Proceeding of the 7th Congress of the ASEAN Orthopaedic Association (AOA) and the Inaugural Congress of the Knee Section of the Western Pacific Orthopaedic Association (WPOA)

The 7th Congress of the ASEAN Orthopaedic Association and the Inaugural Congress of the Knee Section of the Western Pacific Orthopaedic Association took place in Penang, Malaysia in November 18-21, 1987. The Chairman of the organizing committee was Dr. Abdul K. Hamid. The meeting for the 7th AOA Congress was held on 19-20 November 1987. The plenary lectures were given by several speakers including:– Dr. John Fixen of United Kingdom who gave *"Current concepts and surgical management of club foot"*. Dr. Robert Duthie of United Kingdom who gave *"Road traffic accidents: their analysis and implications"*, Dr. Henry Crock of United Kingdom who gave *"Current concepts and basic research in low back pain"*.

The first seminar entitled *"Orthopaedic Education and Research"* by Dr. Robert Duthie of U.K., Dr. Soelarto Reksoprodjo of Indonesia, Dr. P. Balasubramaniam of Singapore, Dr. Direk Isarangkul of Thailand. The second seminar included several papers namely:– *"How I do it anterior lumbar interbody fusion"* by Dr. Henry Crock of U.K., *"Dillwyn Evans procedure for club foot"* by Dr. John Fixen of U.K., *"Unicompartment arthroplasty of the knee"* by Dr. John Goodfellow, *"Open reduction internal fixation of patellar fracture"* by Dr. Paul Lotke of U.S.A., *"Placing of free vascularized fibular graft in the management of congenital pseudarthrosis of the tibia"* by Dr. Robert Pho of Singapore, *"One stage femoral lengthening"*. by Dr. Pesi Chacha of Singapore.

There were several symposia of various topics presented by outstanding orthopaedic surgeons in and out the ASEAN region. The topics they discussed were:– *"Traumatic bone loss and its management"*, the speakers were Dr. Robert Pho of Singapore, Dr. Djoko Simbardjo of Indonesia, Dr. Ali Moor of Malaysia, Dr. Aziz Nather of Singapore, Dr. Chaithavat Ngarmukos of Thailand. *"Lumbar spinal disorder"* with different subjects including:– *"Never root and foraminal stenosis in the lumbar region"* presented by Dr. Henry Crock of U.K., *"Anterior lumbar discectomy and fusion"* by Dr. K.S. Sivanantham of Malaysia, *"Lumbar spinal stenosis"* by Dr. Charoen Chotigavanich of Thailand. The Workshop on *"Paediatric Orthopaedics"* included 3 papers. They were: "Leg equalization" presented by Dr. John Fixen of U.K., *"Surgical management of lower limb problems in cerebral palsy"* by Dr. Sen Gupta of Malaysia, *"Experience with tibial lengthening in Singapore"* by Dr. Pesi Chacha of Singapore. There were several scientific and ASEAN Travelling Fellow Papers presented in this congress.

The Inaugural congress of the Knee Section of the WPOA was held on 21 November 1987. A plenary lecture was given by Dr. John Goodfellow, the topic was *"Patello-femoral joint mechanics and pathology"*. There are two symposia. The first one entitled *"Degenerative joint disorders"*, the topics of presentation were *"Pathology of degenrative joint disorders"*, presented by Dr. John Goodfellow of U.K., *"High tibial osteotomy"* by Dr. N. Subramaniam of Malaysia, *"Joint debridement and house cleaning operation for osteoarthritis of the knee"* by Dr. Isao Abe, *"Anterior knee pain in adolescence"* by Dr. Hugh Phillips of U.K. The second symposium entitled *"Ligament of the Knee"*. The topics of presentation were *"Prosthetic ligament of the Knee"* presented by Dr. K.M. Chan of Hong Kong, *"The indications for ligament repair"* by Dr. T. Satku of Singapore.

The Workshop on *"Total Knee Repalcement"* included three papes namely:– *"Requirment for Successful Total Knee Replacement"* presented by Dr. Paul Lotke of U.S.A., *"Mechanics in Total Knee Replacement"* by Dr. John Goodfellow of U.K., *"Complications in Total Knee Replacement" by Dr. K. Satku of Singapore.*

A Seminar entitled *"The State of Art of Knee Surgery in the Western Pacific Countries"* presented by following authors:– Dr. Brain Casey of Australia, Dr. K.M. Chan of Hong Kong, Dr. Chehab Hilmy of Indonesia, Dr. T. Koshino of Japan, Dr. Jung Man Kim of Korea, Dr. Abdul Hamid of Malaysia, Dr. S. Krishnamoorthy of Singapore, Dr. Jiunn-Jer Wu of Taiwan and Dr. P. Gonggetyai of Thailand.

The followings are some of the abstracts available for publication.

The 7th AOA Congress

November 19-20 1987

PLENARY LECTURE

Road Traffic Accidents – Their Analysis and Implications

R.B. Duthie

Nuffield Orthopaedic Centre, Headington, Oxford, England

In 1979 the Oxford Road Accident Group was set up with engineering and medical disciplines to improve data of human tolerance to injury and the kinematics of injury, and to quantify the level of clinical injury versus the crash severity sustained by the vehicle. Secondary safety particularly applies to the occupants and is concerned with injury mechanisms. Crash severity sustained by the vehicle can be determined by knowing the impact speed, velocity change, deceleration, contact forces and the vehicle damage.

Such analysis both on scene as well as in the garage setting of "towaways" can be measured physically and then analysed by computer using the Crash programme which was developed by the Capspan Corporation. It was found that the velocity change during impact or delta V was the most sensitive of the estimates as regards the vehicle damage, and the velocity change with the collision, utilizing a very simple mathematical model in its estimation. It was a good indicator of the energy absorbed, or the accident severity.

A clinical team was responsible for determining injury severity. Each injury for each occupant was given a body region code and a severity code, with an overall additive severity code. Scoring code systems were the AIS, ISS and MAIS.

Examples will be given to illustrate this form of road traffic analysis.

A study of 39 fractured femora both with direct (by intrusion of the car body) and indirect injuries, i.e. the latter being forces transmitted through the knee, is presented.

Another activity of this group was concerned with correlating the biochemical response to injury with measurements of the plasma catacholamines, noradrenalin and adrenalin.

SEMINARS

Orthopaedic Education and Research

Orthopaedic Education and Research

R.B. Duthie

Nuffield Department of Orthopaedic Surgery, Oxford, England.

Orthopaedic education begins with the undergraduate.

The medical school curriculum should contain teaching within a sufficient time-table to ensure that the graduating doctors has gained insight, information and the ability to examine and manage disorders, diseases and injuries of the musculo-skeletal system. From such teaching, recruitment into orthopaedics is achieved.

After pre-registration internship for one year, additional experience up to two years should be gained in the practice of surgery and in certain peripheral specialities such as plastic, neurosurgery, etc. Only then should the pupil surgeon be admitted to orthopaedic post-graduate education and training.

One then has to differentiate clearly between the traditional apprenticeship system with that of the organised, structured rotational programme. Both are required because surgery requires more than any other speciality not only a detailed technology but also a reasoning ability.

To this must be added the discipline of research not only to contribute directly to the advancement of our speciality but also to the individual himself.

Learning of the basic sciences, e.g. anatomy, biochemistry, bioengineering, etc., of the musculo-skeletal system, must accompany the more vocational aspects of the technology. These must be taught by and seen to be part of the everyday thinking of the teacher. This highlights the necessity for academic departments to provide the training of the teacher and the preparation of various forms of assessment of examination, which can be based upon universities as well as 'craft' colleges of surgeons. (Such a programme will be described.)

Orthopaedic Education and Research in Malaysia

N. Subramaniam, M. Sivanantham***

University of Malaya**, Ministry of Health*, Kuala Lumpur, Malaysia.

The importance and scope of orthopaedic surgery in Malaysia has increased, due to increase in road accident victims, increase in geriatric orthopaedic problems, increase in the usage of implant systems such as internal fixation of fractures, the necessity to develop micro-vascular technique for reattachment of severed limbs, and finally, increased awareness of rehabilitation aspects of orthopaedic surgery, especially of orthotics and prosthetics.

There are now 52 orthopaedic surgeons being full members of the Malaysian Orthopaedic Association. The Ministry of Health has estimated that by the year 1995, 152 orthopaedic surgeons will be required, based on a ratio of 1:210,000 population and one orthopaedic surgeon to every three general surgeons.

The orthopaedic education and training in Malaysia is at present obtained in one of three ways – the M.S. Ortho. programme of the National University of Malaysia in Kuala Lumpur; the four-year training programme of the University of Malaya leading to a Fellowship of one of the Royal Colleges; and a similar but unstructured programme for doctors in Government hospitals. In all of these programmes, the main problem has been one of slow production and high wastage. Post-graduates in the University of Malaya and Government Hospital programme usually polish up their skills by working in an overseas British institution before returning home as a specialist.

The problems faced in Malaysia, with regard to orthopaedic education and training are:

1. Inability to pool the available resources – such as inadequate senior orthopaedic personnel and accredited hospitals for training purposes.

2. Controversies over the type of training to be provided – foreign versus local and research-based versus non-research based.

3. Controversies over gazetting of trainees by the Malaysian Medical Council as specialists and consultants, after obtaining a Fellowship in General Surgery and experience in Orthopaedic Surgery.

4. Controversies in the role of universities and professions in post-graduate training.

These problems are now sought to be overcome by the establishment of a Joint Board for Post-graduate Medical ducation involving institutions in the country concerned with post-graduate training. This Board can supervise a common examination both at primary level and final level, and a role can be given to both the universities and profession at large, to contribute to this programme.

Overview of Orthopaedic Education and Research in Thailand

Direk Israngkul

Ramathibodi Hospital, Faculty of Medicine, Mahidol University, Bangkok, Thailand.

Practice of orthopaedic surgery in Thailand started with the opening of the oldest hospital of this country, Siriraj Hospital 99 years ago (1899). Its first medical school was then founded a year later. The international standard of hospital and teaching with the curriculum of total 6 years was initiated in 1923 and the M.B. degree was first started. Orthopaedic surgery was well established as a speciality in Department of Surgery under leadership of Professor T.R. Noble in 1927. The new era of modern orthopaedics and technology was really started after the return of late Professor Fuang Satayasnguan from the United States in 1943. Chulalongkorn University, Faculty of Medicine, the second medical school was established in 1947. Both Siriraj and Chulalongkorn have had orthopaedic teaching and training activities for students included in their curricula from the beginning. There is at present no private medical school. All schools' curricula have orthopaedic teaching and training block(s) ranging from total of 4 to 10 weeks in the clinical years. There are approximately 600 M.D. graduates yearly under control of the Thai Medical Council who also issues licenses of practices in the country. A graduate who is willing to go on to orthopaedic or other specialities has a strong obligation to serve the Government in a medical service or programme under its direction for 3 years.

Post-graduate training programme in orthopaedics informally started at Siriraj hospital in 1957 for house and senior house staffs under the leadership and guidance of Professor Fuang and Professor Natee Rakspollamuang. They spend few years in general surgery and few more years in orthopaedics. Soon Chulalongkorn and other institutions subsequently started this similar pattern. Solid and formal training programme in orthopaedics really started around 1966 when young and energetic surgeons from many institutions gradually returned back to the country after completion of their orthopaedic training abroad such as in the U.S., U.K., Canada, Germany, France, and Japan. Dr. Thamrongrat Keokarn is one of the pioneer and significant contributors to their milestone. In 1970, the Thai Medical Council was established and through this body, orthopaedic training programmes of all institutions or centers were to be approved. The Orthopaedic Speciality Board, the examination and certification were also started. The formal orthopaedic training includes a year of general surgery and 2 years of orthopaedics Besides the regular programme of the training in the 8 training centers, the Thai Orthopaedic Association has played an important role in teaching residents and continuing orthopaedic education for at least 15 years such as setting up interhospital grand rounds, interhospital lectures, scientific and annual meetings, workshops, special courses, in-training examinations and occasionally helped or organized regional or international congresses. At present, there are 30 to 35 new diplomates yearly. These young surgeons have to return to their obligatory services after finishing the training for a period of time. The total number of registered orthopaedic surgeons is 285.

At the present time basic teaching for students, post-graduate residency training programme and some continuing education in orthopaedics in this country seem to be settled and satisfactory; however few other aspects and possibility of problems may arise and have to be considered including: specialization, how far to go? leave it the way it goes or control it, how?, continuing education for specialists, nonspecialists and health teams, both in Government and private sectors; other non-formal post-graduate training or activities to be eligible for the Board Certification; super-specialization, speeding up or control?; income and security; promotion of research atmosphere, their direction and suitable applications for the great benefit of people; availability of appropriate technology and resources; and finally the preparation of younger orthopaedists to be alert and ready to step into international cooperation both academic and social activities particularly in this region of the world.

SEMINAR

Dillwyn Evans Procedure for Club Foot

John Fixen

The Hospital for Sick Children, London, United Kingdom.

The Dillwyn Evans procedure or collateral operation for relapsed club foot was described in 1961. The opera-

tion is used for the horizontal or sagitally breached foot, following treatment for talipes equinovarus. The most important aspect of this operation is the medical release of the foot and not the calceno-cuboid fusion.

This is often misunderstood by surgeons who think that it is largely a fusion of the calcaneo-cuboid joint. The aim of the operation is to release the mid-foot so the forefoot can be corrected on the hindfoot. As such it is essential that the foot is released right across the mid-foot at the talo-navicular calcaneal cuboid level.

It is also essential that the position of the hind-foot be properly established and if necessary corrected otherwise realigning the forefoot on an uncorrected hindfoot will inevitably lead to poor results.

Finally there is a tendency to think that the correction is simply a lateral shift of the forefoot varus but so often in club foot problems, this is to simple a concept. There is a considerable rotainal element to the correction which allows in properly selected cases the hind-foot to be corrected into valgus and forefoot supination as well as varus to be corrected.

The assessment of the patient and details of the operation and post-operative management will be presented.

Open Reduction Internal Fixation of Patella Fractures

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The patella is one of the most important components to a satisfactory functioning knee. Patellar fractures are relatively common and can be a significant source of morbidity and pain. Fortunately, most of the fractures are nondisplaced and can be treated conservatively. However, a significant number of patella fractures require an open reduction and internal fixation. Patella fractures may be classified according to their type. The most common type requring surgery is a transverse fracture with or without comminution at one pole. The technique used to reduce these fractures requires a continuous anterior band in continuity with a longitudinal wire loop threaded through the patella. With this simple wiring technique most of the patella fractures may be salvaged and rarely will a patellectomy or partial patellectomy be required. The results to date have very satisfactory, with secure fixation, allowing early motion and early return to normal function.

Placing of Free Vascularised Fibular Graft in the Management of Congenital Pseudarthrosis of theTibia

R.W.H. Pho

University Department of Orthopaedic Surgery, Singapore General Hospital, Singapore.

I will discuss the problem of excision of pseudarthrosis of the tibia, the harvestingof free vascularised fibula from the opposite leg and correction of deformity at the recipient leg including lengthening procedure. The place of free vascularised fibula to bridge the bony defect to maintain alignment and length o the leg will be discussed in detail. The problems encourntered and the area of vascular fibula and its effect on epiphyseal growth plate will be discussed too.

WORKSHOP

Paediatric Orthopaedics

Surgical Management of Cerebral Palsy

S. Sen Gupta

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It is now possible, with high accuracy, to specify muscle or muscles responsible for abnormal gaint and joint deformities, so that appropriate surgery can be undertaken to improve gait and correct or prevent deformities. And the vastly improved results can be documented by comparing pre and post-surgery e-m studies.

Cumbersome and heavy splints, calipers and braces have been replaced by light-weight plastic orthoses which when worn under supervision will prevent deformities and improve function. Most common lower limb involvement in spastic type of cerebral palsy are adduction, flexion and internal rotation deformities of hip, producing "scissoring" and eventual dislocation of hip, flexor spasm of knee and equinus with valgus or varus deformities of foot. In over 500 cerebral palsy children, adductor tenotomy with obturator neurectomy, psoas release, gastroc release with neurectomy, ETA, Grice arthrodesis and triple arthrodesis have consistently given satisfactory results. Correction of his subluxation, pelvic obliquity and scoliosis have enabled children to obtain standing and sitting balance, improved hygiene and relieved pain.

As poliomyelitis is disappearing, cerebral palsy has become the commonest paralytic condition seen by orthopaedic surgeons. As cerebral palsy is a multisystem affection, its proper management requires health care personnel from many different specialities. Through probably the greatest problem a cerebral play victim faces is intellectual and communication barrier, orthopaedic care is needed to improve patients' constraints in mobility and function. Loss of mobility is usually due to abnormal neuro-motor control of lower limbs. Resulting muscle imbalance secondarily produces contractures, deformities, and disclocation of joints making walking or even sitting impossible. Aim of orthopaedic care is to develop motor skill and depending on the limits imposed by patients' intellectual capacity, to enable them to walk, perform functions of daily living, use a wheelchair to obtain stable sitting posture or simply improve hygiene.

Prolonged and careful clinical observation and muscle stretch tests enable a clinician to localise muscles with abnormal activity. However, accurate testing of muscles

and their activity is possible today with dynamic and kinetic electromyographic studies. A gait analysis laboratory equipped with computerised facilities can accurately analyse phasic behaviour of lower limb muscles and muscle groups.

Experience with Tibial Lengthening in Singapore

Pesi B Chacha

Orthopaedic Surgery, Mount Elizabeth Medical Centre Singa]

Thirty-five cases of tibial lengthening are presented with an average follow up of 46.8 months. Majority of the cases were due to shortening from poliomyelitis. Except for the first case in the series all were treated by a one stage slow lengthening technique either using Anderson apparutus in the early cases or a Judet apparatus in the later cases. Inferior tibio-fibular joint was fixed with a screw to maintain the ankle mortise. Lengthening of the tendo Achilles was done routinelly if the calf was normal. A percutaneous transverse osteotomy of tibia was done in children under 15 years of age. Lengthening was done at a rate of 1.5 mm a day until the desired length was achieved. On an average 4.2 cm of lengthening was achieved. There were 3 non-unions requiring plating and bone grafting. Pin track infection was common in all patients. Stress fracture of the osteotomy occurred in three patients but all united in a cast. Medical bowing of the osteotomy occurred in two cases. No neural or vascular complications were seen in any of the cases. If the calf was normal and tendo Achilles was not lengthened at the time of the lengthening procedure, equinus deformity occurred. If the foot was flail before lengthening it often drifted into equinovalgus. If calcanovalgus deformity was present before the lengthening, often severe valgus deformity of the foot resulted after lenghthening, often severe valgus deformity of the foot resulted after lengthening was completed. In most cases some degree of stiffness of the ankle and foot resulted after the lengthening procedure.

SYMPOSIUM

Traumatic Bone Loss and its Management

Traumatic Bone Loss and its Management

R.W.H. Pho

University Department of Orthopaedic Surgery, Singapore General Hospital, Singapore

Non-unions in fractures are often treated successfully by conventional methods of bone graft with or without internal fixation. In certain instances such as a badly traumatised limb with extensive damage to the surrounding soft tissue rendering the limb relatively avascular, conventional methods of bone graft often fail. This problem is commonly seen when there is added infections of the underlying bones. In others where there is a large bony defect to be bridged, the conventional non vascularised bone graft frequently demonstrates poor incorporation, especially in the bably scarred area. The surgeon is always faced with the dilemma whether to subject the patient to multiple limb salvage procedures requiring repeated bone graft and prolonged immobilisation or elect to perform ablative surgery such as amputation when a posthesis seems a better solution.

In recent years, there has been increasing recognition of the value and safety of using free vascularised bone graft in replacement of massive bone defects in the badly traumatised limb. In many instances, this procedure has proved to be worthwhile.

The rationale of using free vascularised bone transplant in post-traumatic and problematic non-union is to provide:

1. A strong living internal splint in the presence of a large bony defect.
2. A large vascular bed in badly-scarred area.
3. A living healthy bone in the presence of islands of controlled infected necrotic bone.
4. Skin cover as an osteocutaneous composite graft to replace scar tissue to improve cosmetic appearance to the reconstructed limb.

This technique is indicated in young patients with problematic non-union who had either failed previous multiple bone grafts. It is important to remember that the limb must have good skin quality with normal sensation in the sole and an adequate motor function to move the joint to make this type of surgery worthwhile.

Treatment of Post-Traumatic Bone Loss by Papineau Method in Jakarta

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Grade 3 open fractures is a difficult problem to be treated especially in infected, severely comminuted cases.

The first problem is how to make the bone heal – and the second problem is how to make the wide wound close.

To treat these cases, Papineau from Montreal, Canada, has developed a new concept. His concept consist of 3 points:

Pont 1: Resection of the dead bone as soon as possible to make a good vascularized bone.

Point 2: Implantation of cancellous bone graft in the bone gap.

Point 3: Delayed skin closure.

In this paper will be presented the author's findings in treating 35 cases of open grade 3 fractures by the Papineau method at Jakarta. The most common affected bone in our cases were the tibia (22 cases), femur (5 cases), radius (3 cases), ulna (1 case) and humerus (4 cases).

The longest bone gap after resection was 19cm and the shortest 2cm. Bone union occured in an average of 6 months.

Traumatic Bone Loss – The Malaysian Experience

Ali Noor Ghani

University Kebangsaan Malaysia, Kuala Lumpur, Malaysia.

Significant traumatic bone loss is fortunately not a common problem. Where there is bone loss, it is most frequently from the tibia. Of some 700 tibial fractures treated, only 10 cases of significant bone loss were seen.

Bone loss due to trauma is best grouped under primary and secondary or mixed varieties. Primary bone loss occurs as a direct result of the causative trauma. Secondary bone loss is the more common variety. The disruption of blood supply to the traumatised bone and subsequent infection result in bone being removed in repeated debridements. Bone loss can also be partial circumference or segmental in nature. Our approach to this problem is fairly straightforward.

Small bone defects are easily dealt with. Where there is significant bone loss i.e. larger than 2 centimeters, length needs to be maintained and alignment corrected, Infection is then eradicated and skin cover obtained. Where a portion of the cortical circumference was intact, the prognosis was good. In fact, bone grafting may occasionally not be required.

The Papineau technique is useful in segmental defects. Defects of upto 10cm can be treated with this technique. Segmental defects longer than 10cm require bone grafts, preferably vascularised. On average the patients begin full weight-bearing 11 months post-trauma. Prolonged treatment is the rule.

Traumatic Bone Loss and Its Management

A. Nather

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Bridging large bone defects is one of the most challenging problems in orthopaedics. In managing traumatic bone loss, initial management is that of the open fracture itself. The goals of primary treatment include healing of the wound, stabilising of the fracture and prevention of sepsis. Primary treatment demands thorough wound debridement, proper mechanical irrigation and prophylactic antibiotics. External fixators are used to stabilise the fracture. To avoid shortening, it is important to maintain bone length regardless of how large the bone gap is. Whilst we prefer to leave joints free, where necessary joints may need to be transfixed for rigid stability. If infection occurs, this must first be treated by drainage, continuous irrigation and sequestrectomy, if necessary. It is only when wound healing is achieved that the problem of the bone loss or 'gap non-union' is then addressed. Autologous bone grafting is usually employed. This could either be vascularised or non-vascularised bone grafts and cortical or cancellous bone grafts. The success of implanting a bone graft is analogous to that o planting a seed in the soil. If the soil is good i.e. with a good vascular muscle bed, any seed could survive whether vascularised or not. Studies performed by us in tibia of adult cats showed that large non-vascularised bone grafts do become revascularised and heal with new bone formation by resporption-opposition starting from as early as 2 weeks. Resorption activity was found to be significantly more abundant in the cortex adjacent to the vascular muscle bed compared to the subcutaneous cortex of the tibia ($p < 0.05$). The vascular muscle bed therefore plays a key role in the revascularisation and healing of large non-vascularised bone transplants. it is therefore not surprising that we have found it rarely necessary to use vascularised bone grafts in the femur, where the bed is rich with vascular muscles. Biomechanically, our experiments comparing the transplants in cats showed that non-vascularised transplants achieve 100% normal strength by 12 weeks and that at 12 and 16 weeks, the biomechanical strength of both types of grafts are both equally strong (no statistical difference). Conventional methods of using non-vascularised grafts including, Papineau technique onlay inlay grafts, dual onlay grafts, hemi-cylindrical opposing grafts, cancellous insert grafts, fibula bridge grafts are not only well established but still acceptable and successful methods of treatment. Microvascular techniques are technically demanding and time consuming.

Before embarking on such procedures a team is necessary. Although such facilities are available in our country, such experise are not always readily available. It is also pertinent to note that such facilities are not available in several countries. Nevertheless, there are instances where vascular bone transplants would be preferable – where the bed is badly scarred following infection especially when the tibia is involved – part of this bon is subcutaneous with a surface devoid of vascular muscles.

Lumbar Spine Disorders

Lumbar Spinal Stenosis

Charoen Chotigavanich

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Spinal stenosis is a condition caused by a relative decreae in the size of the neural canal, nerve root canal and neural foramen. Symptoms are caused by a decrease in the amount of arterial supply to the nerve root, as well as compression in the neural structures. Majority of the patients will present themselves to the doctor with intermittent claudication. Physican findings are generally minimal resulting in a discrepancy between symptoms and findings. The diagnosis of this condition is based on clinical assessment, radiographic finding and CT scan.

Conservative regimen can be instituted in mild cases with good clinical response. Surgical intervention will be necessary in the severe stenosis. Adequate surgical exposure, decompression with perfect haemotasis and good

knowledge of surgical pathology are the key factors to the successful treatment.

One hundred cases of lumbar spinal stenosis were presented, 66% were female, over 50% of the cases were more than 60-years-old. Degenerative spondylolisthesis was found in 18%. The rest of the cases were found to have central, lateral, foraminal stenosis and disc herniation was also evident in some patients. Adequate decompression was accomplished in all cases. Posterior lateral fusion was also instituted in an extensive decompression in whom more than 50% of facetectomy was performed. The overall result is quite satisfactory in the 3-years follow-up.

SCIENTIFIC FREE PAPERS

Stabilization Thoraco Lumbar Fracture Using Regular Plate and Screw

Respati Suryanto Dradjat, Subroto Sapardan, Titus Simorangkir

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Stabilization of thoraco lumbar fracture is indicated for unstable fracture with or without neurological deficit. The aim of surgery is to provide early mobilization and shorten hospitalization.

Ten cases of unstable fracture of thoraco lumbar spine were reported, all cases were male, 19 to 49 years old. 9 Cases with nurologic deficit and 1 case without. All cases were stabilized with transplendicular plate and screw using regular narrow plate.

Misplacement of screw is 1 case. The fracture was completely reduced in 2 cases, 4 cases had incomplete reduction, and 4 cases were unreduced.

We found the spine stable after fixation.

An overview of the Singapore Back School Programme

Loo Yin-Peng, Ng Chai-Ming, Kok Li-Peng, Lee Eng-Hin

Singapore Back School, Singapore

The Singapore Back School (SBS) was set up to help chronic back pain sufferers who had not responded to conservative treatment or had failed back following surgery. It aims to:

- educate patients
- provide supplementary information
- promote understanding on the management of back pain.

The complete SBS programme consists of 5 classes – 4 weekly lectures and the 5th, a review class. Details of the programme will be discussed at the Congress.

SBS has been in operation for 1.5 years. We had a total of 73 participants for the past year. Majority of these participants had pain ranging from 1 to 5 years, and age ranged from 30 to 49 years.

Two review classes were called and the return rate was 37%. We found 62% of the participants had significant subjective improvement, 92% considered the back programme useful, 83.6% indicated that their pain had improved and 69% felt that their disability was less.

We are still in the process of conducting further review classes, and will be updating the statistics in due course. We have also sent out questionaires to those who did not attend the review classes.

Local Experience with Lumbar Spinal Stenosis in the General Hospital of Kuala Lumpur

Chong Chee-Lang, Jagjit Singh Sidhu, M Sivanantham

Orthopaedics Institute, General Hospital Kuala Lumpur, Malaysia.

This is a retrospective study of 10 patients from June 1986 to August 1987. 3 were males; 7 were females. mean age was 55 years (range 25 to 72). 6 cases were due to degenerative stenosis; 2 degenerative spondylolisthesis; 2 achondroplasia. 4 of these had combined pathologies. All were found to have neurogenic intermittent claudication; one had perineal numbness.

Myelogram was done in all the cases to identify the stenotic level and C.T. scan was done in 2 cases.

All cases underwent decompression surgery. In the post-operative results, 5 were graded excellent, 4 had partial recovery, and 1 remains the same.

In this small series, they early results are encouraging, Some of these patients are on follow-up. problems in the management, such as documentation and follow-up, are also noted and discussed.

Epidemiology of Spinal Injuries in Singapore

Tan Chong-Tien, Tan Ser-Kiat

Alexandra Hospital, Singapore.

Between Sept. 1985 to Sept. 1987. 100 cases of spinal injuryh patients were admitted to the Alexandra Hospital, Singapore. In 85% of these cases, the injuries involved the thoracic or lumbar spine. Fifteen percent of the cases involved cervical spine.

Flexion/Rotation injuries were the most common type of injuries in the cervical spine, followed by hyperextension injuries. In the thoracic and lumbar spine, burst fracturs constituted 50% of the injuries in these regions, followed closely by wedge compression fractures.

In 80% of the cases of thoracic and lumbar spine injuries, the cause of the injuries was due to falling from heights. Most of these were related to industrial accidents. Road traffic accidents were responsible for only a small proportion of these injuries.

Burst fractures of the thoracic and lumbar spine were associated with significant numbers of neurological deficits and kyphotic deformities. Grossly unstable spinal fractures and those associated with severe deformities were stabilized surgically. Burst fractures with partial neurological deficits

were treated with anterior decompression and posterior stabilization.

The very high incidence of spinal injuries from falling from heights and the high incidence of burst fracture in the thoracic and lumbar regions are the unique features in this study.

Experience with Harrington Instrumentation for Fractured Spine

D.J. Arwade

Sanjeen Hospital, Sangli, India.

Twenty-five cases of fractured spine with neurodeficit were operated for Harrington Rod insertions and mobilized early post-operatively. Restitution of the structural anatomy was achieved and post-operatively results were found gratifying.

Technical problems encountered are discussed and some new instruments which were devised to ease the operative procedure are presented.

Study of Dynamics of the Spinal Cord by MRI in Vivo

Atsushi Harada, Kentaro Mimatsu, Takayuki Miura

Nagoya University School of Medicine, Nagoya, Japan.

Since the Brieg's report in 1960, few reports dealing with biomechanics of the spinal cord have been described. Lately, with the improvement of MRI, a new field has been developed and our experience led us to use this method for studying the dynamics of the spinal cord in outpatients, to confirm the previous report and to compare different pathologies.

Thirty-five patients aged from 14 to 76 years (average 48 years), 19 being cervical spondylosis, 3 ossification of the posterior longitudinal ligament, 3 rheumathoid arthritis, 4 whiplash injury, and 6 others, were studied. Among them, 19 had cervical myelopathy.

They were studied with 0.5T-MR imager and the landmark for measurement was taken at the mid-saggital portion, moving the cervical spine backward and forward.

The average for full extension was 133.7 ± 9.0 mm for the anterior border of the spinal cord and 109.9 ± 9.7 mm for the posterior border, while in full flexion there were 135.8 ± 9.0 mm and 126.3 ± 1.0 mm, respectively, without significant differences among different pathologies.

Based on the above results, we conclude that the Brieg's report is also valid in vivo and observed that there are no significant differences when comparing normal from pathological cases.

Cervical Spinal Cord Injury – The Relationship Between Clinical Neurological Syndromes and the Mechanism of Injury

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Fourty-seven patients with cervical spinal cord injury were studied to determine association, if any, between the mechanism of injury and subsequent neurological syndromes. The mechanisms of injury were studied from history, physical examination and radiography. The neurological syndromes were grouped into complete cord, central cord, anterior cord and Brown Sequard syndromes. It was found that the only association of significance was that between hyperextension injury and central cord syndrome. No associations were noted between other syndromes and the other mechanisms of injury.

The Use of Pedicle Screw Plates

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The technique and indication of Pedicle Screw Plating will be described basedon the authors experience in using this technique for two and-a half years.

Pyogenic Bone and Joint Infections in Saudi Arabia

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In spite of the rapid development, modernization and the ready availability of modern health care in Saudi Arabia, bone and joint infections constitute a major part of orthopaedic care.

We present here an analysis of 125 patients with pyogenic bone and joint infections treated at this major referral hospital of the Eastern Province of Saudi Arabia. These patients formed part of the total of thefirst 200 patients with different types of bone and joint infections admitted to the Orthopaedic Department since the opening of this hospital in 1981. The other major infections' groups were Tuberculosis (56), Brucellosis (27).

Of the 125 pyogenic infections, 92 were males and 33 females. Their ages ranged from six months to 56 years. The majority (62%) were under the age of 20 years. Fifty of these patients suffered from sickle cell haemoglobinopathy. 96 of the total suffered from osteomyelitis and 27 from septic arthritis. The commonest infecting organism was Staphylococcus. Although it is generally believed that Salmonella is the chief causative organism in skeletal infections in sickle cell disease, in our study, Staphylococcus took this prime position.

The results of our study and treatment are analysed and presented. All had antibiotic therapy. Early diagnosis, early surgical drainage and prolonged antibiotic therapy gave a high cure rate. In septic arthritis, open surgical drainage gave far superior results in terms of joint preservation and joint function than those who had only joint aspiration.

Carpal Tunnel Decompression – An Office Procedure

Marar B.C.
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Carpal Tunnel Syndrome is usually done in a hospital, or out-patient surgical setting. The author presents a simple method of doing the procedure in an office or clinic setting, without an anaesthesiologist. This is shown with slides and in a film (VHS video tape).

By doing it as an office procedure, this saves hospitalisation and time in an operating room. For the patient, it is convenient, and with considerable less cost.

Closed Release of Trigger Fingers

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A simple office procedure for the percutaneous release of the trigger digits is described with the use of a simple 18G hypodermic needle. The results of a prospective trial on 36 patients and 43 digits performed in our service is discussed together with the anatomy and possible complications of the procedure.

Anterior Midline or Medial Parapatellar Incision for Knee Arthroplasty

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The incisions for knee arthroplasty were compared as to three major factors affecting wound healing; the lignment to langers lines, the wound tension produced during early mobilisation, and the wound edge viability. The skin cleavage lines around the knee were defined in detail by the traditional technique. The medical parapatellar incision was found to be aligned optimally parallel to the cleavage lines, whereas the anterior midline incision was aligned in a less desirable orientation perpendicular to the cleavage lines.

Atensionmeter was designed and contructed, and was attached to the wound edges of the two prefered incision in cadaveric knees. The tension generated across the wound while the knee was flexed progressively from extension to full flexion was measured. The disrupting tensionacross the anterior middline incision was significantly greater than that across the medijal parapatellar incision ($p < 0.01$).

The viability of the wound edges of the incisions was compared by using the transcutaneous measurement of skin oxygen tension. The viability of the wounds were compared pre-operatively and throughout the post-operative period. The longer lateral skin flap created by the medical parapatellar incision was not subjected to any significant impairment of skin viability. The medial parapatellar incision should therefore be preferred for knee arthroplasty upon its superior healing potential.

Uni-Compartmental Replacement After High Tibial Osteotomy for Osteoarthritis of the Knee with Varus Deformity

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Uni-compartmental replacement was performed on seven knees with medical femorortibial osteoarthritis of six patients after high tibial osteotomy (HTO).

There were two men and four women, whose ages at HTO ranged from fifty-three to sixty-eight years (average 62.1 years). The average period from HTO to uni-compartmental replacement was 3 years and 11 months (range 6 months – 7 years and 4 months). In 4 patients wih 5 knees, uni-compartmental replacement was performed because clinical symptoms were aggravated with recurrence of varus deformity after HOT. For the remaining two knees which showed severe varus knee deformity with remarkable bone defect at the medial compartment of the femorotibial articulation, two step operations with both HTO and unicompartmntal replacement were performed. Follow-up periods after unicompartment replacement ranged from 1 year and 1 month to 9 years and 6 months (average 6 years and 10 months).

Clinical evaluation of all knees using kKnee Score of Japanese Knee Society showed an average score of 51.0 points before HTO and 57.9 points before unicompartmental replacement. At final follow-up, the score was 78.6 points inaverage, which was indicated to be satisfactory. An average femorotibial angle (standing), which measured before HTO and before uni-compartmental replacement was 187.4° (183°–194°), 180.9° (173.5°–188°) respectively. That at final follow-up was 176.2θ (171° – 179°).

Treatment and Results of Infected Total Knee Replacement – Report of One Early Infection and Three Late Infections

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Total knee replacement (TKR) has been one of the main treatments for advanced rheumatoid knee. But the management may be quite difficult if once infected. In this study the treatment and results were reported on 4 cases with infected TKR. These 4 cases were from 1973 to 1984 at the Yokohama City University Hospital and represented 2.9% of the 136 TKR which were performed during that period. All of them were women with rheumatoid arthritis and their age ranged from 41 to 61 (mean 51 years). One patient had infection (early) three weeks after the initial replacement. the other three had lte infection three to nine months after. Acute arthritis without loosening was the initial sign in one case with early infection and in one of

three with late infection which were treated with extensive debridement and suction irrigation drainage under extensive antibiotic cover. In these two patients, the prostheses were left in place. But the remaining two cases with late infection showed chronic arthritis with loosening, and prostheses were removed with debridement. Then one of them was salvaged by arthrodesis. In the other, a new prosthesis (Kinematic rotating hinge type) was inserted 1 year after removal.

The Outcome of the Infected Arthroplasty of the Knee

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A retrospective analhsis of a consecutive series of 471 knee arthroplasty identified 23 cases of superficial wound infection and 25 cases of deep infection involving the prosthesis, Rheumatoid arthritis ($p < 0.05$), use of a constrained prosthesis ($p < 0.01$)and the presence of a superficial wound infection ($p < 0.001$) predisposed to deep infection. Progression of an initial limited superficial infection to a deep infection was found to account for at least 28% of deep infections. Superficial wound infection alone, which was controlled by immobilisation, antibiotics and wound debridement is necessary resulted in pain free gait with little limitation of movement. Deep infection of a cemented knee arthroplasty was eradicated by long term antibiotics in only 2 patients for whom skin cover was provided by a musculo-cutaneous flap. Excision of a sinus tract, wound debridement and exchange arthroplasty were university unsuccessful. However, arthrodesis was able to provide the pain-free gaint which these patients desire in 11 of 12 cases. Treatment must therefore be aggressive. Superficial infection should be immobilised with antibiotics and early eradicated by conservative methods though this may be attempted in the early post-operative period. Early operative intervention to remove the implant and all cement must be undertaken. Following this arthrodesis is the most reliable salvage procedure.

Early Experience with the Porous-Coated Anatomic Total Knee Prosthesis

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Thirty knees in 24 consecutive patients underwent total replacement with the Porous Coated Anatomic (PCA) Prosthesis. All components were cemented except 6 femoral components. The diagnosis was osteoarthritis in 14 patients and rheumatoid arthritis in 10 patients. The average age at operation was 60 years (34 – 75). The average follow-up was 23.4 months (range 12-45 months). All patients had significant improvement of pain and in 22 knees there was no pain at all with any activity. Deformity averaging 14 degrees varus or valgus was satisfactorily corrected. The average range of motion however was only 90 degrees (65 – 105). Radiolucent lines and loose beds were not significant. Complications included one knee with excessive medial laxity which required medial ligamentous reconstruction and two knees which required manipulation under anaesthesia for post-operative stiffness. The early results of the PCA total knee were favourable when used with cement in the treatment of advanced arthritis.

Varus or Valgus Instability Before and After High Tibial Osteotomy for Osteoarthritis of the Knee

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Varus or valgus instability of the knee before and after high tibial osteotomy (HTO) was examined on 144 knees of 121 patients, and all of them had preoperative varus deformity. The average age at the operation was 63.0 years. The average follow-up was 3 years. The measurement of varus or valugs instability in the knee is based upon varus or valgus stress roentgenograms. The varus-valgus instability angle (the difference of the angles between the varus and valgus FTA is defined as the varus-valgus instability angle) tended to become less with the passage of time after HTO. In the group of more than 5 years after HTO when the postoperative standing FTA ranged from 165° to 175° the post-operative varus-valgus instability angles were most markedly decreased by passage of time. Pre-operative severity of varus deformity was well correlated with varus-valgus instability angle. These findings may indicate that even if the knee has more than 10 degrees of varus-valgus instability, high tibial osteotomy can be performed because of post-operative tightening of the soft tissue if it is maintained in a good alignment.

Lateral Subluxation of the Tibia in Gonarthrosis as a Risk Factor for High Tibial Osteotomy

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High tibial osteotomy is considered as an effective treatment for medical gonarthrosis. Among the variety of risk factors, the lateral subluxation of the tibia was considered in this study and our report concerns the importance of it as a radiological criteria for evaluation of patients preoperatively. We divided the subluxation into 2 groups; A for subluxation of less than 6 mm, and B for 6 mm or more.

Of 50 knees of 35 patients who underwent high tibial osteotomy during the years 1971 and 1985, 39 with a follow-up average of 65 months were reviewed. All had a closing wedge osteotomy according to Coventry.

Pre-operatively 24 knees were included into the group A (HSS scoring 67.1 points) and 15 into the group B (58.9). Post-operatively 9 knees of group B passed to group A while 6 remained. The results are better in group A (85.5) than in group B (74.5). Most of the patients with mild undercorrection (5°) in group A had good results (89.2) while all patients in group B had poor results (64.8).

As conclusion, patients with radiological subluxation judged to be of group B, required careful correction at the operation than patients of group A, to get good results.

Clinical Effects of Anterior or Antero-Medial Displacement of Tibial Tuberosity for Patellofemoral Disorders

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Purpose

This study was carried out to show the clinical effects of anterior or anteromedial displacement of the tibial tuberosity for patello-femoral disorders.

Materials and Method

The anterior or antero-medial displacement of the tibial tuberosity was done on 35 knees with patello-femoral disorders (anterior displacement 14, anteromedial 21) of 31 patients (3 men and 28 women, with the age ranging from 16 to 79 years, averaging 50.0). The patients contained 22 with osteoarthritis and 9 with chondromalacia patella. Follow-up periods ranged from 1 to 7 years.

Clinical Result

Pre-operative pain on down-stairs was noted in 34 knees and was relieved in 24 post-operatively. In the same way, retro-patellar crepitation was relieved in 17 of 33, patellar pain on grating in 22 of 27, pain on passive motion of the patellar in 25 of 31, and tenderness. Of the patellar ligament in 17 or 23. Delay in improvement of retro-atellar crepitation may be because of cartilage regeneration. Narrowing of patellofemoral joint was restored in 13 knees of the 26 knees shown in the sky line view. Patellar height was decreased in 26 of 32 knees, measured on lateral view by Insall-Salvati's method, compared with preoperative level. The patellar subluxation was observed to the responsitioned in the sky-line view in 12 of 14 knees treated with antero-medial displacement of the tibial tuberosity. There were two cases with fractures of tips of the tibial tuberosity, probably due to too vigorous quadriceps exercise. The patients were satisfied with the postoperative results in 32 of 35 knees.

Long-Term Evaluation of Quadriceps Strength after Total Knee Replacement

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The Strength of the quadriceps muscle exerts a great influence on the ability to walk and instability of the joint especially after total knee replacement. The quadricpes strength after replacement was measured in 129 knees of 80 patients with rheumatoid arthritis and 7 with osteoarthritis. The patients consisted of 6 men and 81 women with their mean age at the time of operation 57.5 years (range 33 to 83). The mean length of follow-up was 2.4 years (range 1 to 7). The quadriceps strength was measured during the maximum isometric extensor contraction in the supine patient with the knee in full extention, 45° and 90° flexion position. The quadriceps strength in 0° averaged 4.0 ± 2.7 kg (mean ± standard deviation) before srugery, 6.9 ± 2.6 kg 1 year, 8.4 ± 3.3 kg 2 years, 8.7 ± 3.6 kg 3 years after replacement, showing a gradual tendency to increase. But 4 years after operation it averaged 6.6 ± 1.8 kg and showed a tendency to decrease. These findings with an increase of strength for the first 3 years and then with a gradual decrease, were more remarkable in the values at 45° and 90° knee flexion position.

The Pattern of Osteo-Arthropathy in Local Arab Population of the State of Qatar

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State of Qatar is a peninsula in the Arabian Gulf. The environment, religious customs, and culture of the local Arab (Qataris) population resembles that of the Arabian Gulf Arab population.

Degenerative joint disease in the Qataris is common and particularly involves the knees. However, there is a gross difference in the symptomatic O.A. from that observed in other parts of the world.

As there is no documented report of this aspect in the literature, the senior author started a prospective clinical and radiological study of the patients who attended for treatment of symptomatic O.A. of the knees since 1975.

This study in a large number of patients (over 400) with long-term follow-up revealed interesting data which will be presented in the paper. The disparity between clinical symptoms and signs i.e., the clinical pattern and radiological pattern will be highlighted especially in relation to the pattern in the other countries.

From this basic study it is possible to derive many other useful information regarding the O.A. in the regional ethnic Arab population as a whole.

Combined Ipsilateral Fracture Neck and Shaft of Femur

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The combination of the fracture of the femoral neck and shaft of the femur is rare, that at the initial examination the fracture at the neck is frequently missed and only the fracture of the shaft gets treated. The other interesting

aspects of this injury are: the mechanism of the injury, the treatment which is internal fixation of both the fractures, whether to use a single or separate devices, the type of the devices used and the results of fixation.

We present the results of a prospective study of eleven patients with this combination injury treated over a four-year period, with a minimum period of follow-up of two years. We used dual fixation for fractures and at the same sitting. Early secure fixation gives excellent results in terms of union and function. We stress that whenever a patient presents with a fracture of the shaft of the femur, particularly the front seat passenger, after a motor vehicle accident (the 'dashboard' femoral shaft fracture), the hip region should be evaluated repeatedly and again under the image intensifier when fixation of the shaft fracture is undertaken.

The Dynamic Hip Screw in the Management of Inter Trochanteric Fractures of the Femur

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Eight-three (83) consecutive patients with intertrochanteric fractures of the femur were treated by the AO Dynamic Hip Screw. The fractures were classified into four types after Evans classification and the results were evaluated accordingly.

Almost all patients had excellent or good results. There was no implant failure and only one patient needed a revision operation.

The ability o the dynamic hip screw to telescope is a definite advantage in comparison to the fixed angle or two piece nail plates. More precise placement of the screw led to fewer complications.

Our experience with the dynamic hip screw has shown its superiority over the fixed angle and two piece nail plates. However the unstable fracture in an osteoporotic patient is still a very difficult problem.

Tension Band Wiring for Olecranon Fractures

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Tension band wiring, an excellent technique of internal fixation developed by the aO group, counteracts tensile forces that act across the fracture site and converts them into compressive forces. It achieves good union and also allows early active mobilization, thus minimising the incidence of postoperative stiffness.

Between 1982 and 1986, 32 patients (22 males and 10 females ages from 18–85 years) with olecranon fractures and associated complications were seen in the Department of Orthopaedic Surgery, Alexandra Hospital and treated with open reduction and internal fixation by tension band wiring. All 32 patients had, in addition, 2 parallel Kirschner wires introduced across the fracture site to improve alignment and stability.

Post operative results were assessed over a period of 6–18 months. Union was achieved in 31 cases by 12 weeks. 23 cases (72.5%) had already united by 8 weeks. 25 patients recovered full range of movement of the elbow. All these were mobilised 2–3 weeks after the injury. Out of 31 patients interviewed, 24 reported that they were satisfied with their post-operative recovery.

Double Oblique Loops' Technique for Treatment of Displaced Patellar Fractures

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Twelve patients with displaced patellar fractures were surgically treated with the 'double oblique loops' technique.

There were 7 males and 5 females. The average age is 54.3 years. The average follow-up period is 12.9 months. All patients were operated electively.

Surgical method: Through a transverse incision, the patellar fracture is exposed and reduced and held with reduction forceps. Then 2 strong wire loops were applied obliquely to the patellar bone through 3/4 of the quadriceps tendon and whole width of patellar tendon. The 2 wire loops are tightened snugly around the bone. No plaster was necessary and the patients are allowed weight bearing as tolerated after the drain is taken out.

The results are encouraging. There were no significant pain nor stiffness. The results were assessed according to a scoring system. The overall excellent to good results was present in 83.3% of our patients.

Twenty-four patients with similar fractures which were treated with coventional tension band wiring and cerclage wiring were compared with the present series of patients. The 'double oblique loops' technique achieved better results.

The 'double oblique loops' technique is to be recommended here because it is a simple and successful technique. It allows strong fixation to be achieved because the wires can be tightened snugly against bone and produces both the effects of tension band wiring and cerclage wiring.

Biomechanical tests to prove its effectiveness will be carried out with cadaver specimens.

A Pair of Kirschner Wires for Clavicular Shaft Fracture – A Dependable Method of Fixation

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Fractures of the clavicle, even the strong advocates of open treatment of fracture (Muller et. al. 1970) advised non-operative treatment because of ugly scar and high incidence of non-union.

We have performed open reduction and internal fixa-

tion of 31 clavicular fractures: six of them were open, ten had associated ipsilateral fracture of several ribs, twelve were multiple injured, three with a semitubular plate and the rest with a pair of 1.8 mm or 2 mm (AO type) Kirschner wire. All the plastes were broken or became loose within a few weeks, they were successfully treated by a pair of Kirschner wire in combination with tension band wiring and additional bone graft. There was no non-union in the K-wire group; however two of them had primary bone graft because of severe comminution. Full range of motion of the shoulder was obtained in all within three weeks. Protruded wires was an annoying problem, only two needed trimming.

We concluded that a pair of Kirschner wire fixation is advantageous. The scar is small and almost imperceptible. Soft tissue dissection is minimal. There was also ample room for bone graft. When the situation calls such as multiple trauma, associated ipsilateral fracture of the ribs or upper limb we think that this technique is the most apprpriate.

Popliteal Artery Injuries – An Analysis of 22 Cases Presenting in the University Hospital

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Vascular injuries involving the lower limb are generally badly managed with unacceptable loss of limb in the majority of cases. Despite advances in investigative methods, surgical techniques and anaesthesia, the amputation rate for patients with popliteal artery injuries remains in the region of 40–50% as is reported by most workers. Even when the limb is salvaged, late complications are many.

Twenty-two patients presenting to the University Hospital with populited artery injuries following trauma to the lower limbs are presented. Twelve cases were initially seen elsewhere. Ten limbs which were salvaged, had other minor complications.

The reasons for the high rate of amputation and complications in the salvaged limbs are analysed and compared with the excellent results obtained in some highly specialised centres where the urgency of management was directed at re-establishing arterial blood flow to the injured limb.

Replantation – Our Experience

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Forty-six cases of microsurgical procedures performed in our hospital were reviewed. The indications and results of replantation are discussed. A discussion on our intra-operative and post-operative regime for microsurgical procedures is presented too.

PCA Cementless Total Hip for Osteoarthritis of Hip with Acetabular Dysplasia

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PCA cementless total hip replacement was performed for osteoarthritis of the hip with acetabular dysplasia. The purpose of this paper is to present operative procedures and their results. The series included 7 hips of 4 patients. The age of the patients at operation ranged from 43 to 57 years, with average of 50 years. The average follow-up duration was 13 months. During operation, a block bonegrafting was used for acetabuloplasty and the acetabular component was fixed to the grafted bone. At the follow-up, all patients had no pain around their hips and walking ability was also improved after surgery. The average pain of Japanese Orthopaedic Association Hip score was 44 points postoperatively.

The radiograph showed sould union between the grafted bone and the acetabulum. There was no displacement of socket in all of them. However, two-beads dropped out from the surface of the acetabular component in two cases, and calcar bone atrophy was seen in another two.

Isoelastic Cementless Total Hip Replacement – Preliminary Results of 24 Replacements

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Twenty-four (24) isolastic total hip replacement is 18 patients with a follow-up period of 2 months to 2 years are presented. The age range was 24 to 68 with an average of 48.4 years. The main indications for hip replacement were avascular necrosis and osteoarthritis secondary to Rheumatoid Arthritis, Ankylosing spondylitis, Degenerative arthritis, chronic renal failure and revision arthroplasty.

The duration of surgery ranged from 80 minutes to 140 minutes and the average hospital stay was 14 days. Intra-operative complications were rare, only fracture of the greater trochanter and perforation of the femoral shaft which needed revision two days later being recorded. Two patients presented with posterior hio dislocation wihin one month of surgery. Both were managed conservatively with good results. All patients were satisfied with the outcome of surgery and there was a significant increase in the Harris Score with some bedridden patients returning to active independent life.

Analysis of Indigenous Total Hip Prosthesis

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Replacement of the hip joint by the prosthetic one for various disorders has become the standard operation. While the total hip prostheses is expected to last for nearly 25 years in the body, the performance in-vivo of various indigenous prosthetic hip joints was found to vary markedly,

some wearing out within few months post-operatively.

The orthopaedic surgeon, having no means to assess the performance before-hand, of various available implants in the market, was greatly disappointed to find the early post-operative failures.

Analysis of these prostheses was done regarding the quality and congruency of the component parts. The wear rate of the high density polyethylene cup was assessed by devising a new machine-hip joint simulator.

The results were unacceptable by any standards. Suggestions are made to overcome these deficiencies.

Difficulties and Complications of Closed Manipulation of Supracondylar Fractures of the Humerus

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One hundred supracondylar fractures of the humerus were treated in Dr. Soetomo Hospital; 18 cases grade II, and 40 cases grade III.

Difficulties were found mainly in grade III, were the failure of closed manipulation depend on the time of delay and grading of tissue swelling.

Immediate complications (impending Volkman's ischaemia) were found in 3 cases and in 5 cases cubitus varus as late complications.

Finger Tip Injuries

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Finger tip injuries are by far the most common injuries sustained by the hand. A prospective study comparing two methods of conservative treatment using paraffin gauze and zinc tape was carried out at the University Hospital, Kuala Lumpur. This paper presents the results of the study on 68 patients.

L-Rod Instrumentation for Unstable Thoraco-Lumbar Fractures

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From 1984 to 1986 a total of thirteen patients with unstable thoraco-lumbar fractures were treated surgically with L-Rod Instrumentation (L-RI) system. The average flexion deformity pre-operatively was 29 degrees (Cobbs Method) and the average surgical correction attained was 16.2 degrees (67.9%). There was no reduction noted on the posterior displacement of the vertebral bodies, nor was pre-operative progression or appearance of neurologic deficit noted. The procedures were performed without the use of any special instruments.

The study indicates that L-RI system is easily adaptable in any center with basic orthopaedic instruments. It can significantly reduce the total cost of hospitalization and provide adequate reduction for unstable thoraco-lumbar fractures. On follow-up, there were three wire breakages and one rod bent so much so that the stability of the system in the absence of external immobilization is still in question.

Co-Trimoxazole in the Treatment of Chronic Osteomyelitis

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Chronic osteomyelitis is a common complication of acute osteomyelitis. Antimicrobial of choice in chronic osteomyelitis is considered to be penicillinase resistant penicillin and cephalosporin. Emphasis has been placed upon prolonged parenteral administration of these antimicrobials. The necessity of longer period hospitalisation and high cost of prolonged parenteral treatment necessitated trial with oral antimicrobial treatment. Oral from of co-trimoxazole was used and follow-up study in 66 patients revealed successful, improved and failed results in 30, 33 and 3 patients respectively. These results were comparable to the results in twenty-two patients treated with penicillinase resistant penicillin and erythromycin. Efficacy of co-trimoxazole in gram-positive cocci and gramnegative rod osteomyelitis were also comparable. But the duration of treatment with co-trimoxazole was longer than the other group. Toxicity and side-effects were not noted in this study. Co-trimoxazole should be another antimicrobial of choice in chronic osteomyelitis because of low cost, convenient administration and high efficacy.

The Norwich Hip System

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The Norwich Hip System has been designed to provide a safe alternative to cement fixation, particularly in the younger patient. Proximal load bearing on the femoral side is encouraged by femoral implant design and accurate instrumention. Pre-operative planning and the provision of many sizes of implant further guarantees a perfect interference fit with bone. On the acetabular side we have developed a threaded cup of titanium alloy with separate high density polyethlene liners. Instrumentation allows accurate siting of the implant and aims to preserve the sub chondral bone plate. We are unable to report the results of patients with follow-up of two years. The initial clinical and radiological results are discussed.

Absorbable Polymers in Orthopaedic Surgery

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Historically, johnson & Johnson has a long history in the development of absorbable plymers for surgical use particularly sutures, through Ethicon, Inc. Recently, through the synthesis of a proprietary high molecular weight, low monomer content polylactide, Johnson & Johnson Orthopaedics has developed a series of orthopaedic devices which will assist orthopaedic surgeons in their management of fractures requiring internal fixation and torn or severed ligaments and tendons.

present methods of internal fixation utilising metalic devices are subject to two major problems: (1) the necessity of removal at a later date by a second surgical procedure and (2) the possible development of stress protection induced osteopenia due to excessive stiffness. Absorbable polymers such as polydioxanone (PDS) and polylactic acid (PLA) which are fabricated into orthopaedic devices will eliminate these potential problems.

Currently, a number of clinical studies are in progress in the United States under investigational device exemptions (IDE) using an absorbable scaffold for tendon repair and absorbable pins and screws for fracture repair. This paper briefly describes the experimental development of these devices including precilinical toxicology, efficacy in animal models, and clinical indications.

Venous Foot Pump and Deep Venous Thrombosis

Malcolm Binns, Robert Pho Wan-Heng

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Stamatakis (1977) using intraoperative venography demonstrated that proximal femoral vein obstruction during total hip replacement may predispose to venous thrombosis. Our cadaveric studies indicate that extreme adduction of the femur with hip joint dislocated occludes the femoral vein at the inguinal ligament.

Maintaining venous return during and after operations about the hip joint is important in the prevention of deep venous thrombosis. The "venous foot pump" has been described in 1973 by Gardener using standing video-phlebography and has been exploited to maintain venous return in the lower limb with the development of a pulsing pneumatic envelope placed under the sole post-operatively.

We have examined the deep venous system of the foot by various injection studies and dissection with reference to the presence and site of valves, vessel diameter and interconnections.

We have also assessed a simple neuromuscular stimulator that contracts the foot's intrinsic muscles and so empties this deep venous system. This would be of value in the prevention of deep venous thrombosis.

The Role of Arthroscopy of the Shoulder in Diagnostic and Therapeutic Management of Shoulder Problems – A Review of 200 Cases

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The purpose of this study was to define the role of arthroscopy of the shoulder in the diagnostic and therapeutic management of shoulder problems. The posterior portal was selected for the arthroscope and anterior portal for the drainage system. The arthroscopic anatomy of the shoulder joint was clearly visualised. This included a detailed and clear picture of bicep tendon, rotator cuff, glenoid, labrum, humeral head, gleno-humeral ligaments, and the subacromial space. Pathological entities includes frozen shoulder (27%), rotator cuff tears (17%), bicipital tendinitis and tears (15%), labrum pathologies (12%), articular cartilage lesions (11%), synovial lesions (9%), sub-acromial bursitis (9%). Arthroscopic surgery was performed in selected cases such as debridement for rotator cuff and labrum tears, hydrostatic distension and lavage for frozen shoulders, debridement and lavage of cartilage and synovial lesions and subacromial bursoscopy, synovectomy and arthroscopic decompression. The shoulders were mobilized immediately after the operation and functional recovery was good in over 90% of the cases. It was therefore concluded that shoulder arthroscopy may be a useful adjunctive measure in the diagnostic and therapeutic management for shoulder problems.

C.T. Osteometry of the Proximal Femur

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Experience with cemented and uncemented total hip arthroplasty has shown a need for better correlation between prosthetic design and proximal femoral anatomy. 50 pairs of normal adult Chinese cadaveric femora were studied in detail with C.T. There were 82 male and 18 female femora. Specimens were placed supine, and the transverse plane was determined by the distal surfaces of the femoral condyles. Anteroposterior and lateral images of the whole femur were obtained, followed by 3-mm sections of the proximal metaphysis and 5-mm sections of the femoral shaft.

Results:

1. The cross-sectional anatomy of the proxiamal femoral metaphysis corresponded poorly with he geometry of current femoral prostheses.

2. An antero-medial cortical flage partitioned the medulla partially at the level of the lesser trochanter without exception.

3. The femoral neck was retroverted 2° to 11° in 15 specimens.

4. Femoral neck offset varied from 1.7 cm to 3.8 cm only, with a mean of 2.9 cm in males and 2.5 cm in females

5. The isthmus of the medullary canal was narrower in males than females due to thicker cortical bone. The average distance from the femoral head centre to the isthmus was 14.8 cm in males and 14.4 cm in females.

6. The mean valgus angle of the femoral shaft relative to the vertical axis was 7.5° in females and 7.1° in males.

7. Anterior bowing of the shaft followed 3 major patterns.

8. Certain consistent differences were found between left and right sides.

These results emphasize the need for improved prosthetic design, preoperative evaluation, and appreciation of the differences between Chinese and Caucasian anthropometry.

Arthroscopic Management of Discoid Lateral Meniscus in Children

Lewis Kei Hayashi, Konio Ida, Yukiyoshi Oishi, Hiroshi Yamaga, Toshikado Hattori, Osamu Itoh

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Every knee surgeon knows how difficult is the arthroscopic management of discoid lateral meniscus in children. The correlation of symptoms and signs are quite different from adults as previously reported, and the discussion about the amount to be removed and the later osteoarthritic changes still remains.

The discoid lateral meniscus being frequent among the Japanese, we have had the opportunity to operate on and follow-up about 200 cases in this past 5 years, 57 of them in children.

This report consists of 15 cases, 17 knees in children aged from 3 to 12 years old who have had a follow-up period of more than 17 months. We found 88% discoid meniscus of complete type and 12% of incomplete type, and had no cases of Wrisberg's ligament type. The identified tears were: peripheral detachment in 53%, horizontal tears in 29%, and longitudinal tear of the midsubstance in 18%. Transversal tear and bucket handle tear were not seen in this age range. All underwent arthroscopic meniscectomy, total excision in 65%, subtotal in 29% and partial in 6%. All but one who had a retear had relief of symptoms. The clinical and arthroscopic findings, the operative technique and the results are discussed.

Arthroscopic Debridement and Lavage for Osteoarthrosis of the Knee – A Review of 200 Cases

K.M. Chan

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The purpose of this study was to define the role of arthroscopic debridement and lavage in overall strategy of management of osteoarthrosis of the knee.

The age distribution of this group of 200 patients is 35 to 89 (mean of 61) and the follow-up period from 9 to 43 months (mean of 25 months). The criteria for selection of patients are persistent symptoms despite six months of vigorous conservative treatment and significant limitation of daily activities. The operative procedures included a detailed arthroscopic assessment of the extent and degree of degenerative, arthroscopic debridement and removal of loose articular cartilage, degenerative meniscal and ligamentous fragments, localised synovectomy, removal of loose bodies and a thorough lavage of the knee joint. Immediately post-operative mobilization is allowed.

The results are analysed according to the three parameters of pain, range of motion and functional activities. A knee score is awarded to the pre-operative and post-operative status for comparison. The overall results indicate excellent to good in 74%, satisfactory in 17%, fair in 9%. No complication of haemarthrosis or infection is recorded. The procedure is relatively atraumatic and does not preclude future reconstructive procedures, it allows early rehabilitation and has gained good patient acceptance. In selected cases, the need for total knee replacement is postponed.

Arthroscopic Mobilization of the Post-Operated Stiff Knee

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Twelve patients with severely limited knee motion following open operative procedure were treated by percutaneous release of adhesions under arthroscopic control. There were 11 males and 1 female, ranging in age from 19 to 51 years (mean, 27.9 years), being 8 ligamentous injuries and 4 intra-articular fractures. The interval between the open operative procedure and the arthroscopic mobilization ranged from 2 months to 13 months (mean, 8.3 months).

The arthroscopic procedure was done under the lumbar anaesthesia. We used the scissors and motorized shaving device to release and remove the adhesion bands from the pouch and gutters under arthroscopic visualization. Following the arthroscopic release, gentle manipulation was done and increased motion was obtained. The continuous passive motion machine was utilized immediately after the procedure without drainage system.

The interval between arthroscopic mobilization and the final follow-up evaluation ranged from 2 months to 13 months (means, 5.9 months). The mean passive flexion increased from 72° preoperation to 117° at final evaluation. The mean flexion contracture was 17° preoperatively and 8.3° at final evaluation. No complication was seen in our series and we considered in a useful procedure for the post-operatived stiff knee.

Feasibility Study of A Short-Term Protocol for Early Post-Operative Continuous Passive Motion (CPM)

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Continuous passive motion (CPM) is now becoming a new modality of ortho paedic management to overcome and prevent joint stiffness. However, since most CPM protocols were indefinite and took too long (1–3) weeks), the author therefore proposed a briefer protocol lasting only three days. Thirty-four patients, twenty-two and 12 who CPM was used to overcome (group A) and prevent (group B) joint stiffness respectively, were included and followed, and a special CPM device *("Ortho. -KKU." Model)* designed by the author was used. In group A, almost final mobilities, which were significantly increased from pre-treatment values, were obtained on day 3 of CPM and later maintained till average latest follow-up of 23.9 weeks. For group B, mobilities were initially maintained and further improved at the same timings. Patient compliance to the first 12-hour period of CPM was relatively poorer than previous reports, ie., 50 per cent of the existing population responded with moderate irritability and/or pain. However, the use of CPM was generally well accepted by the patients. There were seven whose CPM was prematurely terminated, five from poor compliance, one from breakage of immature callus and the other from breakdown of the machine.

The Diagnosis of Posterolateral Instability of the Knee

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Tests for posterolateral rotary instability have been described by Hughston and Jakob. Two additional tests are described which are more specific as well as more sensitive and partially quantifiable. Static laxity or instability is sought with the knee at 30° off full extension. This is the most efficient angle to detect pathological laxity in the posterolateral structures and correlates with the biomechanical studies of Grood.

The second test is dynamic. It seeks to reproduce the feeling of the posterolateral subluxation in a manner the patient can recognise. Essential features are:

1. Initial posturing of the patient's knee similar to the clinical instability position, and

2. with the thumb behind the head of the fibula and the fingers above the patella, the feeling of subluxation/reduction is sought.

The test is repeated with minor variations of knee flexion/rotation and axial force seeking an abnormal glide (subluxation). Although the patient notes the feeling to be similar to that which occurs when the knee is unstable during activity the test is minimally unpleasant and can be repeated without distress. With suitable initial posturing it can be used for anterolateral instability (pivot shift). The key is to use the thumb and fingers to seek the abnormal subluxation whilst producing minimal patient discomfort. This allows the test to be repeated and quantified without muscle spasm and resistance due to pain. It will be demonstrated on videotape.

These tests allow detection of the lesser grades of instability which may be present associated with anterior cruciate loss or partial posterior cruciate lesion.

The Importance of Surgical Fixation Techniques on Anterior Cruciate Ligament (ACL) Reconstruction

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The result of intra-articular reconstruction of the ACL is variable and unpredictable depending upon many factors which include graft placement, remodelling of the graft tissue, revascularization, tension, and fixation. Among these factors, the surgical method of fixation of the graft plays an important role especially in the early post-operative period. Different surgical methods of graft fixation in ACL reconstruction were examined to determine the effects of mechanical properties of the recontructed ACL. Six different types of grafts were studied by using ten fresh human cadavers. The tendon grafts were removed from each cadaver and fixed to femurs and tibias as ACL substitutes with different surgical fixation methods such as staple fixation, sutures tied over buttons and screw fixation as described by Lambert. Tensile testing showed that the original ACL is significantly stronger than any other reconstructed graft in linear load, stiffness ad maximum tensile strength. All the failures of the reconstructed ACL occurred at the fixation site indicating that the mechanically weak point is located at the fixation site. Among the different methods tested, one-third of the patellar tendon fixed with a cancellous screw, especially with a custom designed large diameter screw, showed significantly higher values.

Anterior Knee Pain in Children with Cerebral Palsy

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Anterior knee pain is extremely common in adolescence. Cerebral palsy patients who walk with markedly flexed knee gait are very prone to this type of pain. In a number of cases avulsion of the distal pole of the patella may occur, leading to serious deterioration in gait. If this stress lesion is not thought of and treated adequately, the deterioration in gait may be ascribed to an overall increase in handicap due to the change in power to weight ratio or some progression of the neurological deficit or simply the patient losing the motivation to walk.

Eight patients were seen within a period of 12 months with

this problem. Their pain and flexion deformities were treated either conservatively or surgically with satisfactory results. If the walking ability in a spastic child deteriorates the possibility of avulsion of distal pole patella should be considered as an eminently remediable condition.

New Grading of Articular Cartilage Degeneration In Osteoarthritis of the Knee – Comparisons with Clinical Findings

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The degenerative findings of the articular cartilage were observed at the time of high tibial osteotomy, unicompartmental arthroplasty or total knee replacement and classified into 9 Grades; Grade 0: normal, Grade I: yellow discoloration, Grade II: softening and unevenness, Grade III: fasciculation adn attrition, Grade IV-a: erosion, Grade IV-b: ulcer down to subchondral bone, Grade IV-c: eburnation of subchondral bone, Grade V-a: bone destruction in an area less than 5 mm in depth and Grade V-b: bone destruction in an area 5mm or more. This series included 63 osteoarthritic knees with varus deformity of 56 Japanese patients (7 men and 49 women) with an average age of 66.8 years (range, 49-83 years). Preoperatively the pain and the ability of walking, ascending and descending, the range of motion and joint effusion were evaluated and knee function was scored using the criteria of Japanese Society of the Knee (the second tentative criteria). In this series, one knee belonged to Grade II, 3 to Grade III, 10 to Grade IV-a, 18 to Grade IV-b, 27 to Grade IV-c and 4 to Grade V-b. As degeneration was advanced more than Grade IV-b, the knee function score showed a tendency to decrease.

Clinical Experience & Research Study of ACL Reconstruction in VGH, Taiperi, Taiwan, Republic of China.

Jiunn-Jer Wu

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The treatment of ACL deficiency presents a frustrating problem for the orthopaedic surgeon. The literature is replete wih articles concerning a large variety of treatment regimens and philosophies. This indicates that probably none of them is ideal.

In the past three-and-half years, 162 cases of ACL deficiency were reconstructed with three different materials: autogenous 1/3 patellar tendon (45 cases), artificial Dacron ligament (82 cases) and Gortex (35 cases); and two surgical procedures with or without isometric concept in VGH.

Twenty of thirty-five cases (57%) treated with patellar tendon graft were graded in good after a period of three years follow-up. The cases reconstructed with artificial ligament were evaluated in good to excellent of initial 18 months in period about 85% (29/34 cases). Failure of Dacron ligament was noted in two cases.

Ideal graft selection and placement are always the disputed points. Concerning the disadvantage of sacrificed autogenous graft and durability of artificial ligament, experimental study of allograft in dogs were performed three years ago. A comparison study between autogenous graft and allograft was investigated with biological section and mechanical testing. The allograft substitution revealed a promising investment.

Functional assessment of ACL reconstruction with gait analysis is our second part of study. The main evaluation parameters include force analysis of knee joint, floor reaction force and kinematic change of knee joint during the level walking. The cases treated with isometric concept were approached the normal pattern and knee reaction force.

ACL exhibits a complex fiber geometry which different fiber lengths allow ligament function in different planes to knee motion. None of the graft tissues can closely simulate the microgeometry of a normal ACL at implantation. Experimental study and objective evaluation will be the solution of this problem.

Meniscal injury in Sports' Athletes

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With the recent increasing popularity of sports, the incidence of meniscal injury has been increasing in both high athlete and recreational sports.

Of 480 cases of knee arthroscopy performed during a period of time of 37 months from March 1984 to March 1987, 250 received arthroscopic meniscectomy. Of these 250 cases, 82 for which some kinds of sports were responsible and which permitted direct examination were usbjected to postoperative evaluation and questionnaire. These 82 cases comprised 38 males and 43 females and had a period of time from injury to knee arthroscopy and a post-operative follow-up period of 17.5 and 24.8 months on an average. ACL insufficiency involved 40 cases.

Evaluation by sites of injury revealed lowering for lateral, medical and bilateral injuries in this order. All 16 cases of both medical and lateral meniscal injuries were complicated with ACL insufficiency and had a period of time from injury to knee arthroscopy as long as 28.1 months on an average. Also from the viewpoint of the results of questionnaire ACL insufficient group showed lower rate of recovering pre-injury sporting level.

Results of the Total Condylar Knee Arthroplasty (Five to Nine Years Follow-up)

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Total condylar knee prosthesis is the one of the con-

ventional tricompartment arthroplasty among the various types of knee replacements. During the period from 1978 to 1985, 367 total condylar knee arthroplasties were carried out in 256 patients.

This clinical and radiological study deals with value of TCK prosthesis in 155 consecutive patients with a follow up of 5 to nine years.

Clinical results were evaluated on with the scale of Japanese Orthopaedic Association and theGrading in Hospital for Special Surgery for the scale of radiological evaluation. Regarding pain relief, results were most significant, preoperatively an average of 1.8 point in RA and 2.0 in Osteoarthritis, improved to 4.4 in RA and 3.7 in Osteoarthritis post-operatively.

On the contrary, range of motion were shown to decrease in most cases, the average of post operative flexion were 88.9 degree in RA and 93.9 degree in osteoarthritis.

In the AP view, radiolucent zone were much more significant in zone I than other area. Radiolucent zone were recognized mainly the part of plate.

In this series, aseptic loosening was not recognized in femoral, tibial and patelar componet.

From these results, we concluded that total condylar knee arthroplasty was still durable and reliable operation.

Review of Monteggia Fractures in Children

Lam Khee-Sien, Cecilia Ngan, Tay Boon-Keng, N. Balachandren

This is a retrospective review of Monteggia fractures in children aged fourteen completed years and below. Twenty-one cases were identified out of three hundred and eighteen cases of forearm fractures in children, over a six-year period. All four types of Monteggia fractures according to Bado's classification were found, commonest being Type I and the least being Type II and IV. The incidence were consistent with other reviews. Treatment ranged from simple manipulation and reduction under intravenous Lignocaine to Open Reduction with or without Internal Fixation, using AO plates, 'K' wires or Rush Rods for the Ulna fractures. Seven were treated conservatively and thirteen operatively. Of those treated conservatively, only three had good results, one recurrent dislocation of Radial head and two were lost to follow-up. Of those treated operatively, one had persistent dislocation of Radial head, two lost to follow-up the rest had good results. None of the other known complications occurred in this study.

Giant Cell Tumor – An Analysis of Cases in the Singapore General Hospital

How Tet-Sen, Minnie Pang, Tay Boon-Keng, N. Balachandran

This study is of cases of giant cell tumour among the ethnic local population studying the sex, age and racial distribution.

The methods of treatment ranged from curettage and bone grafting to wide excision and reconstruction using vascularized fibula grafts.

The age of patients in this survey ranged from 15 to 71 years of age. The most common site of the tumour was around the knee.

Anterior and Posterior Displacement After A Salter Type Innominate Osteotomy

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Redisplacement of the hip after innominate osteotomy for congenital dislocation of the hip presents serious and difficult problems.

Ten patients were treated for anterior or posterior displacement of the hip after an innominate osteotomy for congenital dislocation of the hip. All required a repeated open reduction with an additional procedure, either at the same time as reduction or as a second stage.. Stable reduction was achieved in 8 cases, but in 2 the initiao attempt failed and the operation had to be repeated.

The clinical features of hips with this complication are described and the technique of the salvage operation is discussed.

Histological and Ultrastructural Studies on Calcification and Ossification Processes in the Femoral Head Epiphysis of Parathyroidectomized Rats

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This study was undertaken in an attempt to show the effect of parathyroidectomy on the calcification and ossification processes in the femoral head epiphysis of rats, through the findings obtained by a light microscope, a scanning electron microscope and an energy dispersive X-ray analyzer.

Materials and Method

A total of 256 Wistar rats were used in this experiment. Parathyroidectomy or sham operation was performed at the age of 28 days. Both femoral heads of all rats were excised at the ages of 42, 56, 70 or 84 days and they were compared between the parathyroidectomized rats and controls.

Results

The rate of appearance of ossification centers of parathyroidectomized rats was higher than that of the controls at the age of 84 days ($P < 0.005$). The apatite crystal globules were observed to deposite in the epiphyseal cartilage at the calcification stage and their sizes increased with age. The tendency was found to be slightly accelerated in the parathyroidectomized rats. The ratio of calcium

to phosphorus of apatite crystal globules measured by an energy dispersive X-ray analyzer was lower in the parathyroidectomized rats ($P < 0.01$). Earlier completion of calcification may cause higher rate in appearance of ossification centers as a consequence of parathyroidectomy.

Effects of Thyrocalcitonin on the Proximal Epiphysis of the Tibia in the Rat

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The purpose of this paper is to study effects of thyrocalcitonin on the epiphysis of the tibia in the rat by using histomorphometric methods.

Materials and Method

Twenty-five Wister rats aged 3 days were divided into control (n = 13) and [Asul. 7] ECT (n = 12) group. The latter were given daily injectionof [Asul. 7] ECT (0.1u/kg body weight, s.c.). After 3 weeks' treatment, all rats were scrified, bilateral tibiae were removed and serum calcium, phosphate and alkaline phosphatase were measured. Both tibiae were fixed in 0.5% cynauric chloride in methyl alcohol containing 1% N-methyl morpholine for 4 days at room temperature and were decalcified with neutralized EDTA. The epiphysis of the tibiae were observed by soft X-ray and decalcified section. Several histomorphometric parameters of the trabecular bone were measured.

Results

As for the body weight, the length of the tibia and the thickness of the epiphysis, there were no differences between [Aust. 7] ECT groups and control one. In the biochemical data, decrease of serum phosphate and increase of alkaline phosphatase were observed in [Asul. 7] ECT group ($p < 0.01$). Histomorphometric findings, osteoid specific volume (o Vsp) and relative osteoid volume (ROV) were decreased in [Asul. 7] ECT group ($p < 0.05$). There was no significant difference in trabecular bone specific volume (tVsp), active formation surface ratio (AFS) and mean osteoclasts number (MCN) between groups.

Histological Observations on Tissue Reaction of The Rats' CalcanelTendon to Sintered Hydroxyapatite

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Synthetic hydroxyapatite is known as osteosynthetic material. Synthetic hydroxyapatite blocks were implanted into the unilateral calcaneal tendons of 12 Wister rats 3 months of age. Tissue specimens from each site were obtained six weeks, eight weeks, and ten weeks after implantation. No inflamatory reaction was observed around the implants. A thin layer of connective tissue was at the surface and the tissue infiltrated into micropores of the hydroxyapatites. Fibrous fibers were rarely observed in this connective tissue.

Natural History of Osteonecrosis in the Femoral Condyle of the Knee

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Natural history of osteonecrosis in the femoral condyle of the knee were examined in 15 knees of the 14 patients (5 men, 9 women). The average age was 62.8 years (range, 23 to 79). The average follow-up was 4.9 years (range, 1 to to 12). There were 11 patients with spontaneous osteonecrosis and 3 withsteroid induced osteonecrosis. The medical femoral condyles were involved in 13 knees, and the lateral in 2. The greatest width of the lesion was measured on the anteroposterior roentenogram at the follow-up. All patients were divided into two groups according to the size of the lesion. The necrotic lesion with less than 10 mm width, which were rates as miniature size, had good natural course because of no progress in stages. The average femorotibial angle in 4 knees of them showed slight increase. The group with width more than 10 mm were 10 knees, the femorotibial angle of which have tendency to be varus. Among them, the lesion of 3 knees had developed their stage. The average size of osteonecrosis induced by steroid was larger than that of spontaneous one.

Osteonecrosis of the Knee

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Spontaneous osteonecrosis of the knee is described as a sudden onset of pain on the medial side of the knee, in older females, associated with a radiolucent lesion surounded by a sclerotic halo in the medial femoral condyle. This is associated with a focally hot bone scan. The natural history of this disease can be categorized by five stages dependings on the severity of the lesion. The smaller lesions in the lower stages heal and their symptoms resolved without long term sequlae. The larger lesions with secondary degenerative changes require surgical reconstruction.

Osteonecrosis has also been recognized to occur in the medial tibia plateau. This syndrome has similar presentation with pain on the medial side of the knee in elderly patients. These patients also have focally intense bone scans which demonstrate the lesion to be in the tibia by the medial view. The clinical course is similar to that with femoral osteonecrosis. Most of these patients never develop a radiographically demonstrated lesion and their symptoms resolve and their bone scans become cold. However, a few people go on to collapse in the tibial plateau and require surgical intervention.

The recognition of these entities in the femoral

condyle or tibial plateau is limited and it is important to be aware of these syndromes in order to avoid unnecessary surgical intervention.

Osteonecrosis of Femoral Condyle in Patients with Rheumatoid Arthritis

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Osteonecrosis of the femoral condyle has previously been reported in the patients in association with the diseases such as systemic lupus erythematosus and after renal transplantation treated with high-dose corticosteroids. It is known that osteonecrosis of the femoral head occurs in the patients with rheumatoid arthritis. However, osteonecrosis of the femoral condyle has not been described in English literature. We have observed osteonecrosis of the femoral condyle in four patients with rheumatoid arthritis. Those patients were all females and the ages ranged from 47 to 79 years. Two of these four patients received systemic corticosteroid treatment. Osteonecrosis was found in the medial condyle in three patients and in the lateral in one. The diagnosis was based on a subchondral radiolucency and a sclerotic halo on the roentgenograms. Bone scintigrams were also helpful for diagnosis. Total knee replacement was performed in two patients of them, ending in satisfactory results.

The Optimal Tourniquet Pressure Application Utilizing Pulse Oxymeter

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Pneumatic tourniquets are commonly used to obrain bloodless field in the extremities at Surgery. However, excessive pressure beneath the tourniquet and ischemia could cause potential complications. In order to determine optimal tourniquet pressure, we have been utilizing pulse oximeter with which the pulse of the digit can be detected. The senor of pulse oxymeter with which the pulse second toe of each patient. Subsequently, the tourniquet was inflated and the pressure at which the pulse of the second toe dissappeared was monitored.

Considering the change of blood pressure and positioning during surgery, the optimal tourniquet pressure was determined by adding 75mm Hg to the monitored pressure. Thirty-two surgeries of the lower extremities in thirty patients were studied. The average tourniquet pressure applied was 263 mm Hg which was significantly lower than conventional tourniquet pressure. The duration of tourniquet application was 13 minutes to 201 minutes (avrrage 88 minutes). No major complications were noted and complete bloodless field was obtained in 27 cases. Although there was minimal bleeding in four of 32 cases, only one case required re-application of the tourniquet because of bleeding. It appeared that the use of pulse oxymeter is safe and is an easy method to determine optimal tourniquet pressure.

The Inaugural Congress of the Knee Section of the Western Pacific Orthopaedic Association

November 21, 1987

SYMPOSIUM

Degenerative Joint Disorders

High Tibial Osteotomy for Osteoarthritis of the Knee – University Hospital Experience – 10 years (1976 – 1986)

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Between 1976 to 1987 March, a total of 54 patients had Hight Tibial Osteotomy operation for treatment of medical compartment osteoarthritis of the knee. Of these, only 39 patients wre available for review, and they constituted 46 knees which were operated upon. The study was conducted retrospectively, the data being obtained from the clinical notes of these patients. The maximum follow-up was four years six months, and minimum was six months. The parameters worthy of analysis was the surgical technique of High Tibial Osteotomy and relief of pain after operation. Due to poor documentation, the degree of pre- and post-operative varus deformity could not be assessed accurately.

The following techniques of osteotomy were used:

Coventry Type (Closing wedge)	: 23 knees
High Dome-Barrel Vault	: 23 knees
	46 knees

Follow-up assessment of the knees were done using the knee function assessment chart of the British Orthopaedic Association Research Sub-Committee, with some minor modifications.

The overall results of the High Tibial Osteotomy operation with regard to relief of pain was satisfactory. The range of movements and functional status of the patients after operation did not improve. Of the various types of operation, the High Dome Barrel Vault Technique appeared to give better results than the Coventry Technique. The degree of correction of varus deformity could not be studied adequately, but it was clear that persistent instability of the knee is a had prognostic sign. Complications in either technique were few, there being one case of common personeal nerve palsy, and two cases with loss of extension of the big toe. Two cases developed non-union, and two pain over the staples, which were removed.

The conclusions obtained from this study were the following:

1. High Dome-Barrel Vault type of osteotomy gave better results.

2. Ligament laxities, if uncorrected, produced bad results.

3. The degree of varus correction does not co-relate well with the results many patients with persistent varus still were free of pain.

Arthroscopic Joint Debridement for Osteoarthritis

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Intraarticular debridement in the treatment of osteoarthritis of the knee includes shaving and trimming of degenerated articular cartilage, removal of loose bodies, partial or total resection of the degenerated or ruptured meniscus, partial synovectomy and resection of the osteophytes. The debridement is indicated for the patients with rather mild or moderate degenerative changes of the knee with no marked varus or valgus deformity or those who are rather old who are unable to undergo major surgery because of poor risk. This time 32 knees of 31 patients were investigated with follow-up duration ranging from 5 months to 4 years. The age of the patients ranged from 44 to 78 years. The pain and walking ability improved moderately as well as massive joint effusion. However, range of motion was unchanged and degeneration was more advanced in several cases. The patients (22 out of 31 cases) were satisfied with the results of surgery.

Anterior Knee Pain

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Evidence is presented from a controlled anthropometric study that chronic overloading of the patello-femoral joint rather than abnormal mechanics is the dominant factor in the knee pain of adolescents.

WORKSHOP

Total Knee Replacement

Requirements for Successful Total Knee Replacement

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Results from total knee replacements have been extremely satisfactory and their longevity has been most graftifying. In order to obtain and improve upon these results there are five basic requireements which must be considered.

1. Satisfactory materials, including biocompatibility, adequate strength and wear characteristics and lack of oncogenic potential.

2. Correct design features, including condylar shape and tibial restraints. The need to sacrifice and salvage the posterior cruciate ligament remains undertermined and appropriate stem design remains to be determined.

3. Fixation to bone is an important requirement and as yet still undertermined. The results with cemented prostheses are so successsful that porous in-growth has not yet shown itself to be superior. New techniques for in-growth are yet to be fully tested.

4. Operative management is necessary for all total joints. The environment must be clean, the risk of infection must be low and techniques to place the total knees in proper position must be carefully developed.

5. Perioperative problems must be carefully evaluated. The role of pulmonary embolism, blood loss, continued passive motion and postop rehabilitation are still being developed and is important to the long-term success of these

SYMPOSIUM

Ligaments of the Knee

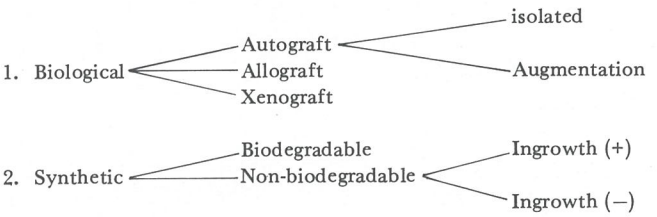
Prosthetic Ligament of the Knee

K.M. Chan

Hong Kong.

The A.C.L. deficient knee presents a tremendous challenge to the orthopaedic surgeon. In the light of the advancement of new medical technology in biomechanics, synthetic research, arthroscopic surgery and rehabilitation, the utilization of ligament substitutes for ACL deficient knee has made immense progress in the last decade.

The ligament substitute can be classified as follows:



prostheses. These requirements are universal, and when resolved will indicate the best chances of continued long-term success with prosthetic joints.

The ideal prosthetic ACL should provide:

1. Exact reproduction of physical restrain system of the natural ACL.

2. Long-term biological compatibility and mechanical efficiency.

3. An average life-time greater than existing methods of reconstruction using autogenous graft alone.

4. The surgical technique allows for precision of graft placement, preferably with arthroscopic assisted procedure to minimise trauma, correct tensioning and secure fixation to allow immediate joint mobility and rehabilitation.

Seven ligament substitutes are discussed: carbon fibre,

Kennedy Ligament Augmentation Device (LAD), Leeds-Keio, Xenotech, Allograft, Meadox and Gortex. They should be critically assessed by the following parameters:

1. **Biological Factor**
   - biocompatibility (intra-articular & intra-osseous)
   - chemical stability
   - genotoxic effect
   - mutagenic effect
2. **Mechanical Factors**
   - ultimate strength
   - stiffness
   - cyclic creep
   - fatigue strength
   - elongation at failure
   - resistance to abrasion
3. **Technical Factor**
   - bone tunnel approaching isometry
   - bone tunnel size match with graft
   - avoid sharp edges
   - intercondylar femoral notchplasty
   - proper tensioning
   - ultimate biological fixation

The relative merits and potential problems of these ligament substitutes should be recognised and appreciated.

The ultimate success of ACL reconstruction surgery depends on proper patient selection, accurate diagnosis and documentation, precise selection of surgical procedures and an intense rehabilitation programme.

SEMINAR

State of the Art of Knee Surgery in the Western Pacific Countries

Knee Orthopaedics in Australia

Brian Casey
Sydney, Australia

Knee orthopaedics' forms part of any orthopaedic practice in Australia. However, in the larger cities some orthopaedic surgeons practise mainly or fully in the area of the knee. Most of this latter group are members of the Australian KNee Society.

The vast majority of knee problems relate to arthritis and trauma, especially sporting and motor vehicle accidents. Australian Rules' Football produces a high rate of anterior cruciate ligament damage whilst most posterior cruciate ligament problems come from motor accidents, especially motorcycle. Most meniscal surgery is performed arthroscopically. Osteotomy is increasingly used particularly for medical compartment arthritis and postero-lateral instability. Three compartment knee replacements are used most commonly but the use of unicompartmental tibio femoral replacement is increasing. The treatment of osteochondritis dissecans has been improved by the use of the Harbert Scaphoid screw.

The State of Art of Knee Surgery in Hong Kong

K.M. Chan, David Fang
Hong Kong

In Hong Kong most orthopaedic surgeons look after a broad spectrum of partients in the general and teaching hospitals ranging from trauma, hand, spine, paediatric orthopaedic, joint reconstruction, sports medicine and general orthopaedics. The tremendous workload we encounter in the public service preclude a climate of ultra-speciality development. In recent years the speciality of knee surgery is gradually gaining popularity and diversity.

A survey of knee surgery in seven orthopaedic unit reveals the following patterns: 1. Arthroscopy (43%); 2. fractures (37%); 3. ligamental repair and reconsturction (12%); 4. total knee replacement (4%); 5. Osteotomy (4%). The otal number of knee operations performed in one year ranged from 61 to 253 (average 135).

Arthroscopy

Diagnostic arthroscopy is widely practised in most centres. Specialist management for sports injuries is becoming more recognised in our community. Pattern of arthroscopic surgery generally indicates that meniscus and ACL injuries are the commonest (62%), followed by osteoarthritis (21%), chondromalacia patellae (10%) and a variety of other pathologies such as synovial disease, pathological shelf syndrome, osteochondral fractures, etc.

New arthroscopic techniques are meniscoresis, arthroscopic assisted ACL reconstruction, arthroscopic synovectomy, arthroscopic abrasion arthroplasty.

Fracture Treatment

The general pattern of fracture around the knee is patella fracture (60%), tibial plateau fracture (23%), femoral condylar fracture (15%) and other (2%). The basic principle of managing intra-articular and juxta-articular fractures is stable internal fixation of the fracture and early mobilization. The use of Continuous Passive Motion (CPM) is widely accepted as an integral programme of the early phase of rehabilitation.

Ligament Repair & Reconstruction

Most grade 3 acute collateral ligament injuries are repaired primarily. The management of ACL injury is undergoing a stage of evolution with initially an accurate assessment including EUA and arthroscopy followed by an intensive rehabilitation programme. The symptomatic ACL deficit knees are selected for reconstruction.

Reconstructive Surgery for Osteoarthritis

Arthroscopic Surgery offered the first line of "Conservative Surgery" for patients with early degeneration.

Patients suitable for osteotomy are not common because many of them are reluctant to go through a major open surgery in a relatively ear y stage while other present too late for osteotomy. There is a balance distributionof high tibial osteotomy (Coventry) (40%) and dome osteotomy (Maquet) (60%).

The scope of development of total knee replacement is mainly limited by the budgetary constraints in public institutes. The Kinematic, PCA and Insall-Burnstein Systems are the favourites. The osteoarthritis knees outnumber the rheumatoid knees (4 to 1). Unicompartmental knee replacement is gaining more attention in the local orthopaedic community.

The State of Art of Knee Surgery in Indonesia

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In this paper a recollection has been put forward of the development of Orthopaedic Surgery in Indonesia.

Due to the still very small number (1987 – 85) of orthopaedic surgeons, only a few can really busy themselves with knee surgery specially, but its progress is discussed.

Although orthopaecic surgery is still young in Indonesia, advancement in technology in this field is being followed closely and as its proofs are that arthroscopy and arthroscopic surgery as well as total knee arthroplasties and artificial ligament reconstruction are being performed in several eities.

Some of our cases of the use of the arthroscope and TKA cases will be discussed.

The State of Art of Knee Surgery in Japan

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Various remarkable developments on knee surgeries have been reported in Japan since 1910. On meniscus injury, there were reports of trigger knees (Takagi and Nagura 1925), penumoarthrography (Matsumaru and Ueda 1933, Imai 1962) and lateral meniscus injury (Amako 1958). The cruciate ligament injury was reconstructed using artificial ligament (Fujikawa et. al., 1983) and autograft (Shino (1984). Diagnosis of rotational instability (N-test) was established by Nakajima (1973). Osteoarthritis and osteonecrosis was investigated on ultra-micro pathology (Hirohata), etiology (Iseki), treatment by high tibial osteotomy with blade plate fixation (Koshino 1969, 1977) and on cartilage regeneration (Fujisawa 1979). There were reports on recurrent dislocation of the patella (Takagi 1924), chondromalacia (Akamatsu 1972), patello-femoral biomechanics (Shinno 1961) and treatment of tibial tuberosity advancement (Kobayashi et. al., 1977). The fascial membranes were investigated for surgical treatment of ankylosis (Sumida 1913, Jinnaka 1930 and Kohno 1946). The artificial knees developed were hinge type (Hashikura 1956, Katayama et. al., 1972), polycentric (Nishi), cementless surface replacement type (Kodama and Yamamoto 1972) and ceramic (Ohinishi). Investigation of arthroscopy started in Japan (Takagi 1918) and Watanabe No. 21 was developed in 1959. Many reports were issued by Watanabe on osteoarthritis (Abe) and meniscus repair (lkeuchi, Chen). Painful shelf syndrome was reported by lino (1939) and Sakakibara (1976).

The State of Art of Knee Surgery in Korea

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The Korean Knee Society was founded in 1983, and there are 90 members now. Since that time there are remarkable developments of the art of knee surgery including TKR, ligament surgery and arthroscopic surgery.

Recently there are many new young arthroscopists and a few of them have developed good surgical techniques including meniscectomy, total synovectomy, reconstruction of ACL with artificial ligament and primary repair of ACL with staple, etc.

Concerning the ligament surgery, we have developed various new techniques including Biceps Femoris rerouting operation for the PLRI, Gastrocnemius transfer for the AMRI, vascularized patellar tendon graft for the ACL (Modification of Clancy's method) and advancement of ACl or PCL for the old healed incomplete tear of the ligaments.

For the prevention of stiffness of the knee joint and for the better bealing of repaired or reconstructed ligament, we use the limited motion brace which has alreayd been proven successful.

For the advanced arthritis of the knee, especially rheumatoid arthritis and osteoarthritis, total knee replacement of various types is popular in Korea. Recently surface replacement including "Oxford Knee" was tried in a few centers. Pstoperative stiffness is a main problem of TKR which is solved with alternate flexion and extension splint by author.

A new technique of arthrodesis has also been developed which has proved successful.

The State of Art of Knee Surgery in Malaysia

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The preoccupation with trauma associated with road traffic accidents has dictated the trend of orthopaedic surgery in Malaysia for the past 20 years. During this period, there has been a six-fold increase in the number of vehicles on the Malaysian road and a similar increase not only in the number of road traffic accidents, but the injuries thereby sustained have become more seious and gruesome. Tuberculous and pyogenic infections of bone and joint have continued to maintain an even level of concern throughout these years.

In the past 15 years, there has been a greater awareness of sports injuries in Malsysia, because of the pressing need

to recognise and treat these injuries early.

Amongst joints injured in road traffic accidents, the knee is the commonest; similrly the knee bears the brunt of the injuries in sports.

Knee surgery, particularly for meniscal injuries and ligamentous instability, have received much attention in the University Hospital (UH), Kuala Lumpur, which has come to be recognised as the centre for treatment for sports injuries. Knee injuries in 'soliders have kindled a similar interest in the Armed Forces Hospitals.

Open meniscectomies had been routinely carried out, with or without preoperative arthrography, until 1980 when arthroscopy of the knee made its debut in Malaysia, following which diagnostic arthroscopy and arthroscopic surgery began to be carried out in the University Hospital, General Hospital Kuala Lumpur and in the Armed Forces Hospitals. This was further boosted by a hands-on course on Arthroscopy conducted in General Hospital KL in 1982 with the help of Dr David Dandy.

Injuries involving ligaments of the knee have been treated conservatively in general, except in centres in KL where reconstructive procedures eponymously associated with Hey Groves, MacKintosh, Jones and Insall are being carried out mainly in UH and General Hospital KL. Synthetic cruciate ligaments have also been used in the Orthopaedic Department of University Kebangsaan Malaysia, with satisfactory results.

The advent of total knee replacement arthroplasty came in the wake of an instructional course on surgery of the knee conducted in December 1985, and the Insall-Burstein system is now being used in UH and UKM, as well as in a few private hospitals. Professor George Bentley, Dr Robert Jackson, Dr. Russell Windsor, Dr. Joe Miller, Dr. Tomihisa Koshino, Professor Kamal Bose, Dr Satku and Dr KM Chan were members of the teaching faculty on the course along with Malaysian orthopaedic surgeons.

Knee surgery is enjoying a period of resurgent enthusiasm amongst Malaysian orthopaedic surgeons and, spurred on by the global advances being made in this challenging field, the interest will continue to gain strength in the years adead.

The State of the Art o Knee Surgery in Singapore

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The state of the art of Knee Surgery in Singapore has come a long way since the early seventies. The AO Techniques and instrumentation has enabled us to treat complex fractures of the knee effectively. Diagnostic and operative arthroscopic surgery of the knee has made great progress.

In total knee replacement the results are now comparable to that of total hips. In tumour surgery of the knee we now strive for limb salvage.

Other technological advances such as the continuous passive mobilise machine, cybex and computed tomography have enabled us to serve our patients better.

Clinical Experience and Research Study of ACL Reconstruction in V.G.H., Taipei, Taiwan

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The treatment of ACL deficiency presents a frustrating problem for the orthopaecic surgeon. The literature is replate with articles concerning large variety of treatment regimens and philosophies. This indicates that probably non none of them is ideal.

In the past three-and-a-half years, 177 cases of ACL deficiency were reconstructed with three different materials; autogenous 1/3 patellar tendon (45 cases), artificial Dacron ligament (82 cases) and Gortex (50 cases); and two surgical procedures with or without isometric concept in V.G.H.

Twenty of thirty-five cases (57%) treated with patellar tendon graft were graded good after a period of three-years follow-up. The cases reconstructed with artificial ligament were evaluated good to excellent of initial 18 months' period about 85% (29/34 cases). Failure of Dacron Ligament was noted in two cases.

Ideal graft selection and placement are always the disputed points. Concerning the disadvantage of sacrifice autogenous graft and durability of artificial ligament, experimental study of allograft in dogs were performed since three years ago. Comparison study between authogenous graft and allograft was investigated with biological section and mechanical testing. The allograft substitution revealed a promising investment.

Functional assessment of ACL reconstruction with gait analysis is our second part of study. The main evalua= tion parameters include force analysis of knee joint, floor reaction force and kinematic change of knee joint during the level walking. The cases treated with isometric concept approached the normal gaint pattern and knee reaction force.

ACL exhibits a complex fiber geometry which diff-ferent fiber lengths allow ligament function in different planes to kee motion. None of the graft tissues can closely stimulate the microgeometry of a normal ACL at implantation. Experimental study and objective evaluation will be the solution of this problem.