the change of patient characteristics over the last 15 years.

Methods: A retrospective review of all patients who underwent primary TKA for primary knee osteoarthritis was conducted in our institution from January 2000 to December 2014.

Results: In all, 2588 TKAs were performed on 2098 patients (1599 female, 499 male). The annual number of TKAs increased from 91 in 2000 to 377 in 2014. The annual number of patients increased from 58 in 2000 to 317 in 2014. The mean age of the patients did not show significant change over the past 15 years, but the proportion of patients >80 years showed a significant increase from 4.8% (2000 to 2004) to 12.5% (2005 to 2009) to 15.6% (2010 to 2014), while the proportion of patients <60 years decreased significantly from 17.1% (2000 to 2004) to 13.4% (2005 to 2009) to 10.1% (2010 to 2014). The lower limb mechanical axis malalignment did not show significant changes, from 15.1° deviation in 2000, to 14.8° in 2004, 12.9° in 2009, 14.7° in 2011, and 13.3° in 2014.

Conclusions: There was an increasing trend towards TKAs, both in terms of number of operations and patients. The number of younger patients having TKA decreased over the last 15 years, whereas the number of those >80 years increased significantly.