



# Department Of Orthopaedics & Traumatology Queen Mary Hospital University Of Hong Kong Medical Centre Newsletter



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## Professor J.C.Y. Leong

After 38 years as a staff member, and 23 years as Head of Department, I shall be leaving The University of Hong Kong to head The Open University of Hong Kong. Tremendous changes have occurred in our Department since I first joined it. From a Department with an international reputation for its pioneering work on tuberculosis of the spine, with only clinical research, it slowly but steadily evolved into a major centre for applied research into device design and creation (such as the halo-pelvic apparatus), and later basic research into biomechanics, biomaterials, electrophysiology, molecular biology, and genetics. Most recently, a generous location by Dr. Stanley Ho will spearhead our thrust into tissue engineering and stem cell research. Many specialities of orthopaedics have been developed, some at a more mature stage than others, with the mature ones formed into Divisions. Some have attained international acclaim, such as spinal surgery, hand and microvascular surgery, paediatric orthopaedics, and to a lesser extent, joint replacement surgery and traumatology. These achievements have occurred because of an excellent team of people including medical staff employed by the University and Hospital Authority, technical, secretarial and support staff. Much remains to be done, to maintain our leadership position in the orthopaedic world. However, I am convinced that our Department stands on very firm ground, and with good and younger people at the helm from now on, it will be in a propitious position to surge further ahead.



## Recent Advances in Limb lengthening and deformity correction

Dr. Y.H. Li Consultant  
Duchess of Kent Children's Hospital

In the recent 2 decades, there has been an upsurge in the interest and the use of limb lengthening techniques to achieve

leg lengthening and deformity correction. This technique is based on the principles of **Distraction Histogenesis** which is the use of a distraction force to stimulate the formation of skin, muscle, nerve, vascular structures, connective tissue, lymphatic vessels & bone.

The commonest **Clinical applications** using distraction histogenesis are

- Limb lengthening
- Deformity correction
- Non-union, congenital pseudoarthrosis
- Osteomyelitis
- Contractures
- Clubfoot
- Bone transport in compound fractures with bone loss



New bone formation in distraction



Marked limb length discrepancy due to congenital limb hypoplasia

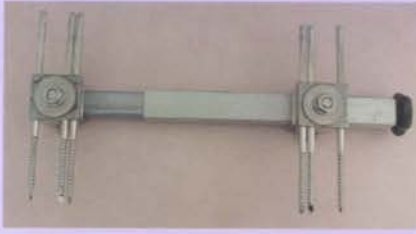


Achondroplasia with dwarfism

## History of leg lengthening

The first leg lengthening operation was done in 1905 by Codivilla using femoral osteotomy & calcaneal pin traction. Ombredanne, in 1913, was the first to use external fixator for lengthening.

Wagner in 1963 used a Monolateral fixator with a mid-diaphyseal osteotomy with acute and rapid large distractions with no waiting period to perform leg lengthening. Poor bone formation was the rule and bone grafting and plating of distraction gap was a necessity.



Wagner Lengthnee

It was not until 1950's that Ilizarov used the method of Distraction Osteogenesis that leg lengthening became more successful and thus more widely done. This method was not known to the world until 2 decades ago that a group of Italian surgeons attended Ilizarov's hospital in Kurgan, Siberia, USSR. Since then this method was widely practiced by the western world.

### Ilizarov method

Ilizarov method uses a circular fixator with thin transosseous wires. He performed what we called Corticotomy to preserve the blood supply in the medullary canal. After operation, there is a latency period of 5 to 7 days to let the blood vessels to heal before distraction at a rate of 0.25 mm four times a day is done. After completion of distraction, there is a consolidation period in which we wait for the bone to consolidate before the fixator is removed.



Ilizarov fixator

### Orthofix method

De Bastiani, in 1987, used a Monolateral fixator for lengthening. The osteotomy is done by first making multiple drill holes

before it is cut with an osteotomy. The waiting period is a bit longer (10 to 14 days) to allow early callus formation (Callotasis) before distraction at the rate of 0.25 mm four times a day is done.



Orthofix fixator



### Examples

- 1) **Ilizarov** : leg lengthening and new bone formation using Ilizarov method



New bone formation at distraction gap

- 2) **Orthofix** : leg lengthening and new bone formation using Orthofix method



New bone formation at distraction gap

The Ilizarov system is a versatile system and the components can be put into a wide range of combinations to allow distraction, compression, angulation, rotation and translation. This method can therefore be applied to deal with a large number of difficult clinical problems.

At the **Duchess of Kent Children's Hospital**, we started using the method in 1992. We have treated a wide range of problems like leg length discrepancy, dwarfism and short stature, osteomyelitis, congenital pseudoarthrosis of tibia, bone transport, clubfoot and other foot problems, malalignment of long bones and contractures. Methods we now use include Ilizarov, Orthofix and lengthening over nails. Some of these examples are illustrated below :

### Bilateral leg lengthening in dwarf patients



## Clubfoot deformity correction



Clubfoot deformity



Ilizarov apparatus applied



Final result

## Congenital pseudoarthrosis of tibia



Paediatric size Ilizarov rings

Congenital pseudoarthrosis of tibia



Resection of pseudoarthrosis followed by bone transport to from new bone

## Correction of forearm deformities in multiple exostosis and radial clubhand



Wrist deformity due to multiple exostosis



Lengthening of shortened ulna



Radial clubhand with short radius



Clinical picture with wrist deformity and absence of thumb



Lengthening of radius and correction of forearm deformity

## Complications

As with any surgical operations, problems are bound to arise and they are more prone to occur in leg lengthening because of the complicated operative system and the inherent problems in distraction histogenesis. Experience and vigilance are required to minimize these complications. Common problems that can arise include:

- Wire & Pin problems
- Pain
- Premature/ delayed consolidation
- Neurologic & vascular injuries
- Axis deviation
- Contracture
- Joint stiffness/subluxation
- Fracture after frame removal

## Conclusion

We have seen an explosion of the use of different types of distraction systems to correct difficult clinical problems and to generate new tissue. Orthopedists are now starting to do leg lengthening with an intramedullary (IM) nail so that there is no need to have an external fixator on the outside which will improve patients' comfort greatly. Dwarf patients are now seeing new lights and they may not need to look up to people anymore in future.

Prof. Michael A. Tonkin, Professor of Hand Surgery at the Department of Hand Surgery and Peripheral Nerve Surgery Royal North Shore Hospital and University of Sydney, Northern Clinical School Australia delivered the first Harry Fang Visiting Professor Lecture "On Surgeons, Heads, Hearts and Hands" on November 25, 2003.



Dr David Fang presenting a souvenir to Professor Tonkin after the lecture

The 5th Yang Hsueh Chi visiting professor is Dr Patrice Diebold from France. He is the current president of the European Federation of Foot and Ankle Society. Apart from being the visiting professor for the Department, giving his professor lecture on the 5th November 2003, he was also one of the invited overseas speakers of the 23rd

Annual Congress of the Hong Kong Orthopaedic Association.



Dr Diebold giving his lecture at the 23rd Annual Congress of the Hong Kong Orthopaedic Association

At the invitation of the AO Spine group, our Department has formed the first International Spine Reference Centre in Asia. The opening of the AO International Spine Reference Centre was held at the Faculty of Medicine, The University of Hong Kong on 25th October 2003 and the inaugural scientific meeting was held on 25th and 26th October 2003, with the themes being spinal tumours and degenerative lumbar spine disorders. In addition to the local faculty, four international speakers, including Prof Max Aebi (Switzerland), Prof S Boriani (Italy), Prof K Tomita (Japan), Mr. J O'Dowd (UK) attended the meeting.



The opening of the AO International Spine Reference Centre.

A farewell dinner was held for Professor John Leong on 28 November 2003. Many guests and friends, including the Department donors and those from the University and the Hospital Authority, were present to give the happy farewell to Professor John Leong. We wish Professor Leong all the best at the Open University of Hong Kong.



Professor Keith DK Luk, new Department Head, toasting to Professor John Leong.

## Donations

Mrs Wong Ma Lin Ying, Angeline, in expressing appreciation to the medical care she received from Professor D.K. Luk and his team, kindly donated a sum of \$100,000 to the Department in support of research, patient service and educational activities.

Mathys Hong Kong Ltd. generously donated a lump sum of \$723,400 to the Department for the establishment and operation of the AO International Spine Reference Centre. The Centre aims to promote and disseminate the latest knowledge and technology of spinal surgery.

Mr. Lau Wah, in remembrance of his late father Mr. Lau Kim Chai, generously donated a sum of \$300,000 to the Department in support of research, patient service and educational activities.

## Academic Awards

Best Oral presentation Award. Second SICOT/SIROT International Annual Conference. Cairo, Egypt. September 10-13. 2003.

Novel bioactive bone cement for Spinal surgery  
Lu WW, Cheung KMC, Luk KDK, Leong JCY

Best paper award for an associate fellow at HKOA 2003

Intervention of a New Spinal Implant for Gradual Scoliosis Correction  
Yeung KWK, Cheung KMC, Lu WW, Luk KDK and Leong JCY.

Best basic science paper award at HKOA 2003

Delivery of Bone Morphogenetic Proteins 2 and 4 by use of adeno-associated viral gene therapy  
Cheung KMC, Chen Y, Luk KDK, Xu R, Lin MC, Lu WW, Leong JCY, Kung HF.

Moe Basic Science award at the Scoliosis Research Society meeting in Quebec City,

Canada. Sept 2003.

A novel Sr-HA bioactive bone cement for vertebroplasty  
William Lu, KMC Cheung, KDK Luk, JCY Leong

Best paper award at the International Society for the Study of the Lumbar Spine, Vancouver April 2003

Association of lumbar disc degeneration with type IX collagen polymorphisms in Chinese

Cheung KMC, Jim J, Nonopone NH, Cheah KSE, Ala-Kokko L, Ott J, Karppinen J, Song YQ, Yip SP, Leong JCY, Luk KDK, Chan D.

二等獎 (second prize) 於 第八屆挑戰盃, which was organized by Ministry of Science and Technology and Ministry of Education, The People Republic of China 2003.

用於脊柱側凸矯形的新型超彈性鎳鈦記憶合金植入性器械

楊偉國, 張文智, 呂維加, 鍾志源, 陸駿, 梁智仁