Department of Orthopaedics & Traumatology
The University of Hong Kong Medical Centre
Queen Mary Hospital
Newsletter

Vol. 5, Issue 1, March 2005

Message from Professor Keith DK Luk

Last June, our Department has been formally renamed as the Department of Orthopaedics and Traumatology to better reflect the scope of our work and align with the international nomenclature. To show our unity and to create a 'Brand name', we have collectively chosen a departmental color, designed a new logo, a pattern for souvenir, a name card and not the least, a powerpoint slide format. You should notice this image change in this first newsletter of 2005.

The most important change, however, has to be the reorganization of the Department into 7 subspecialty divisions which took effect from the 1st of January 2005. This decision was arrived at after a lengthy deliberation with all medical, nursing and paramedical staff of the HK West Cluster and at one time also colleagues of the HK East Cluster. With the recent changes in the employment strategies of the Hospital Authority, the majority of the graduating orthopaedic specialists will have to find their way into the private sector. It is therefore essential that they are fully prepared to practice independently after their 6 years of training. Over the past decades, while the trainees in our department might have had the opportunity to rotate through all the subspecialty disciplines and see the most complex procedures, they might not have prepared themselves to become a general orthopaedist. It is for this reason that during the reorganization, the Division of General Orthopaedics & Oncology has become one of the seven together with the Divisions of Hand & Foot Surgery, Joint Replacement Surgery, Paediatric Orthopaedics, Sports & Arthroscopic Surgery, Spine Surgery and Orthopaedic Trauma. We are also actively looking into the possibility of collaborating with our colleagues in private to provide training for the General Orthopaedics rotation. The Division of General Orthopaedics & Oncology is the largest of all and is led by two specialists, Drs TP Ng and WY Ho, and staffed by 5 others. They will be responsible for most of the pathologies that are commonly encountered in general practice or the category A list of the 'College training guidelines'. From the service point of view, this Division will also serve as the coordinator for patients who need multi-subspecialty treatment. Inter-division referrals and multi-clinic attendances should be minimized. Each of the other subspecialty divisions is headed by a senior specialist and supported by specialists and trainees. They will concentrate on the secondary and tertiary level services. I am confident that this new initiative of our department will prove successful and best serve both our patients and our future generation of orthopaedic surgeons.

It is never too late to send a New Year greeting, may I take this opportunity to wish you all a healthy and prosperous Year of the Rooster?

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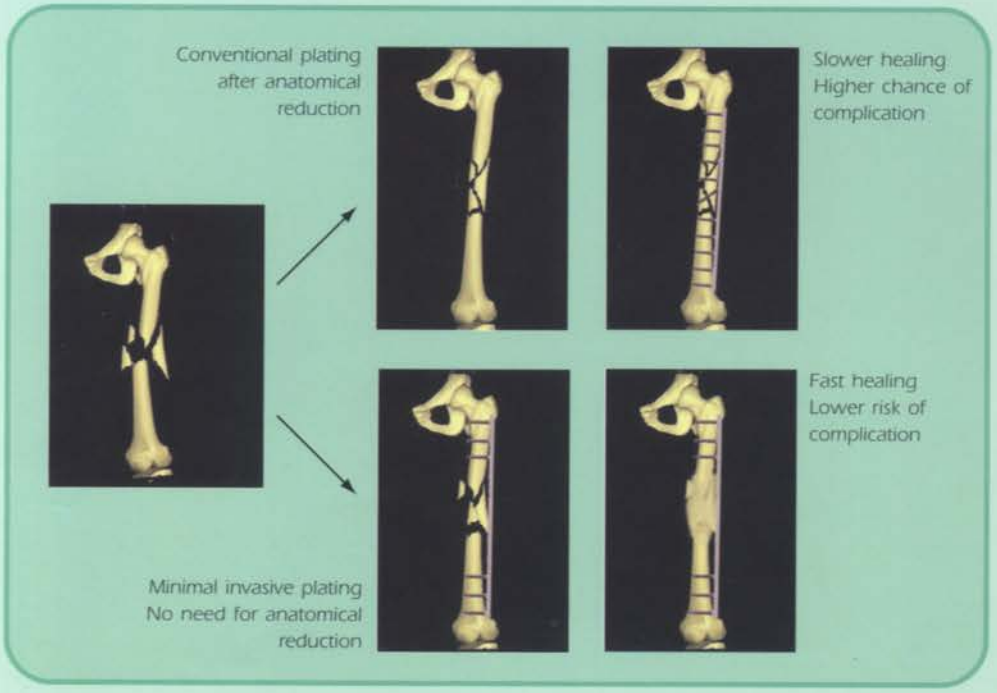
Minimally Invasive Plate Fixation In Fracture Management

Dr. Frankie Leung
Chief, Division of Orthopaedic Trauma

Injuries resulting in fractures are very common in modern society. In the past, a lot of these fractures in the long bones were treated with plaster casting, traction or other immobilization methods. Despite the fact that most fractures treated in this manner proceeded to healing, the rehabilitation of the affected body part was often delayed. In most cases early mobilization of affected bone and joint and even ambulation is desirable. There was a saying in orthopaedics that 'Life is movement, movement is life', which rightly pointed out the importance of early rehabilitation. The founding of the AO/ASIF or the Association for the Study of Internal Fixation in 1958 marked an important milestone in the history of fracture treatment. This led to an enthusiasm of operative fracture treatment including rigid plate fixation in the past few decades.

The conventional concept of plate fixation of a fracture included accurate reduction of fracture fragments and rigid fixation using screws and plates. The fractured bone after fixation would be strong enough for immediate movement of joints and partial loading of the bone. However, in order to achieve this goal, there must be considerable surgical dissection and stripping of periosteum for direct visualization of fracture fragments. Unfortunately, this may lead to devascularisation of fracture fragments and sometimes delayed union of the fracture site. Poorly vascularised bony fragments also serve as good foci for infection to occur.



Locking plating system as internal fixator

It is known that conventional plate fixation relied on intimate contact between bone and implant. This may result in pressure necrosis and delayed healing. In conventional plating, the screw acts as an anchor, its axial force being exploited to press the plate against the bone. This produces a large frictional force at the bone-plate interface when the construct is loaded and has been shown to cause vascular disturbance, especially to the periosteum. However the innovative design of locking head screws within the plate results in stronger fixation and theoretically, quicker healing. The whole plate is lifted off the bone surface. The fixation power in cancellous bone or even osteoporotic bone is also improved with the use of locking screws. There will not be pulling out of screws, particularly if the screws are directed in multiple directions.

Instead of rigidly splinting the fractured bone, the implant can be viewed as a strong device holding the bones together, without an exact and fitting contact between the implant and the bone. At selected body sites, these plates can be slid under skin, muscles and other soft tissues. This forms the basis of minimally invasive plate osteosynthesis or fixation (MIPO). At the present moment, only long bone fractures such as femur, tibia or humerus can be treated with such technique. (Fig 1a – 1d)

Distal tibial fracture fixed with MIPO technique

Fig. 1
Reduction and fixation as shown on fluoroscopy

Fig. 2

Fig. 3

Fig. 1d Small incisions used to insert the implant

Minimally invasive plate fixation

With increasing knowledge of fracture healing, there is now a global trend towards minimally invasive method of fracture fixation or osteosynthesis. Improvement in the design of implant and fixation device together with better imaging techniques, to the extent of computer navigation, make fracture fixation a much less invasive procedure than before. Not just the operative risk is reduced, but also fracture healing is enhanced. Moreover, due to better preservation of blood supply to the fractured bone, the chance of infection is also decreased. (Fig. 2a – 2g)

Fig. 2 Humeral fracture shaft fracture fixed with MIPO technique

Fig. 2a Intraoperative photograph showing the limited incision

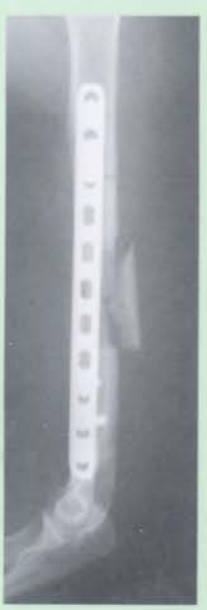


Fig. 2bc Early postoperative radiographs showing the non-anatomical reduction

Fig. 2de Radiographs at 2 months follow-up showing rapid callus formation

Fig. 2fg Good range of motion

Although the technique of minimally invasive plate fixation can be applied to most long bone fractures, its best indication is its use in comminuted fractures where accurate reduction is not possible. Usually rapid callus formation is usually seen before any loosening or failure of the implant. There is usually a greater satisfaction from patients as wound pain is minimized. An improvement in rehabilitation is also witnessed as the patient can start to have range of motion exercise immediately after the surgery. (Fig. 3abc)

Fig. 3a Insertion of femoral plate using multiple small incision

Fig. 3b

Fig. 3c Smaller wound with lesser surgical trauma can result in speedy recovery of function

Imaging of the fracture

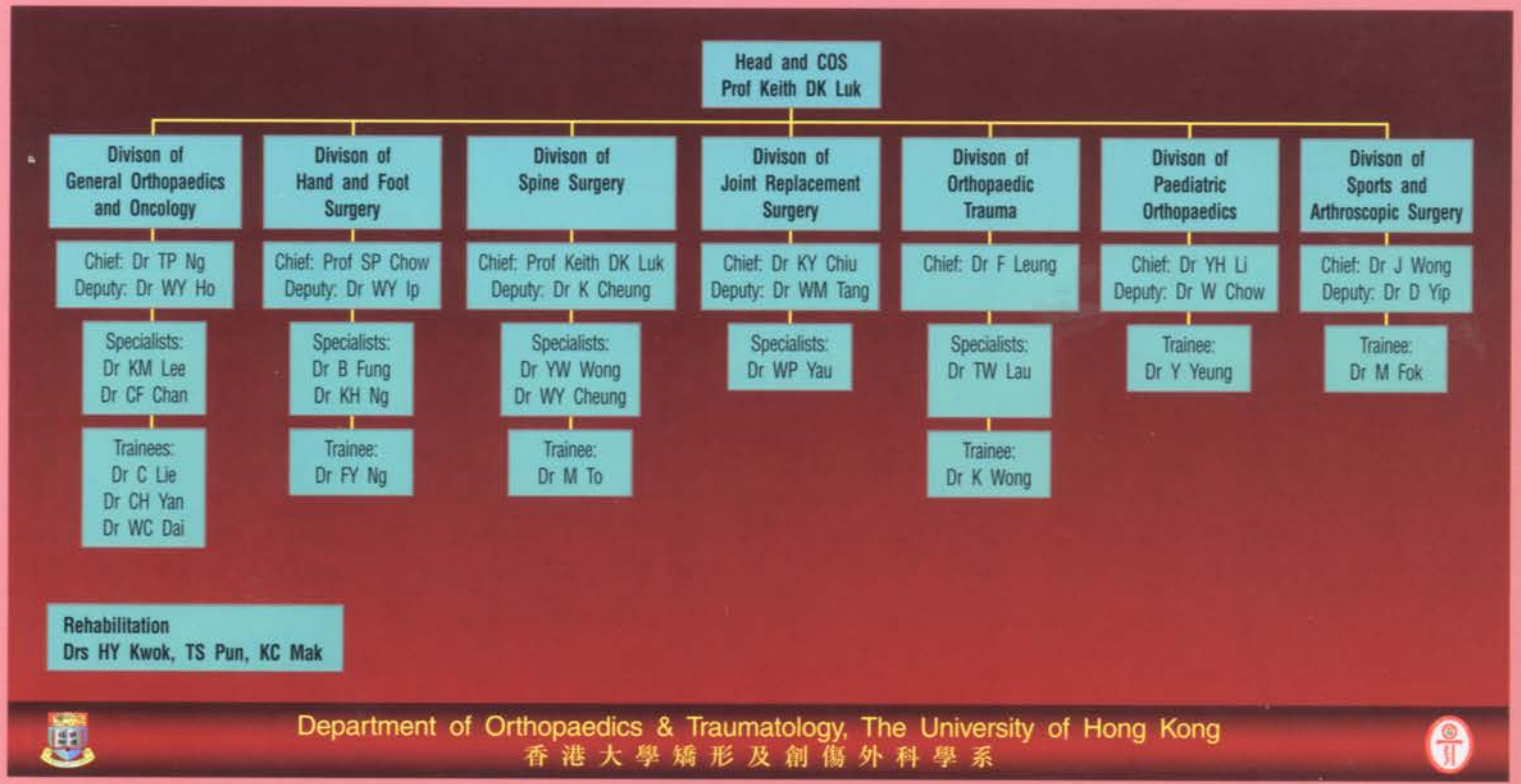
The accuracy of preoperative diagnosis and planning in trauma surgery relies on imaging tools like CT and MRI. However, there is little application or transfer of this information to the intra-operative setting. Now since the fractured bone fragments are no longer under direct vision, the accuracy of fracture reduction has to be judged by good imaging as well. In most of the cases, this can be done with intra-operative fluoroscopy monitoring. (Fig 4) The accurate placement of screws and implant at the desired position can be achieved. Such technique is commonly used in most hospitals at the present moment. However, this leads to the issue of increased exposure to irradiation for health personnel. Computer assisted surgery has the potentials to overcome this problem. The basic idea is the visualization of the surgical tool on a monitor in real-time within the images of the patient. A navigation system will provide the link between the real and the virtual tool. Such navigation system can be CT-based or fluoroscopy-based. This advanced technology has been applied to surgery of spine, pelvis and other long bone fractures and studies have shown an increased accuracy and reliability in the placement of implants.

Fig. 4 Intra-operative fluoroscopy monitoring

Conclusion

With the introduction of minimally invasive techniques and the development of internal fixator, a new age has dawned in fracture fixation. Every procedure in fracture care should take this concept into account. This minimal invasive technique has been applied in Queen Mary Hospital for more than four years with promising results.

Department Structure



Donations

Donor	Amount	Purpose
Mr Suen Fung Leung of Sunnyside Limited	HK$100,000	To support spine research activities
Mr Lawrence Fung and Family	HK$200,000	To support spine research activities
Dr Chan Pak Hang	HK$20,000	To support department research
Mrs. Pauline MA	HK$5000	For Department development and research

Research Grants

Grants	Amount	Project Title	Investigators
Hong Kong Research Grants Council Central Allocation Scheme	HK$4.14 million	Development of Novel Materials for Orthopedics 新穎骨科物料的發展 (Collaboration with Department of Physics & Materials Science, City University of Hong Kong, Department of Mechanical Engineering, Hong Kong University of Science & Technology, and Department of Biochemistry, The University of Hong Kong)	Prof Paul K Chu, Prof Keith DK Luk, Dr Kenneth MC Cheung, Dr William W Lu, Prof SC Tjong, Dr CY Chung, Dr Danny Chan, Dr QP Sun

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