THE HONG KONG 香港醫訊
# MEDICAL DIARY
www.fmshk.org
VOL.14 NO.10 OCTOBER 2009

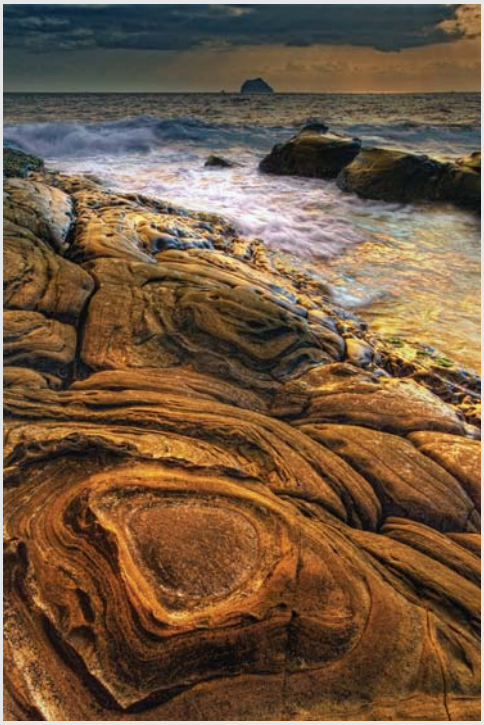
## Urinary Tract Stones

OFFICIAL PUBLICATION FOR THE FEDERATION OF MEDICAL SOCIETIES OF HONG KONG ISSN 1812 - 1691

# Contents



# The Cover Shot



## The Rock from Outer Space

I came across this beach in Taiwan, and discovered the amazingly strange rocks. Their colours and shapes seemed so unusual that they seemed to have come from outer space. Ordinary drab rocks change to a coating of dramatic colours. The photo captured sunrays penetrating cloudy skies, in this early morning. This light reflected on the surface of the sea as well as the wet surface of the rocks, causing a golden brown shiny appearance.

The photograph was taken with the HDR (High Dynamic Range) technique. It was a diagonal composition. Post processing further accentuated the colours, leading to a saturated image that helped to dramatise the scheme.

More photos in this series can be seen at my coming solo photographic exhibition "Photos from Amy's Wanderings" on 16-18th October, 2009, at the HK Cultural Centre, Main Foyer E2.

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**Published by**
**The Federation of Medical Societies of Hong Kong**



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# All Along; All the Way...

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***Editor***

"***Experto credite*** (Trust the one who has gone through it)"
-Virgil 70-19BC

Urinary tract stone is the third most common problem in daily urological practice. The lifetime prevalence of urinary tract stone disease is estimated to be as high as 10%, varying according to age, gender, race and geographic location.

The struggle with urinary tract stones had helped to define urology as a distinct discipline in medical practice. Even Hippocrates in his famous oath expressed apprehension with the procedure of stone removal. Major breakthroughs in the technology and techniques in treating urinary stones witnessed in the past three decades effectively sidelined open surgery and took treatment of urinary stones out of the hands of the occasional surgeon. A trained urologist is nowadays the only person who is well versed with all the latest technologies of urinary stone removal: from extracorporeal shockwave lithotripsy, various types of endoscopy of the urinary tract, to different devices to crack the stone under endoscopic guidance. In this issue, experienced colleagues in the Hong Kong urological fraternity describe the state of the art in shockwave lithotripsy and percutaneous nephrolithotomy, and report on recent progresses in retrograde intrarenal surgery and minimally invasive percutaneous procedures. Urologists have been treating stones all along and are still getting better.

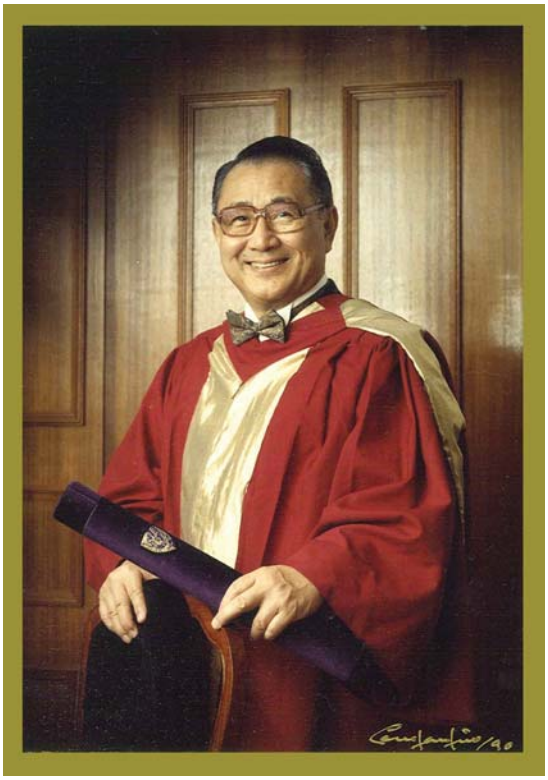
The battle of urologists with urinary stones stops of course not at its removal. Urologists deal with the myriad of emergency situations that urinary stones can bring about. Urologists tide patients over their acute problems and prepare them for further investigations and definitive treatment. Finally, when the urinary tract is clear of stones, urologists will look into any possible underlying cause for stone formation in the patient and institute measures to prevent stones from coming back. In this issue, there are articles on the work of urologists in such aspects. Urologists look after their urinary stone patients all the way.

Urologists handle different problems caused by urinary stones with various modalities of treatment day in and day out. If one gets a urinary stone, why settle for anything less?

# Our Fond Memory of The Late Professor Sir Harry Fang Sin-yang (1923-2009)

MBBS MD MCH Orth FRCS FACS FRACS FRCPE(E)

**Founding Vice President (1965-75)**
**and**
**President (1975-1979) of the Federation of Medical Societies of Hong Kong**



**Professor Sir Harry Fang Sin-yang (1923-2009)**

Professor Sir Harry Fang peacefully passed away on 24th August 2009 at the age of 86. He was the Founding Vice President of the Federation of Medical Societies of Hong Kong for ten years and the President of the Federation for four years. During his presidency, he contributed significantly to the medical and health professions as well as the community of Hong Kong. He will be greatly missed by all members of the professions and all citizens in the HKSAR.

Professor Fang received his secondary education at the Queen's College and medical education at the University of Hong Kong. He then specialised himself in Orthopaedics and dedicated himself to the teaching, clinical services, research and publication in the specialty of Orthopaedics and in the area of Rehabilitation: known to us as the Father of Rehabilitations both in Hong Kong and in the Asia-pacific Regions. He was instrumental in the developmental and nurturing of the art and science of orthopaedic surgery and devoted himself to the work and advocacy in the area of rehabilitation as exemplified by the legendary list of special schools, rehabilitation centres and vocational training centres for individuals with special needs. He was editors of many reputable peer-reviewed journals, authors and editors of more than 100 papers and book chapters. He was instrumental to the inauguration of the Hong Kong Academy of Medicine and was subsequently awarded with the Honorary Fellowship of the Hong Kong Academy of Medicine and the Honorary Fellowship of the Hong Kong College of Orthopaedic Surgeons in recognition of his outstanding contributions.

During the period when he was the Medical Superintendent of St. Paul's Hospital, he has initiated a significant series of changes endeavouring to upgrade quality of services and standard of management at the private hospitals visionally preparing the private hospitals to promote the private-public interfacing within the medical professionals which both the HKSAR Government and the medical and health services strive to achieve in recent years.

As a gentleman of high virtue and integrity, he never forgot the good education he had received from his alma mater and contributed significantly to The University of Hong Kong serving in various capacities at the top management level bringing the University to the present state ranking as one of the top institutions in the world through his great leadership and dedicated hardwork. He was also heavily involved in the inauguration of plenty of other tertiary institutions such as The Chinese University of Hong Kong, the Hong Kong Polytechnic University and many others.

In the late 1950's, Hong Kong was striving to regenerate the many community services which had either stood still or only slowly developed during the War. The medical and health services were the foremost with the return of many practitioners to resume their medical practice. Many others went for further studies and returned with specialist training and grouped together in their medical specialties. It was felt that the formation of a Federation of these groups would help them develop more properly and efficiently. The idea was first conceived by Sir Albert Rodrigues and Professor Sir Harry Fang and received enthusiastic support from the late Professor C Elaine Field, President of the Hong Kong Branch of the British Medical Association (BMA) and the late Professor G. B. Ong, President of the Hong Kong Chinese Medical Association (HKCMA) which later became our Hong Kong Medical Association (HKMA). The enthusiasm of these pioneers prevailed through the ranks of their members and the Federation of Medical Societies of Hong Kong was inaugurated on 18th February 1965 with Sir Albert and Professor Fang elected unanimously as the Founding President and

Founding Vice President of the Federation respectively. There were fourteen member societies present at the time of the First Annual General Meeting. Under their efforts throughout the first ten years, both Founding Presidents set up robust structure for the Federation and successfully published our First Issue of the Medical Directory of Hong Kong in December 1970 with Professor Sir Harry Fang as Editor-in-Chief. In order to have a visible icon for the Federation and to have a meeting place for professionals to interact, Professor Fang ably negotiated with the Hong Kong Government for land allocation and effectively raised funds for the building cost of the present Federation premises in Wanchai whereby we officially moved in by the year 1975. Through the good infrastructure built up by Professor Fang, the Federation continued to flourish to the present 127 member societies: a unique big family for all medical, dental, nursing and allied professionals in Hong Kong. This is the vision Professor Sir Harry Fang initiated and dedicated to promote. The present achievements of the Federation are fruits bearing witness to the success of his endeavours over the past four decades. Professor Fang continued to attend the Federation meetings and social functions after his Federation Presidency despite his busy commitments to both the profession and the community. He always participated at our Meetings of the Presidents, the Annual Social Dinners at the New Year Eves and the Annual Scientific Meetings during the 1991 to 2003 period and he was always popular amongst his younger colleagues by virtue of his good memory, quick wits, warm smiles, great sense of humour and visionary comments. The Federation Council and Executive Committees forever remember his innovative yet strategic advices on the policy issues and guiding directions of the Federation. His article on "Evolution of the Federation of Medical Societies of Hong Kong" published on the Monograph for the Celebration of the 30th Anniversary of the Federation in 1995 remains one of the valuable archives for our beloved Federation.

Professor Fang's blessing to the medical profession did not stop at the Federation. He had been President of the British Medical Association, Hong Kong Branch (1964-1965), President of the Hong Kong Medical Association (1966-1968), President of the Hong Kong Orthopaedic Association (1969-1971), President of the Hong Kong College of Orthopaedic Surgeons (1987-1993), President of the Hong Kong Society for Rehabilitation (1989-2002) and many others. Under his leadership at these professional organisations, he established good infrastructures and excellent functioning policies to ensure effective running for them in subsequent years. Above all, he was also patrons of many medical and health services, and subspecialty societies whereby his patronage was not only limited in names but also with close attention to the daily activities. To all these societies, he is a man of words and actions and a great gentleman of wisdoms and advices.

Besides his contribution to the medical profession, Professor Fang was a prominent community leader in Hong Kong. He had been Member of the Legislative Council (1974-1985), Executive Council (1978-1983), Chairman of the Rehabilitation Development Coordinating Committee of the Hong Kong Government (1977) and many others. For all these contributions, he had been awarded with a long list of honours and medals including the "Citizen of the Year Award of Hong Kong (1981)" and the "International Man of the Year Award (1981)" in recognition of his immense contributiions to the Community.

We are all saddened that Professor Fang had left us. To the profession, we have lost a visionary pioneer, a respected senior, a powerful mentor, a close friend and a great multi-talented colleague. To the community of Hong Kong, we shall forever remember this great leader who had devoted his lifetime to the rights, welfare and health for the citizens in our community especially for those with special needs. He had established a strong infrastructure for his successors to promote and demonstrated clear directions for his colleagues to follow. He will be eternally remembered by us all.

Professor Sir Harry Fang is survived by his wife Lady Fang Ip Hung-cho, a son and four daughters. On behalf of the medical professionals may we offer our deepest condolences to his family!

**Dr. Chok-wan CHAN**
**Federation President (1991-2003)**

# Medical Treatment of Premature Ejaculation

**Dr. Siu-king MAK**

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Dr. Siu-king MAK

*This article has been selected by the Editorial Board of the Hong Kong Medical Diary for participants in the CME programme of the Medical Council of Hong Kong (MCHK) to complete the following self-assessment questions in order to be awarded one CME credit under the programme upon returning the completed answer sheet to the Federation Secretariat on or before 31 October 2009.*

## Introduction

Premature ejaculation (PE) is a common male sexual dysfunction with a prevalence of 30%. It was estimated that 75% of men may experience PE at some point in their sexual lifetime. The inability to control the timing of ejaculation can lead to reduced confidence, increased sexual anxiety and performance anxiety. PE can exert significant distress to both the patient and his partner.

## Definition of PE

**It is not standardised. Different authorities have their own definitions.**

**DSM IV TR:** Persistent or recurrent ejaculation with minimal sexual stimulation before, on or shortly after penetration and before the person wishes it. The condition must also cause marked distress or interpersonal difficulty and cannot exclusively be caused by the direct effects of a substance[10].

**ICD10:** For individuals who meet the general criteria for sexual dysfunction, the inability to control ejaculation sufficiently for both partners to enjoy sexual interaction, manifest as either the occurrence of ejaculation before or very soon after the beginning of intercourse (if time limit is required, before or within 15 seconds) of the occurrence of ejaculation in the absence of sufficient erection to make intercourse possible. The problem is not the result of prolonged absence from sexual activity[11].

**International Society for Sexual Medicine:** A male sexual dysfunction characterised by ejaculation which always or nearly always occurs before or within approximately 1 minute of vaginal penetration; the inability to delay ejaculation on all or nearly all vaginal penetrations; and negative personal consequences, such as distress, bother, frustration, and/or the avoidance of sexual intimacy[7,12,15].

**EAU Guidelines:** The inability to control ejaculation for a "sufficient" length of time before vaginal penetration. It does not involve any impairment of fertility when intravaginal ejaculation occurs[13].

**AUA Guidelines:** Ejaculation that occurs sooner than desired, either before or shortly after penetration, causing distress to either 1 or both partners[14].

**International Consultation on Urological Disease:** Persistent or recurrent ejaculation with minimal stimulation before, on, or shortly after penetration and before the person wishes it, over which the sufferer has little or no voluntary control, which causes the sufferer and/or his partner worry or distress[15].

## Physiology of PE

**Ejaculation** is a spinal reflex under supraspinal control. It is a sequential process composed of emission and expulsion. The **emission** phase involves the secretion of seminal fluid from the prostate and the seminal vesicles, contraction of the smooth muscles of the seminal tract from the epididymis to the prostate to transport the ejaculate, closure of the bladder neck and the internal urethral sphincter, and the ejection of sperms into the posterior urethra. **Expulsion** occurs when the semen is forcefully advanced through the urethral meatus by rhythmic contractions of the pelvic floor muscles and the bulbospongiosus muscles.

The triggers for ejaculation include tactile stimulation of the glans penis and various supraspinal stimuli. The neural control network for ejaculation involves specific spinal, supraspinal and peripheral enural pathways. Regulation of the ejaculatory reflex at the level of the spinal cord requires several neurotransmitters that include 5-hydroxytryptamine (5-HT), dopamine, acetylcholine, adrenaline, neuropeptides, oxytocin, gama aminobutyric acid (GABA) and nitrous oxide (NO). Their exact role are still yet to be defined but they coordinate the sympathetic, parasympathetic and somatic nervous system.

One of the most investigated neurotransmitter in sexual behaviour is **5-HT**. 5-HT neurotransmission is locally regulated by the 5-HT transport re-uptake system. As 5-HT is released, the transport system is activated to remove 5-HT from the synaptic cleft and thus avoiding over-stimulation of the post-synaptic 5-HT receptors. PE might be associated with the presence of lower synaptic levels of 5-HT especially in the ejaculatory modulation region of the CNS.

Assessments of PE include measurements of the **Intravaginal ejaculation latency time (IELT)** and the **Patient reported outcomes (PROs)**. IELT is an objective prospective measurement at-each-coitus using a

stopwatch handled by the female partner[17]. PROs assess the subjective components of PE that include control over ejaculation, satisfaction with intercourse, interpersonal distress or difficulty, and the patient's perception. PROs address both the observable and non-observable aspects of the condition included in the definitions. PROs are typically evaluated by self-completed questionnaires such as the Premature Ejaculation Profile (PEP).

PE can be classified as either a "**Life-long**" condition (from onset of the first sexual encounter) or "**Acquired**" condition that develops after an interval of normal sexual function. In life-long PE, there is a potentially biological component due to an inherited hyper/hyposensitivity of central 5-HT receptors. In acquired PE, there is a predominant psychological component that is related to stress or situational factors. It may be associated with erectile dysfunction. The newer third type "**Nature variable**" PE is rather a normal variation in sexual performance. And lastly, "**Premature-like Ejaculatory Dysfunction**" is a man who complains of PE despite the fact that his ejaculation time is within the normal range, i.e. 3-6mins or may even be of very long duration.

## Current Treatment Options for PE

Behavioural, cognitive, and sex therapy are the first line treatment for "Acquired", "Nature variable" and "Premature-like Ejaculatory Dysfunction". An integrated approach, including a combination of psychological/behavioural and pharmacologic treatments, may be most effective because this combined strategy would address both the psychological and physiological dimensions of PE. Behavioural, cognitive, and sex therapy approaches have been used to treat PE. Although these strategies have demonstrated some short-term success, they are associated with substantial relapse[1]. Pharmacological therapy can be the first line treatment for "Life-long" PE. However, up to this moment, there are no pharmacological therapies solely indicated and approved for treating PE. Current available pharmaceutical therapies for PE involve the off-label use of serum serotonin reuptake inhibitors (SSRIs), phosphodiesterase type 5 inhibitor (PDE5i) and topical anaesthetics. New agents being designed for on-demand treatment of PE include dapoxetine and tramadol.

## Conventional Agents

The use of **long-acting SSRIs** to treat PE is based on the observation that a common side effect of these drugs when used for the treatment of depression is delayed ejaculation. The proposed neurological action following long-term administration of SSRIs is more serotonin release into the synapse, stronger enhancement of serotonin neurotransmission and consequently stronger activation of postsynaptic 5-HT receptors. Clinically observed ejaculation delay can only occur after 1-2 weeks of regular intake. The daily dose of SSRI for treatment of PE is paroxetine (hydrochloride) hemihydrate 20-40mg, clomipramine 10-50mg, sertraline 50-100mg, fluoxetine 20-40mg or citalopram 20-40mg.

However, long-acting SSRIs have been associated with a number of **unwanted sexual side effects** including lose of libido and erectile dysfunction[1] and abrupt cessation of these agents may lead to the **discontinuation syndrome**[2]. This is characterised by symptoms such as tremor, shock-like sensation when turning the head, dizziness, nausea or vomiting, fatigue, and headache[16]. Therefore, patients taking an SSRI should be advised not to stop taking the medication abruptly. Further, SSRIs should not be prescribed to men aged <18 or men known to have a depressive disorder, particularly when associated with suicidal thoughts. Although daily use of an SSRI for PE treatment is efficacious and safe, its clinical use is still limited by an absence of approval for this indication by the US Food & Drugs Agency (FDA).

**Topical agents** that can desensitise the penile skin have been used for the treatment of PE[3]. They incluse lidocaine spray, lidocarine/prilocaine-based cream[4] or spray (TEMPE spray)[5], or the herbal-derived SS-cream[6]. Although topical agents are simple to use, their applications are limited by side effects of penile anaesthesia and even female partner vaginal numbness if the agent is not confined by a condom.

**PDE5is** have been evaluated for use in PE. A recent meta-analysis concluded that there is little evidence for their efficacy in the treatment of PE, except in patients with comorbidity of ED[7,12,15].

## Newly Developed Agents

**Dapoxetine** is a new "designed-for-purpose" agent, currently in development for the treatment of PE, and which may address the shortcomings of existing pharmacological therapy. It has been approved for use on PE in Sweden, Finland, Portugal, Austria and Korea. 24 phase I trials, 2 phase II trials and 5 phase III trials have been conducted worldwide.

### *Mechanism of Action*

Dapoxetine is a new short-acting SSRI in development for the on-demand treatment of PE. It is believed to delay the timing of ejaculation via modulation of the expulsion reflex at a supraspinal level[8,9].

### *Pharmacology*

Dapoxetine, or (+)-(S)-N,N-dimethyl-(a)-[2-(1-naphthalenyloxy)ethyl]- benzenemethanamine hydrochloride, is a water-soluble white powder with a molecular weight of 341.88, a pKa of 8.6, and an absolute bioavailability of 42%

Following oral administration of a single dose, peak plasma concentrations were reached with dapoxetine 30 and 60 mg, respectively, at 1.01 and 1.27 hours postdose. This abrupt rise in plasma concentrations has been shown to prolong intravaginal ejaculatory latency time (IELT) in the absence of 5-HT1a receptor desensitisation, which is an important factor in the ejaculation-delaying effects produced by other long-acting SSRIs.

### *Dosage and Administration*

Following a single dose, mean (standard deviation) IELT increased from 0.9 minute at baseline to 2.05 (3.02)

and 2.41 (3.82) minutes with dapoxetine 30 and 60 mg, respectively (vs 1.38 [1.84] minutes with placebo; P≤ 0.0006 for both). Although dapoxetine is intended to be taken 1 to 3 hours prior to anticipated intercourse, significant increases in mean IELT have also been seen with doses taken 0.5 to 1 hour, 3 to 4 hours, and more than 4 hours before sexual activity. Elimination of dapoxetine is rapid and biphasic, with initial half-lives of 1.31 and 1.42 hours following oral administration of dapoxetine 30 and 60 mg, respectively; plasma levels typically fall to less than 4% to 5% of peak concentrations 24 hours after dosing. Unlike long-acting SSRIs, the pharmacokinetics of dapoxetine is not affected by multiple dosing. After 6 days of daily treatment, plasma concentrations decreased to less than 7% of peak levels within 24 hours of taking the last dose. Daily dosing of dapoxetine resulted in only modest accumulation.

### *Drug Interactions*

The pharmacokinetics of dapoxetine 60 mg was found to be similar among young (ages 18-45 years) and elderly (age >65 years) men. The consumption of a high-fat meal demonstrated only a modest effect on the pharmacokinetics of dapoxetine. Following a **high-fat meal**, peak plasma concentrations decreased by 11% and time to peak concentration was delayed, whereas elimination kinetics was not affected. Consumption of **alcohol** before taking dapoxetine did not appear to impair the pharmacokinetics of dapoxetine. Co-administration of dapoxetine may alter the effects of ethanol on some cognitive and subjective measures, such as dizziness, drowsiness, slow reflexes, and impaired judgement. Similarly, dapoxetine has no clinically important pharmacokinetic interactions with PDE5is, including tadalafil or sildenafil. The co-administration of dapoxetine and **tamsulosin** was not found to alter the pharmacokinetics of either drug or the orthostatic profile of tamsulosin.

### *Adverse Effects*

Nausea (15.3%), dizziness (10.2%), headache (8.1%) and diarrhoea (6.1%) are top reported adverse effects[19]. They were mild to moderate in severity and occurred within the first 4 weeks of treatment.

### *Tramadol*

Tramadol is a central acting analgesic agent that combines u-opioid receptor activation and reuptake inhibition of serotonin and noradrenaline. **On-demand** use of tramadol 50mg (taken 2 hours prior to coitus) was associated with a clinically relevant ejaculation delay in a double-blind, placebo-controlled study on men with PE[18]. The most common adverse effects were nausea (15.6%), vomiting (6.2%) and dizziness (6.2%). However, further long-term follow up studies are needed to evaluate the risk of opioid addiction with this drug.

## Conclusion

Long-acting daily SSRIs have been very effective and are still the best treatment option for life-long PE. Significant adverse effects from daily SSRIs treatment can contribute to poor drug compliance. Topical agents are simple treatment options but they have never gained popularity among men with life-long premature ejaculation. Newer short-acting on-demand agents like dapoxetine have been developed to treat PE as the main indication and have shown in multiple phase III trails to prolong IELT and improve PROs. However, there is no randomised, double-blind, placebo-controlled trial directly comparing the potency of this short-acting on-demand agent and long-acting daily SSRIs. Long term follow up studies are also required to evaluate the safety use of opioid analgesic agents for PE.

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## MCHK CME Programme Self-assessment Questions

**Please read the article entitled "Medical Treatment of Premature Ejaculation " by Dr. Siu-king MAK and complete the following self-assessment questions. Participants in the MCHK CME Programme will be awarded 1 CME credit under the Programme for returning completed answer sheets via fax (2865 0345) or by mail to the Federation Secretariat on or before 31 October 2009. Answers to questions will be provided in the next issue of The Hong Kong Medical Diary.**

**Questions 1-10: Please answer T (true) or F (false)**

1. **premature ejaculation is the result of prolong abstinence from sexual activity**
2. **epididymis is involved in the emission phase of ejaculation**
3. **premature ejaculation may be associated with lower synaptic level of 5-HT**
4. **IELT is an subjective estimation of control over ejaculation**
5. **Life-long premature ejaculation is more likely to have psychological cause**
6. **Sexual therapy for acquired premature ejaculation has substantial relapse.**
7. **Delay ejaculation usually occur within two days of intake of long acting SSRI**
8. **Long acting SSRI is known to cause erectile dysfunction**
9. **There is good evidence that PDE5I can help PE even in patients without ED**
10. **Dapoxetine is intended to be taken 1 to 3 hours before anticipated intercourse**

## ANSWER SHEET FOR OCTOBER 2009

**Please return the completed answer sheet to the Federation Secretariat on or before 31 October 2009 for documentation. 1 CME point will be awarded for answering the MCHK CME programme (for non-specialists) self-assessment questions.**

# Medical Treatment of Premature Ejaculation

**Dr. Siu-king MAK**

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*Andrology Section, Hong Kong Urological Association*

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Contact Tel No.:_____ CDSHK No.: _____

## Answers to September 2009 Issue

**Adult Respiratory Distress Syndrome: Challenges and Triumphs**

**1. F 2. T 3. T 4. F 5. T 6. F 7. F 8. T 9. T 10. F**

# Extracorporeal Shock Wave Lithotripsy

**Prof. Chi-fai NG**

MBChB(CUHK), FCSHK, FRCS(Ed), FRCSEd (Urol), FHKAM(Surgery)
*Professor, Division of Urology, Department of Surgery, The Chinese University of Hong Kong*

Prof. Chi-fai NG

## Introduction

The introduction of extracorporeal shock wave lithotripsy (ESWL) in the early 1980s revolutionised the treatment of urolithiasis and provided an apparently near-ideal minimally invasive procedure. Shock waves that are generated by a source external to the patient propagate through the body before being focused on a kidney stone. These waves cause stone fragmentation directly by producing mechanical stress or indirectly by collapsing of cavitation bubbles formed by the negative pressure in their trail. The initial result of ESWL was promising, with a greater than 90% success rate achieved.[1] Although the subsequent development of ESWL has been less satisfactory, it remains the most commonly performed procedure to treat stone disease.

## History

Shock waves are high-energy pressure amplitudes generated in fluid media, such as air or water, by an abrupt release of energy within a small space. The waves propagate according to physical laws of acoustics, and are transmitted through the media with low attenuation. The interest in shock waves started from a military programme. In the 1950s, Dornier, a German aerospace firm, took note of the different degrees of injuries sustained by crewmembers inside a tank turret after the tank was hit by a shell. This phenomenon was attributed to the relationship of each crewmember's position as it related to the entry point and distribution of shock waves throughout the tank turret. An unusual pattern of metal fatigue in aircraft was also observed and was thought to be caused by the previously unrecognised effects of shock waves. It was postulated that shock waves produced by supersonic aircraft were being focused inadvertently by the contours of one part of the plane's fuselage onto another part of the plane, which resulted in the acceleration of metal fatigue. To explore these propositions, Dornier established a programme to develop a system for the production of reproducible focused shock waves. In subsequent investigations, an engineer noted the effect on biological tissue (pain as from an electrical shock) when in contact with the shock wave set up. This phenomenon led to further investigation of the effect on biological structures. Thereafter, the idea of using focused shock waves to fragment human kidney stones arose, and a grant from the German government was obtained. In the early 1970s, an experimental programme was set up in Munich, led by Chaussy and colleagues. After 10 years of continuous efforts in in vitro and animal research, the first human trial of shock wave therapy on a renal stone was performed in February 1980. 1 The success of this human trial opened up a new chapter in minimally invasive surgery for urolithiasis.

## Basic Principle of ESWL

Every lithotriptor contains three essential components - the generator and focusing system, the coupling system and the imaging system. The generator is the heart of a lithotriptor: it is the source of shock waves. There are several commonly used mechanisms for shock wave generation, including electrohydraulic, electromagnetic and piezoelectric mechanisms. In order to focus the shock wave into a small target zone for more effective stone fragmentation, a focusing mechanism is needed. Depending on the type and configuration of shock wave generators, there are several focusing systems - ellipsoid reflecting surface for electrohydraulic generator, converging acoustic lens for planar electromagnetic generator etc. Finally, the imaging system, either fluoroscopy or ultrasound, will help to locate the target stone and position it into the focal zone of the generator.

## Current Applications of ESWL in the Management of Urolithiasis

Theoretically, all stones can be treated by ESWL. However, due to better understanding of the limitations of ESWL and the improved outcomes of competing endourological procedures, ESWL is best applied in certain selected situations. The ideal situation will be a stone of size less than 2cm presenting in a normal urinary tract.

Absolute contraindications for ESWL include uncontrolled urosepsis, uncontrolled hypertension, distal obstruction for stone passage and pregnancy. There are also some situations, either related to the stone or to the patient, that are relatively not suitable for ESWL. Stone burden greater than 2 cm size will have higher retreatment rate and auxiliary procedure rate. It may also result in the steinstrasse (stone street) due to the production of large amount of small fragments causing ureteric obstruction. (Figure 1) Cystine stone is well known for its resistance for ESWL, and therefore, it is not advisable to offer ESWL to someone with known cystinuria.[2]

Patient's factors that are relatively less favourable for

ESWL include obesity and abnormal renal anatomy. Due to the limitation of the geometric configuration of machine generator and focusing system, it may be sometimes difficult, if not impossible, to put the stone into the focal zone of the generator. Congenital urinary tract conditions, including horseshoe kidney, ureteropelvic junction obstruction, calyceal diverticulum etc, may affect the drainage of the urinary tract and result in suboptimal outcome. Unfavourable lower caliceal anatomy, such as a narrow or long infundibulum, or an acute infundibulopelvic angle, may lead to poor clearance of stone fragments and therefore alternative treatments may be preferred.[3] Also there are evidences suggesting that elderly patients may have poorer treatment result and also have higher complication rate.[4]

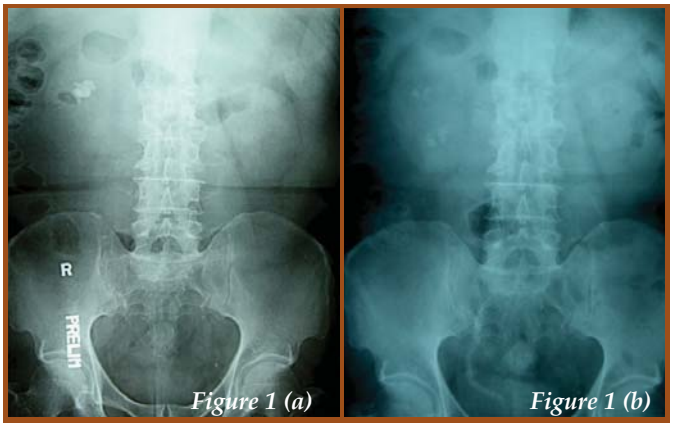


*Figure 1 (a) a stone larger than 2 cm treated with ESWL (b) steinstrasse formed at the lower ureter*

## Perioperative Management of ESWL and Ways to Improve Treatment Outcomes

After deciding to treat a patient with ESWL, urine culture should be done to rule out active infection. If the patient is on aspirin, other anti-platelet or anticoagulants, they should be stopped prior to the procedure to prevent bleeding complications. For aspirin, it should be stopped for at least 5 days.

The patient should avoid a full meal before ESWL. A single dose of antibiotic prophylaxis may be given to decrease the chance of infection.[5] In the original HM3 lithotriptor, general anaesthesia was almost always necessary for pain control during ESWL. Nowadays, with the newer generations of lithotripters, most of the patients can be treated under simple analgesia and sedation. This makes the procedure more convenient and comfortable. However, in a retrospective review of the treatment outcome of patients having renal or proximal ureteric stones, patients who received general anaesthesia (87%) had a significant better stone-free rate at three-month than those received intravenous sedation alone (55%). ($p< 0.001$)[6] In fact, treatment outcome could also be improved by giving more analgesia during treatment, in additional to a single dose of analgesic premedication.[7] The reason for this difference in treatment outcome is probably related to the pain induced patient movement. Therefore, more liberal use of analgesia will help to improve the treatment result.

The target stone will then be located by either fluoroscopy or ultrasound, and then positioned into the focal zone of the machine. Nowadays, most of the machines are using water cushion ("Dry head") for transmission of shock waves into the patient's body (coupling). Studies have shown that adequate application of gel between the cushion and body and avoid the trapping of air bubbles in between will improve the efficacy of shock wave transmission. [8]

Although ESWL is well known for its minimally invasiveness, there are still some associated complications. One of the major complications is vascular injury resulting in haematoma formation. Although the incidence of clinically significant haematoma was reported to be less than 1 %, up to 20-25% of patients would have some degree of haematoma as detected by imaging after ESWL.[9] In a porcine model, Willis et al had demonstrated by starting treatment at a lower energy level for at least 100 shocks, the size of vascular lesion would be significantly decreased.[10] The protective effect of this prophylactic shock is probably related to the shock wave-induced vasoconstriction that could limit the development of haematoma. Therefore, it is recommended to start the first 100 shocks at about half of the maximal energy level for patients with renal stones.

In the initial development of ESWL, it was noticed that uncoordinated release of shock waves would result in cardiac arrhythmias. Therefore, in HM-3, shock waves were delivered at a rate synchronised with the patient's electrocardiogram, i.e. shock wave only fired during the refractory period of the ventricular cycle. As a result, the shock wave delivery rate was typically around 60-80 per minute in most cases. The disadvantages of this slow shock wave delivery rate were longer procedure time and longer exposure to sedation/anaesthesia. Electrical artifacts due to patient movement sometimes would also affect the treatment. In the subsequent development of second and third generation lithotripters, it was noticed that ungating the shock wave from ECG would rarely, if ever, result in any cardiac complications. Thereafter, in most centres shock waves are delivered at a rate of about 100-120 shocks per minute.[11] However, there are increasing evidence suggesting that slower shock wave delivery rate will result in better stone treatment results and the effects are particularly obvious for patients with stones more than one cm in size.[12] Therefore, a slower shock wave rate should be used especially in patients with bigger size stones.

Vital signs, including blood pressure, pulse, oxygen saturation, should be monitored during the procedure. High blood pressure may increase the risk of haematoma formation. Therefore if the blood pressure cannot be controlled by adequate analgesics or simple antihypertensive, treatment should be stopped. Usually the stone will be treated till the recommended energy amount or till the stone is not visible by imaging. After the completion of treatment, usually the patient will be monitored serially to assess the fragmentation result and also the stone fragment clearance. Traditionally, we monitor the passage of stone fragments after ESWL and see whether any further treatment is needed for our patients. Studies suggested that the use of alpha-adrenergic blocker might help to speed up stone passage, minimise analgesic demand and also decrease incidence of steinstrasse.[13, 14] Therefore, a short course of alpha-adrenergic blocker can be prescribed as an adjunct treatment after ESWL.

## Complications of ESWL

Immediate complications include stone fragment related complications such as ureteric colic and steinstrasse. Other complications include haematuria, haematoma formation and adjacent organ injury. There are still some controversy about the long-term complications of ESWL, including increased incidence of new onset hypertension in the elderly[15] and new onset diabetes.[16] Further prospective studies may be needed to assess the long-term sequel of ESWL.

## Other Applications for ESWL

In addition to being one of the first-line treatments for urolithiasis for the past two decades, shock waves have been used in other branches of medicine. Other stones that can be fragmented by shock waves include bile duct stones[17,18] and pancreatic and salivary gland stones.[19] Shock wave therapy for gallstones is not effective, however, because of their tendency to multiply and their frequent recurrence secondary to underlying gall bladder dysfunction.[18]

Shock waves are also used for treatment of other urological conditions, including Peyronie's disease[20,21] and chronic pelvic pain syndrome.[22]

Lastly, shock wave therapy is frequently employed by orthopaedic surgeons in the management of conditions such as tendinosis calcarea, epicondylitis humeri radialis, plantar fasciitis, delayed bone healing, and nonunion of long bones. [23, 24, 25]

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# Percutaneous Nephrolithotomy

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## Background

Percutaneous extraction of renal stone - properly termed percutaneous nephrolithotomy (PCNL) - had been invented over three decades ago. Fernstrom and Johansson (1976)[1] first reported the formation of a percutaneous track for the specific purpose of subsequently removing an intrarenal stone. This technique was rapidly taken up by other centres, with Alken et al (1981)[2] and Wickham et al (1981)[3] further demonstrating the effectiveness and safety of the procedure in disintegrating and clearing not just small stones in renal pelvis. It has since evolved and been refined with the development of purposely designed instruments, endoscopes and accessories, and has remained a standard treatment for different varieties of renal stones since the eighties.

PCNL can be in short for nephro-lithotomy or nephro-lithotripsy: 'lithotomy' meaning removal of stone, and 'lithotripsy' meaning shearing or fragmentation of stone. Different urologists may have their own preferences and variations of the basic operative technique. The standard method should be one that has been most researched and tested, that can be safely applied under all circumstances, that consistently produces optimal and reproducible results, and of paramount importance, that can be taught and learnt easily.

## Clinical Applications

PCNL can practically be applied to most, if not all, renal stones. It is the preferred treatment for obstructive stones that have long been impacted or stones that are deemed too big (>1.5 cm) to be optimal for extracorporeal shock wave lithotripsy (ESWL), because percutaneous removal has less infective and obstructive complications and more effective stone clearance. In a prospective randomised trial of ESWL versus PCNL for lower pole nephrolithiasis, Albala et al[4] suggested that lower pole calyceal stones larger than 1 cm are better treated by primary percutaneous removal, as this offers the best chance of rendering patient stone-free after one single procedure. PCNL can also be applied to stones in calyceal diverticulum (Fig 1), horseshoe kidney, transplanted kidney (Fig 2a-f), and in children, though these are challenging situations where substantial technical difficulty would be expected.

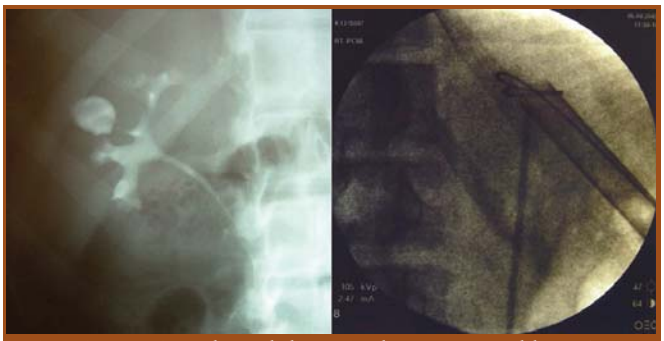

*Fig.1 Stones in calyceal diverticulum, removed by PCNL*

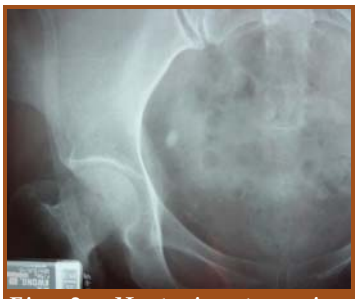

*Fig. 2a Ureteric stone in transplanted graft kidney*

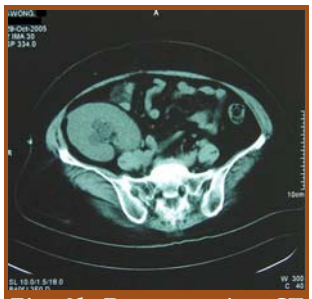

*Fig. 2b Pre-operative CT mandatory to find access for puncture*

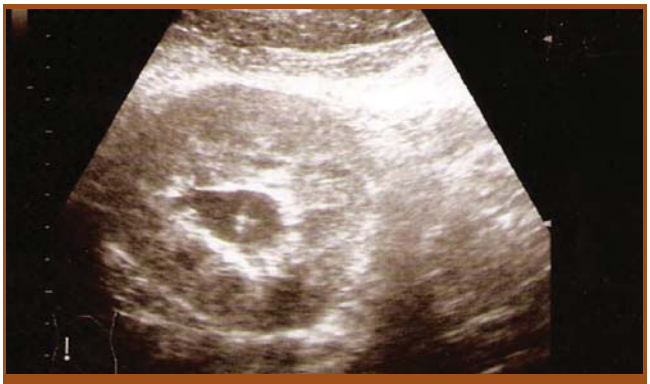

*Fig. 2c Percutaneous puncture under ultrasound guidance*

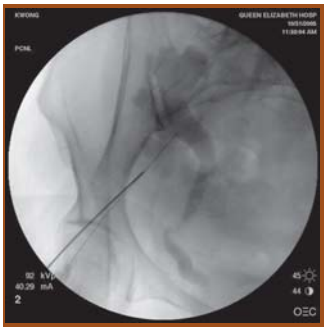

*Fig. 2d C-arm imaging of percutaneous puncture*

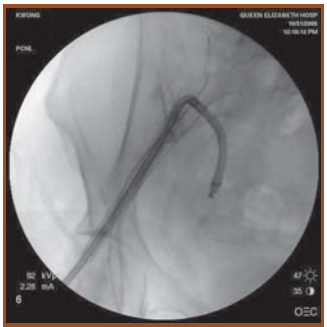

*Fig 2e Antegrade ureteroscopy using a flexible cystoscope*

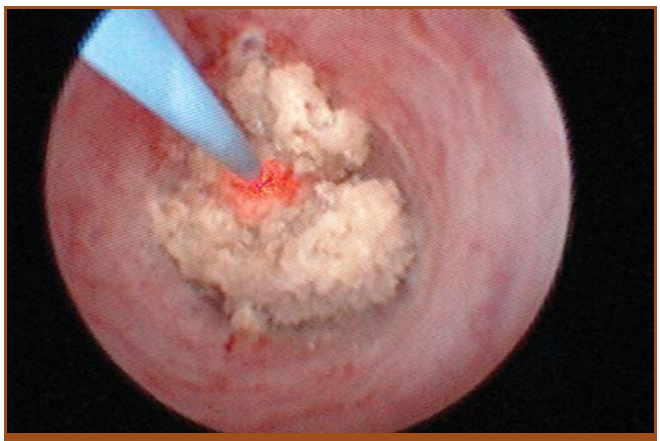

*Fig. 2f Stone pulverised by holmium laser*

Staghorn calculi are complex, infective, and often large renal stones filling both centrally the renal pelvis and peripherally the calyces. Initial experiences with ESWL or PCNL monotherapy were poor. They are now best treated by a combined endourological approach - PCNL followed by adjuvant ESWL - in order to reduce the rates of infection, sepsis, haemorrhage requiring transfusion, pleural complications associated with multiple percutaneous tracks, and residual stone fragments, with the ultimate aim of preserving renal function in the long term. The AUA Nephrolithiasis Guidelines Panel has in fact suggested that the primary treatment modality for most patients with staghorn calculi should be percutaneous stone removal followed by shock wave lithotripsy and/or repeat percutaneous procedures as warranted[5]. The Panel emphasised that the first part of combination therapy should be percutaneous debulking, to remove largest stone burden possible starting from the part centrally located in renal pelvis. This is followed by adjuvant shock wave lithotripsy to the hopefully small residual peripheral burden in the calyces (Fig 3), and a 'second look' percutaneous procedure via the mature track to hasten clearance of post shock wave stone fragments, generally referred to as 'sandwich therapy' [6].

PCNL is contraindicated if patient has uncorrectable coagulopathy. Antiplatelet medications like aspirin should be discontinued 7 days before operation.

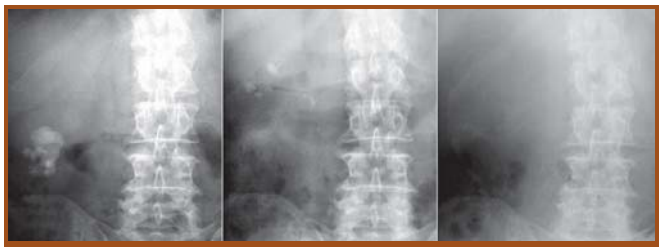

*Fig. 3 Staghorn stone, treated by debulking PCNL, followed by adjuvant ESWL*

## Surgical Technique

The main limitation of PCNL is often technical, as difficulties can be encountered in getting at the stone especially in a kidney with severely distorted and undilated pelvi-calyceal system. Pre-operative urographic assessment with computed tomography is therefore helpful in planning the operation. Any urinary tract infection needs prior treatment with appropriate antibiotic, and a temporary percutaneous nephrostomy can be inserted to drain an obstructed and infected pelvi-calyceal system beforehand.

The standard operative technique of PCNL consists of three main steps:

1. percutaneous puncture of pelvi-calyceal system,
2. development of track,
3. fragmentation and/or removal of stone.

## Anaesthesia and Positioning

The PCNL operation should preferably be performed under general anaesthesia, as patients need to lie in an uncomfortable position for a relatively long duration, often up to three hours. However, if the operation is done as a staged procedure, percutaneous puncture without track dilatation or removal of simple small-burden renal stones could be done under sedo-analgesia.

Percutaneous puncture could be the most difficult step, especially when the pelvi-calyceal system is not dilated and/or the anatomy is distorted. Careful positioning of patient facilitates correct puncture of the collecting system, while at the same time protects the anaesthesised patient from inadvertent injury. The positions generally preferred for puncture are:

1. prone oblique with affected side tilted 30 degrees up, so that the posterior lower pole calyx is directed posteriorly on the vertical sagittal plane (Fig 4);
2. completely prone, with puncture performed from posterolaterally.

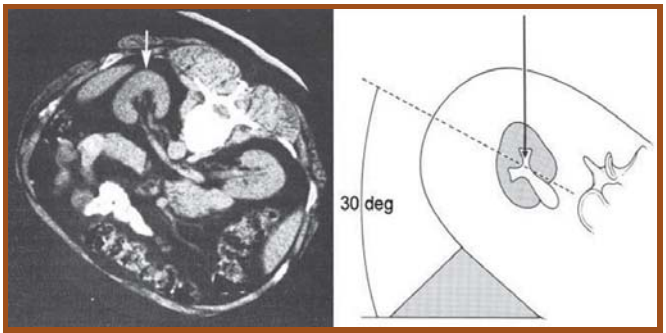


*Fig. 4 Posterior lower pole calyx in prone oblique position*

## Percutaneous Puncture

Percutaneous puncture of the pelvi-calyceal system is done with precision under the guidance of one of the following imaging techniques:

1. 1. Radiographic contrast medium, coloured blue with methylene blue, can be injected via a pre-inserted retrograde ureteral catheter to outline the pelvi-calyceal system. This provides an additional advantage of slight distension of the collecting system that may facilitate percutaneous puncture, and can be repeated as often as is necessary without any dose limitation.

2. Hydronephrotic collecting system can be punctured easily under realtime ultrasonographic guidance (Fig 5).

3. Intravenous injection of contrast medium produces a pyelogram for targeting the puncture. However delineation of the collecting system may not be optimal due to poor kidney excretion, and there is a dose limit due to nephrotoxicity of the contrast medium.

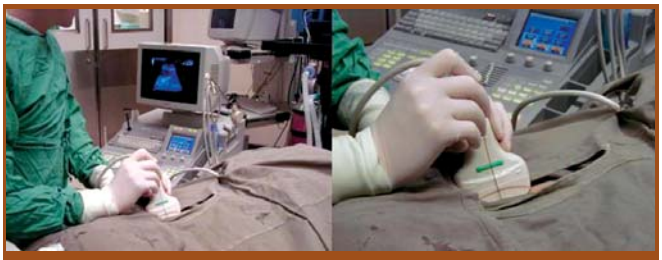

*Fig. 5 Percutaneous puncture under realtime ultrasound guidance*

Initial exploratory puncture is performed with a 21G or 22G skinny needle from below the 12th rib, targeting a posterior calyx preferably of the lower pole, aligning the direction of access with the axis of the targeted calyx and its infundibulum, aiming to traverse the minimum thickness of cortical parenchyma possible, and entering the calyx through the papilla. The depth of the advancing needle point and its relationship to the target calyx can be confirmed using C-arm fluoroscopic imaging. Rotation of the C-arm enables biplanar imaging and guidance, or the C-arm can simply be kept in the vertical plane and one judges the relative position of the needle point to the target calyx by applying the principles of parallax. Successful puncture or entry into the target calyx can be ascertained when a stream of blue-coloured fluid flows out from the needle upon withdrawal of the stylet.

A second definitive puncture is then performed with a larger 18G needle. Insertion of this needle into the target calyx enables subsequent introduction of a .038 or .035 working guidewire into the pelvi-calyceal system. It can be achieved under fluoroscopic guidance, by parallel puncture beside the initial skinny needle (Fig 6a-b), or by co-axial puncture making use of a Mitty-Pollack needle. This latter technique is particularly useful to a novice urologist.

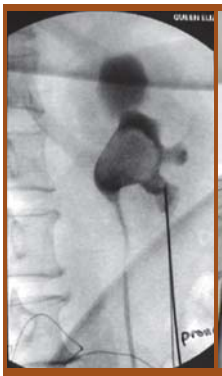

*Fig. 6a Percutaneous puncture of posterior lower pole calyx*

*Fig. 6b Parallel puncture*

Two guidewires must be inserted into the pelvi-calyceal system, the second one serving as a safety guidewire to avoid losing the track in case one guidewire accidentally slips out of the collecting system in the later part of the operation. The guidewires have less chance of being displaced from the system if they can be manipulated across the renal pelvis and passed down into the ureter (Fig 7). If this cannot be achieved, the guidewires at least have to be coiled up in the upper pole calyx (Fig 8), or less favourably in the renal pelvis. It is highly recommended that one of the guidewires has to be an Amplatz extra-stiff guidewire that has less chance of kinking or displacement during track dilatation.

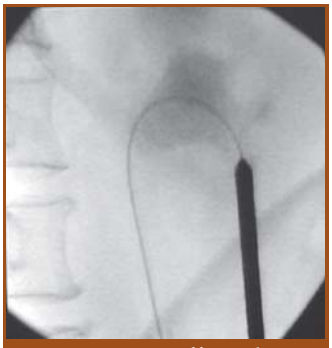

*Fig. 7 Extra-stiff guidewire passed down into ureter and track dilated with Alken dilators*

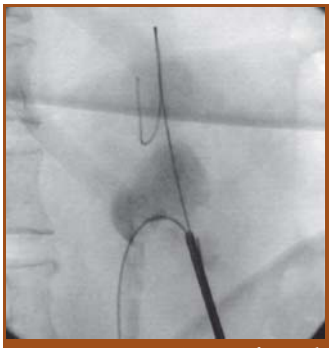

*Fig. 8 Insertion of 2nd guidewire into pelvi-calyceal system*

Additional puncture may be necessary subsequently, if there remains significant stone fragments not reachable through the primary access using either rigid or flexible endoscope (Fig 9). A supracostal puncture provides upper pole renal access that is needed when there is substantial stone burden in the upper pole calyces, or in horseshoe kidneys.

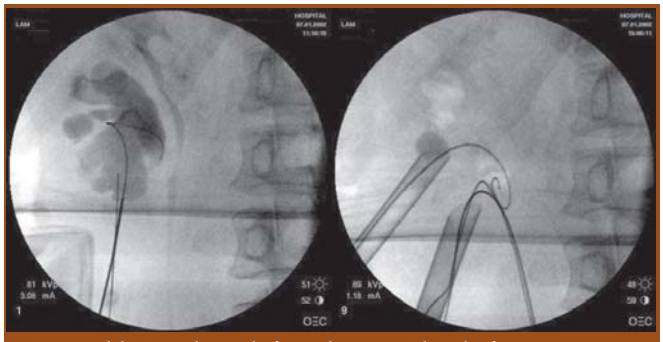

*Fig. 9 Additional track for a large mid pole fragment*

## Development of Track

The second step is to dilate a track from the skin through the renal parenchyma into the collecting system, and to place a working sheath.

Over the guidewire, fascial dilators are inserted to serially dilate the track between the skin and the renal calyx to enable subsequent instrumentation. There are 3 types of fascial dilators:

1. Amplatz teflon dilators,
2. Alken telescopic metal dilators,
3. balloon dilator.

Under fluoroscopic guidance, fascial dilators are inserted along the extra-stiff guidewire until their tips enter well into the collecting system. Serial coaxial dilatation using telescopic metal dilators over a central guide rod is better than sequential dilatation using teflon dilators, as the

former technique is faster and has much less danger of losing the track. The fastest method of track dilatation is to use a balloon dilator, as it does not require serial insertion of multiple dilators of increasing size. Its only drawback is the cost of the balloon dilator.

After dilating the track to the desired size (generally 26 to 30 Fr), an Amplatz sheath made of teflon with a lumen of the same size is slipped over the dilator and manipulated into the collecting system (Fig 10). This Amplatz sheath provides tamponade to stop any bleeding from the freshly developed track, while at the same time serves as a conduit for introducing instruments and a channel for irrigation fluid to flow out easily.

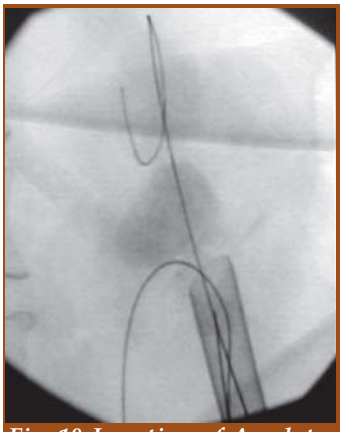

*Fig. 10 Insertion of Amplatz sheath*

## Nephroscopy and Stone Extraction

The third step is to introduce a nephroscope via the Amplatz sheath into the pelvi-calyceal system to locate the stones (Fig 11). The standard 26 Fr rigid rod-lens nephroscope with off-set eyepiece provides excellent optics and allows the use of strong rigid instruments to deal with the stones. Continuous irrigation with warm normal saline is set up to fill the pelvi-calyceal system with fluid, with inflow via the endoscope and outflow simply via the Amplatz sheath. This allows a very rapid flow to clear stone fragments and blood, and thus enables good endoscopic view. It dissipates the heat energy of mechanical lithotripsy and so minimises its potential injury. Last but not least, the importance of an effective irrigation system is to maintain a low pressure in the pelvi-calyceal system that reduces the risks of pyelo-renal reflux and its resultant fluid absorption and sepsis.

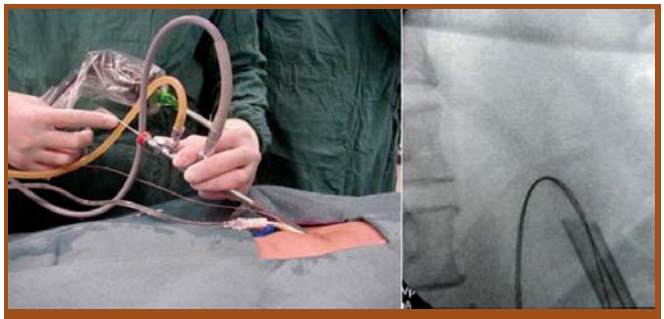

*Fig. 11 Neproscopy and extraction of stone, with C-arm flouroscopy confirming clearance*

Smaller stones can be retrieved with rigid stone forceps directly via the Amplatz sheath. Commonly preferred instruments are tripod graspers or forceps with strong alligator jaws. Larger stones have to be fragmented first using either one of the following energies:

1. ultrasonic lithotripsy,
2. holmium laser lithotripsy,
3. pneumatic lithotripsy.

The modern ultrasonic lithotriptor is particularly suitable for staghorn stones. Ultrasonic energy readily pulverises soft staghorn stones, and the resultant tiny fragments and powder are simultaneously sucked away by the hollow rigid metallic probe that delivers the energy. Holmium laser is ideal for cutting harder stones into smaller pieces.

## Post-operative Care

At the end of the operation, a percutaneous nephrostomy catheter is inserted along the track and left in place for one to two days. This temporary catheter nephrostomy provides monitoring for haemorrhage and diverts urine in case drainage down the ureter is not functioning well due to temporary obstruction by inflammatory swelling or blood clot.

The patient is only left with a wound of the size of the working sheath, that is, no more than 1 cm. However, the patient may still have some pain albeit moderate, and nausea is not uncommon. It is advisable on the first day post operation to limit oral intake to fluids, give intravenous fluid infusion, prescribe appropriate analgesic as required, and to continue antibiotic therapy. Simple uncomplicated cases can be discharged two or three days post operation.

Possible complications of PCNL include sepsis, haemorrhage requiring transfusion, traumatic arterio-venous fistula or false aneurysm, injury to adjacent bowel, failed access or failure of equipment, and with supracostal punctures, pneumothorax and pleural effusion. Major complications can occur in 1% to 7% of patients undergoing PCNL.

## Conclusion

Percutaneous nephrolithotomy has long been proven to be safe and efficacious. It is icminimally invasive surgery and is an indispensable tool in the armamentarium of urologists for the treatment of renal stones. Its indications can be extended further to include upper ureteric stones by the use of antegrade ureteroscopy, or to deal with concomitant pelvi-ureteric junction stricture by percutaneous endopyelotomy.

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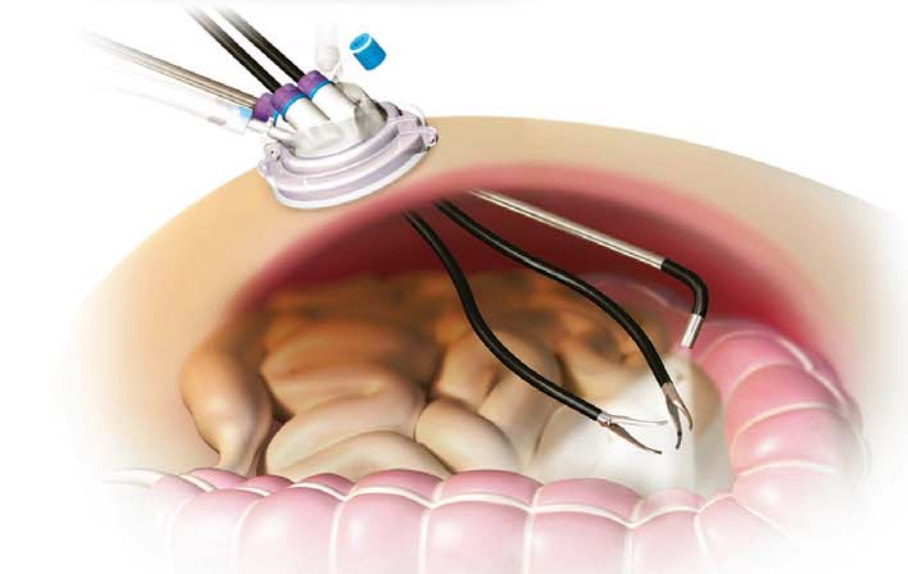

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# The New MPCNL (Minimally Invasive Percutaneous Nephrolithotomy) for Treatment of Upper Urinary Tract Stones

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## Introduction

The kidney lies deep in the retroperitoneum, but it is in fact only 7-8 cm from the skin surface if we approach it from the back. It makes sense to create a stable track/ conduit directly from the skin surface on the back to the pelvicalyceal system for stone removal. This concept formed the basis of the modern day percutaneous nephrolithotomy (PCNL).

Conventionally, a track of 1cm diameter (Fr 30) is created through which the endoscope is introduced to reach the stones, which are then broken down using mechanical, ultrasound or laser energy of the surgeon's choice. The stone fragments are then removed with forceps or grasping baskets via the track.

## Quest for a Smaller Track

While PCNL represents a great improvement compared to open stone surgery, it is in fact a "penetrating injury" to the kidney and is still associated with significant morbidity like bleeding. The need for creating a Fr 30 track was questioned as it is now clear that a larger size track is associated with more bleeding complications. As the track diameter increases two-fold, the cross sectional area affected by the track increases four-fold, and similarly for the amount of renal parenchyma that can be crushed or damaged. A smaller track with less trauma would be desirable.

In fact, percutaneous stone removal with a smaller track (Fr 12-18), had been reported as early as 1997[1]. The term "minimally invasive percutaneous nephrolithotomy (MPCNL)" was first coined by Lahme et al in Germany in 2001[2]. The challenge lies in the lack of proper endoscopes and equipment. It becomes more difficult to maintain good endoscopic view and even more difficult to remove the stone fragments as the track gets smaller. Therefore, these early reports concluded that MPCNL was technically feasible but should only be used in patients with stone load less than 2 cm, or as a secondary track in a difficult PCNL, or in paediatic patients.

## New Developments in MPCNL Techniques

However , recent reports from the Guangzhou group in China had drawn new interests in the use of MPCNL. Their approach and technique, which they coined as the Chinese MPCNL, was built on their experience on a large number of patients with stone diseases. It had evolved through many years of practice before the technique ,equipment and set up are standardised[3].

The Guangzhou group had recently reported their results of MPCNL performed from year 2001 to 2005. A total of 4760 MPCNL procedures were done in 3610 kidneys. There were 1240 staghorns and 85 ureteric stones. There were 14 transplanted kidneys and 27 cases of horseshoe kidneys. The average operating time was only 78 mins. The stone free rate at post op Day 2 was 89 %. The major complication rate was 0.86%. The mean haemoglobin drop for each MPCNL procedure was 0.88mg/dL. One important feature of this technique was kidney puncture based on pre-op imaging and intra-op tactile feedback, with minimal use of fluoroscopy. That would require a long learning curve[4].

The new MPCNL procedure was introduced in Hong Kong since 2005. Our local experience also showed that this was feasible even for staghorn stones. It achieved a comparable stone clearance rate and operating time to the standard large track PCNL. In particular, we found that there was less bleeding and less requirement for transfusion. In Hong Kong, the use of fluoroscopic guidance permitted kidney punctures with greater accuracy[5].

## Highlight of the Surgical Technique

The detailed surgical technique had been described elsewhere[6].
Highlight includes:

1) The procedure should be performed very gently.
2) The procedure should be performed using specially designed miniaturised endoscopes and equipment.
3) There is preference for intercostal skin punctures via the 11th rib space.
4) Usually a track of size Fr18 is formed, and a peel-off sheath is used for the track.
5) There is preference for punctures via the posterior middle calyx. This would permit good access of the endoscope to the ureter and different calyces.
6) A slim and compact operating rigid cystoscope or short operating semirigid ureteroscope usually of size Fr 8/9.8 is used.
7) Stone fragmentation can be achieved with a 1mm pneumatic probe (lithoclast) or with holmium laser.
8) Pressurised irrigation at a pressure of 350mmHg is required to maintain good view and for flushing out

the stone fragments. Stone removal is also facilitated by retrograde saline flushing through a ureteric catheter by an assistant.

Two example are shown to illustrate the advantage of MPCNL

In Case 1: An adult patient with a left side staghorn stone of 4.5cm. The stone was removed in one session. A middle calyceal puncture was used and the manuverability of the miniaturised endoscope was good. (Fig. 1a & 1b)

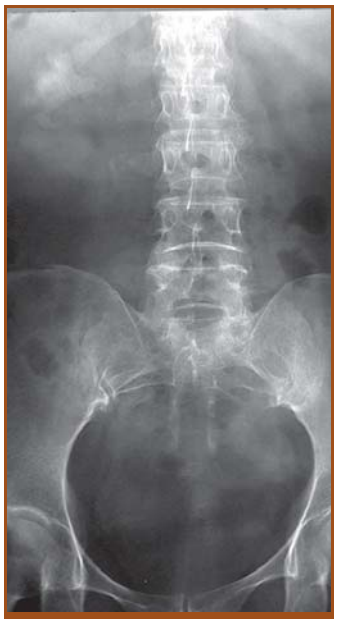

*Fig. 1a: Case 1 pre-op*

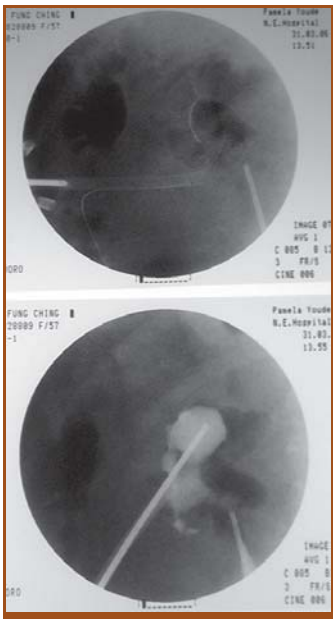

*Fig. 1b: Case 1 intra-op*

In Case 2: The patient had a 2 cm partial staghorn causing obstruction.
She had undergone retrograde flexible ureteroscopy andlasertripsy followed by multiple sessions of ESWL and was complicated with several episodes of sepsis. Standard PCNL was unsuitable due to the narrow infundibulum and pelvis. MPCNL removed all the obstructive stones at the pelvis in one session. (Fig. 2a, 2b & 2c)

*Fig. 2a: Case 2 pre-op*

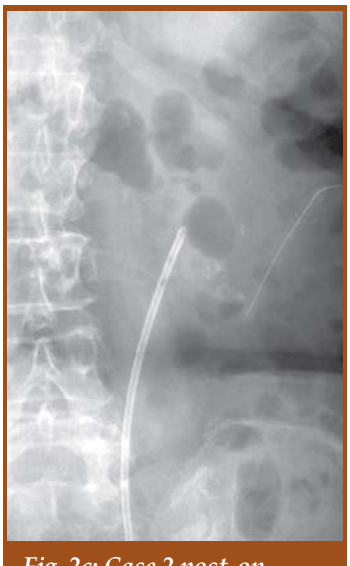

*Fig. 2c: Case 2 post-op*

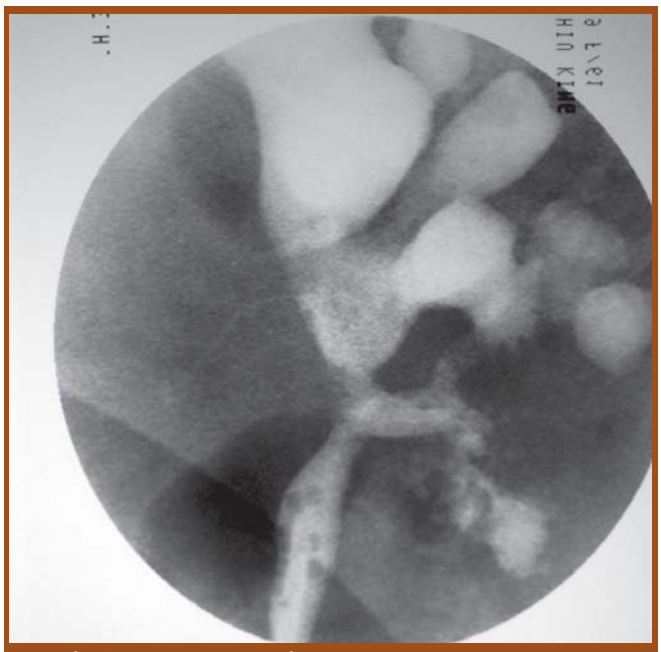

*Fig. 2b: Case 2 pre-op with contrast*

## Renal Pelvic Pressure

Realising that a renal pelvic pressure exceeding 30mmHg contributes to backflow from the renal pelvis into the bloodstream and thus bacteraemia, the Chinese group in Guangzhou conducted measurements of the renal pelvic pressure during the MPCNL procedure. With a Fr 18 track, they found that the average renal pelvic pressure during the procedure was only 11.68mmHg, and the time for such pressure to exceed 30mmHg was only 10 seconds[7]. Similar measurements were repeated in Hong Kong also shown reassuring results[8].

## Conclusion

The new MPCNL can be used in adults and can remove even large staghorn stones. It is less invasive than the standard PCNL with less risks of bleeding. It is particularly suitable in undilated systems and in those with narrow infundibula.

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# Retrograde Intrarenal Surgery (RIRS) - Ureterorenoscopic Lithotripsy for Renal Stones

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## Introduction

Ever since the first ureteroscopy performed by Hugh Hampton Young at the beginning of last century,[1] ureterorenoscopy has evolved over nearly a century from the era of happenstance to the Digital & Robotic era. This evolution culminates in the technique of retrograde intrarenal surgery (RIRS) utilising flexible ureterorenoscope and Holmium laser, which is a very effective treatment option in the Urologist's armamentarium when first-line treatment options, viz, extracorporeal shockwave lithtropsy (ESWL) and percutaneous nephrolithotomy (PCNL) failed; it would also be used as first-line treatment in selected patients.

## History

The first ureteroscopy began by happenstance.[1] Hugh Hampton Young, the "Father of Modern Urology", introduced a Fr 12 Paediatric cystoscope into the massively dilated ureter of a child with posterior urethral valve in 1912. He was able to advance up to renal pelvis and became the first Urologist to view the intrarenal collecting system of a patient endoscopically. The enthusiasm for ureteroscopy cooled down until the first breakthrough in the late 1950's with the development of the first fibreoptic endoscope. The first flexible ureterorenoscopy was performed by Marshall via an ureterotomy using a Fr 9 flexible endoscope for diagnostic purposes in 1964.[2] But then it was not until 1977 that Goodman reported the first rigid ureteroscopy for therapeutic purposes[1]; whereas Fuchs & Fuchs (1990) reported the first large series (208 patients) of renal calculi treated by flexible ureteroscopy.[3] The benchmark for contemporary RIRS using flexible ureterorenoscope and Holmium laser for treatment of renal stones was set by Grasso & Chalik in 1998[4].

## Contemporary RIRS for Renal Stones

### *Instruments*

Standard instruments for RIRS include:

- Flexible ureterorenoscope
- Holmium: yttrium-aluminium-garnet (YAG) laser
- Video camera
- Fluoroscopic support
- Accessory instruments
  - Guide-wires
  - Dilators
  - Access sheath
  - Basket
  - Ureteric catheters

### *Flexible Ureterorenoscope*

Standard fibreoptic flexible ureterorenoscopes have a tip size in the range of 6.75 - 9Fr. They are actively deflectable (primary deflection) with 120 to 170 degrees of deflection in one direction and 170 to 270 degrees in the other. Secondary deflection will be passive or active (Fig. 1); active secondary deflection allows better manoeuvrability especially in the lower pole calyx. They have working channels of Fr 3.6 - 4 and standard instruments (e.g. baskets) are Fr 2.2 - 3 in size.

*Fig. 1a Flexible ureterorenoscope with active primary & passive secondary deflections.*

*Fig. 1b Flexible ureterorenoscope with active primary & secondary deflections.*

### *Holmium: YAG Laser*

The Holmium:YAG laser is the lithotripter of choice for RIRS nowadays. It has a wavelength of 2100nm and tissue penetration of 0.4mm. The laser energy is delivered via quartz fibres to the stone surface, where it is absorbed and turned into heat energy that pulverises the stone into dust by a "photothermal" effect. Thus, stone fragment retrieval with basket / grasping forceps would not be necessary. Laser lithotripsy can be carried out safely in patients on anticoagulants.[5] The size

200micron laser fibre used in flexible ureterorenoscopy will minimise the hindrance to scope deflection (Fig 2). The usual laser setting on commencing the procedure would be 0.8J x 5 - 8Hz and then adjusted accordingly.

*Fig. 2 Holmium: YAG laser machine and laser fibres.*
*Note: 200micron laser fibre is used in RIRS to minimise hindrance to deflection.*

## Video Camera and Fluoroscopy

Accurate and clear visualisation of the ureter and pelvi-calyceal system using video camera is essential to the success of the procedure. Delineation of the pelvi-calyceal anatomy using fluoroscopy and retrograde pyelogram helps the surgeon to orientate him/herself throughout the procedure.

## Accessories

- **Guide-wires**
  The double flexible-tips guide-wire is essential for scope introduction in order to avoid damage to the flexible ureterorenoscope. Standard 0.038G PTFE-coated guide-wires would be used for the placement of ureteric catheters, introducing dilators / Access sheath and serve as safety guide-wire (Fig. 3a).

- **Dilators and Access Sheath**
  The use of Access sheath (Fig. 3b) is optional during RIRS, which would depend on the personal preference of the surgeon, stone load and pelvi-calyceal anatomy. The size of commonly used Access sheathes include Fr 9/11 and Fr 12/14. Serial Teflon dilators up to size 16 would be used for ureteral calibration and dilatation before introducing the Access sheath over guide-wire under fluoroscopic guidance.

  *Advantages* of using an Access sheath include:

  1. Facilitate repeated introduction and withdrawal of the endoscope which would be required for patients with large stone burden;
  2. Avoid build-up of pressure within the pelvi-calyceal system especially when pressurised irrigating fluid is used to improve vision.[6]

  *Disadvantages* of using an Access sheath include:

  1. Pre-stenting with double-J ureteric catheter for about 2 to 4 weeks for ureteric dilatation would be required to facilitate insertion of Access sheath especially for oriental patients with a less spacious ureter;
  2. Traumatisation of the ureter may occur during ureteral dilatation and introduction of the Access sheath.

- **Baskets / Extractors**
  Development of the tipless Nitinol basket is vital for the success of RIRS of renal stones (Fig. 3c). Tipless design avoids traumatisation of the mucosa during intrarenal manipulations. Nitinol baskets also preserve tip deflection of the flexible ureterorenoscope. Relocation of lower pole stones into renal pelvis or upper pole calyx with basket will greatly enhance the efficiency of stone fragmentation. Extraction of stone fragments via the Access sheath would be considered in patients with large stone burden. Latest designs (e.g. NGate from Cooks Medical) allow a "frontal attack" to the stones instead of the usual sideway stone entrapment.

- **Ureteric Catheters**
  Standard Fr 6 / Fr 7 open-end ureteric catheters will be used for retrograde pyelogram at the beginning of the procedure and temporary drainage post-operatively. Fr 6 / Fr 7 double-J ureteric catheters will be used for pre-stenting or temporary stenting post-op.

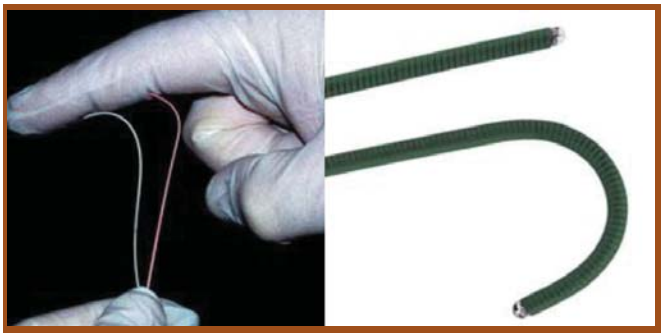

*Fig. 3a Guide-wires*
*(Left: double flexible-tips; right: PTFE-coated)*

*Fig. 3b Ureteric access sheath*

*Fig. 3c Tipless nitinol baskets*

### *Indications*

Indications of RIRS for renal stones are listed as follows:
1. Failed Extracorporeal shockwave lithotripsy
2. Radiolucent stones
3. Concomitant ureteric and renal stones
4. Anatomical problems e.g. infundibular stenosis
5. Nephrocalcinosis
6. Bleeding disorders[5]
7. Need for complete stone removal e.g. pilot

### *Pre-operative Assessment and Procedure*

Imaging assessments on stone load, stone location and pelvi-calyceal anatomy are essential before the procedure.[7] Intravenous urogram is the most commonly used imaging modality. Pre-operative retrograde pyelogram would be required for patients with impaired renal function. CT urogram is becoming more and more popular nowadays. An informed consent should be obtained including counselling on treatment options, procedure and potential complications, whereby possibilities of requiring post-op stenting, second-look procedure, auxiliary procedure and failed procedure are all thoroughly explained. Urine cultures are performed to ensure that patients have sterile urine before the procedure. Patients with asymptomatic persistent bacteriuria should be given an appropriate antibiotic for prophylaxis. Patients are put under general anaesthesia with prophylactic antibiotics administered on-induction. With the patient in Lloyd-Davis position, cystoscopy and retrograde pyelogram (RP) are performed to delineate upper tract anatomy and any stone migration before instrumentation is noted. Essential points of RIRS:

- Safety guide-wire inserted up to renal pelvis;
- Ureteric dilatation and use of Access sheath as preferred / indicated;
- Flexible ureterorenoscope "rail-roaded" up to renal pelvis over double-flexible tips guide-wire under fluoroscopic and endoscopic guidance;
- Systematic inspection of the pelvi-calyceal system to identify pathology endoscopically under saline irrigation (pressurised irrigant as required, preferably with Access sheath) and aided with fluoroscopy / RP as required;
- Commence lithotripsy with Holmium laser;
- Stone relocation / retrieval with basket as indicated;
- Assess stone clearance with endoscopy / fluoroscopy / RP;
- Placement of double-J ureteric catheter as indicated.

Post-operative ureteric stenting is optional and routine ureteric stenting after uncomplicated ureteroscopy is not necessary.[8,9,10] Indications for post-operative ureteric stenting include ureteric injury, ureteric stricture, solitary kidney, renal insufficiency and a large residual stone burden.

### *Post-operative Management and Follow-up*

RIRS for renal stones can be performed as Day-surgery in selected patients, viz, patients with stable / no co-morbidity, smaller stone burden as well as uncomplicated procedure. Continuation of antibiotics is optional, but it would be preferable in patients with long procedure / persistent bacteriuria pre-op.

Patients will usually have their first follow-up visit scheduled about 2 weeks post-op. Treatment outcome will be assessed with a KUB radio-graph or additional imaging as indicated.

## Outcome of RIRS for Renal Stones

Michael Grasso was credited for setting the benchmark of contemporary RIRS for renal stones. 228 patients were treated with RIRS in his series reported in 2000.[11] Overall success rate (stone fragment <2mm in size) was 81% after primary RIRS and improved to 90% after secondary RIRS. Best results were achieved for upper & mid-pole stones with 90% success rate after primary treatment and up to 97% success after secondary RIRS. Grasso & Ficazzola have reported their results of RIRS in treating lower pole renal calculi.[12] 101 RIRS were performed in 79 patients. Patients were analysed in 3 groups with stone sizes of 10mm or less (group 1), 20mm or less (group 2) and more than 20mm (group 3). The overall complete fragmentation rate (stone fragment <2mm in size) was 91%. Complete fragmentation rate was 94% and 95% for group 1 and 2 respectively after one session; it was 45% after one session and 82% after two sessions for group 3.

The excellent results of Grasso inspired the Lower Pole II study, which was a prospective randomised study involving 19 centres.[13] Patients with lower pole renal stones of 1cm or less were randomised to receive ESWL or flexible ureterorenoscopy (URS). 78 patients were randomised in total and 67 patients remained on protocol. Treatment outcome was assessed by non-contrast CT. Stone-free rates at 4 months follow-up were 35% and 50% for ESWL and flexible URS respectively, but the difference was not statistically significant. Overall complication rates were similar (ESWL 23% Vs URS 21%). Smith DR and Patel A have commented that the Lower Pole II study has disappointingly lower stone-free rates for both modalities than was expected from previous publications, which would be attributed to the higher sensitivity of non-contrast CT to identify small and clinically insignificant fragments.[14]

We have reviewed our local experience of RIRS for renal stones in 48 patients treated between 2004 and 2007 in our centre.[15] 45.8% of patients have failed previous ESWL; 56.3% of patients have stone sizes less than 10mm, 37.5% have stone sizes 10 - 20mm and 6.7% have stones >20mm in size. Successful outcome (residual stone fragments <4mm in size) was achieved in 62.5% of patients and half of the patients underwent Day-surgery. Minor complications developed in 2.1% of patients.

## Guidelines

ESWL and PCNL are the recommended ***primary*** treatment options for renal stones (stone size <20mm and 20mm or more respectively) in the European Association of Urology (EAU) Guidelines.[16] Flexible URS was stated as an effective treatment for ESWL refractory renal calculi (Grade A recommendation), with reported stone-free rates of 50 - 80% for calculi <1.5cm in size, while larger stones can also be treated successfully.[16] It was also stated in the guidelines that "because of the poor

results of ESWL for lower pole stones..... flexible URS could become a reliable first-line treatment for lower pole stones < 1.5 cm." Flexible URS is also an option when ESWL might be contraindicated or ill-advised (Grade C recommendation)[16] e.g. patients on anticoagulants[5], obesity[16], pregnancy[17] etc.

## Large Stone Burden

Although RIRS would be optimal for stone sizes <1.5cm, RIRS for patients with large stone burden was shown to be an effective and safe treatment option. Grasso M et al have reported their series of treating 51 patients with large stone burden (size 2cm or more).[18] Many of these patients had co-morbid conditions that precluded or complicated standard percutaneous treatment. Treatment success was achieved in 76% of patients after primary treatment and increased to 91% after secondary treatment. Three postoperative complications occurred including pyelonephritis, prostatic bleeding and a cerebral vascular accident.

Breda A et al have recently shown that planned second-look RIRS (within 15 days) was efficacious and safe for patients with large stone burden.[19] Overall stone-free rate was 93.3% with mean number of procedures 2.3 (2 - 4). 3 out of the 15 patients developed minor complications.

We have reported our limited local experience recently in 8 patients.[20] Indications included anatomical problems, failed ESWL and multiple stones. Mean stone size was 17.3mm (10 - 30) and mean number of stones was three (1 - 5). Successful outcome (fragments <2mm) was achieved in all but one patient (87.5%); 5 patients underwent Day-surgery. A minor complication developed in one patient (post-op fever).

## Complications of Ureteroscopy

A meta-analysis published by the EAU-AUA Guidelines panel has evaluated the most relevant complications of ureteroscopy - sepsis, steinstrasse, stricture, ureteric injury and urinary tract infection.[21,22] The overall complication rates reported in recent literature are 5 - 9%, with a 1% rate of significant complications. Serious complications, including renal loss and death, were rare.[16]

## Future

### *Digital Era*

In line with the high-definition era of laparoscopic surgery, ureterorenoscopy has entered the digital era recently. Humphreys MR et al have demonstrated the beauty of digital ureterorenoscopy (Fig. 4a).[23] The distal tip objective is a CMOS imaging sensor coupled to a prism, utilising light emitting diodes as the light source, which gives the surgeon superb vision within the pelvi-calyceal system (Fig. 4b&c). Further studies will be required to demonstrate whether improved vision with digital imaging in RIRS will be translated into improved outcome.

*Fig. 4a Digital flexible ureteroscope.*
*(Humphreys MR et al. J Urol 2008; 179:970 - 975.)*

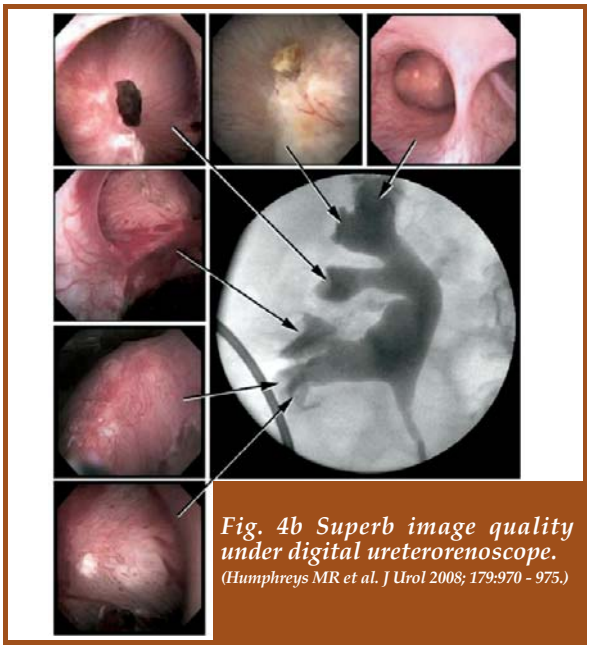

*Fig. 4b Superb image quality under digital ureterorenoscope.*
*(Humphreys MR et al. J Urol 2008; 179:970 - 975.)*

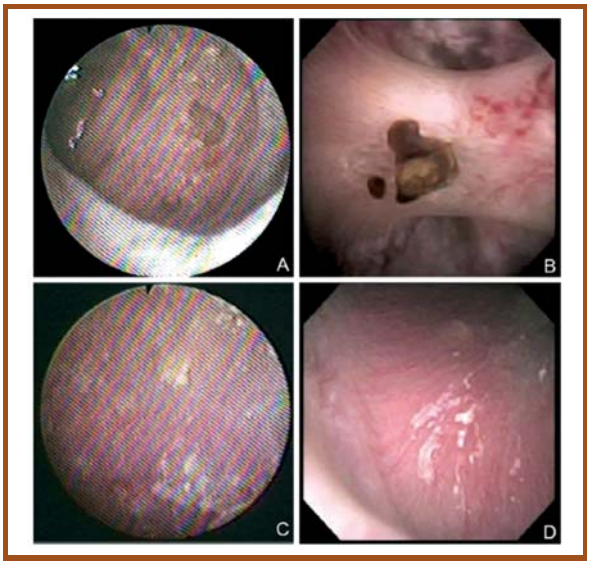


*Fig. 4c Comparison of analog to digital flexible ureteroscopic images.*
*A, conventional view of renal calculus; B, digital view of renal calculus on compound papilla; C, conventional imaging of Randall's plaque; D, digital view of Randall's plaque. (Humphreys MR et al. J Urol 2008; 179:970 - 975.)*

## Robotics

Flexible ureterorenoscopy would exert excessive strain on the surgeon who would need to keep the endoscope in deflection(s) in order to approach the target; and the operation may take hours. Robotics may be the solution to this problem. Desai MM et al have reported their ingenious design of a flexible robotic retrograde renoscopy in swine model.[24] Remote robotic flexible ureterorenoscopy was performed bilaterally in 5 acute swine (10 kidneys). A novel 14F robotic catheter system, which manipulated a passive optical fibrescope (7.5Fr) mounted on a remote catheter manipulator was used (Fig 5). The potential advantages of Robotic renoscopy compared with conventional manual flexible ureterorenoscopy include an increased range of motion, instrument stability, and improved ergonomics. The group has also reported their first human experience in the recent World Congress of Endourology & SWL in December 2008.

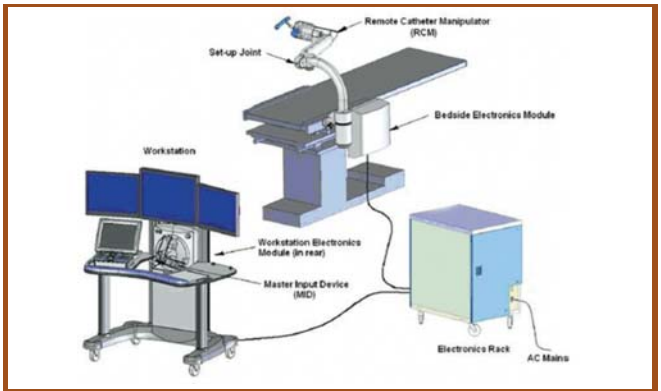


*Fig. 5a Components of flexible robotic catheter control system (Desai MM et al. Urol 2008; 72(1): 42 - 46.)*

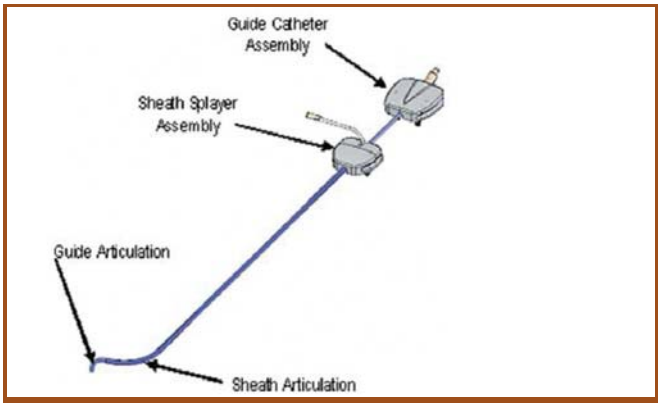


*Fig. 5b The steerable catheter system*
*Note: the steerable catheter system contains an outer catheter sheath (14F/12F) and an inner catheter guide (12F/10F). (Desai MM et al. Urol 2008; 72(1): 42 - 46.)*

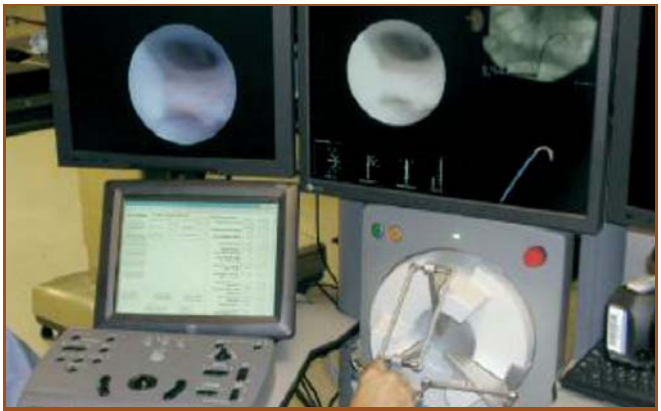

*Fig. 5c Simultaneous fluoroscopic and endoscopic view seen by the operating surgeon seated at a remote workstation.*
*Note: coloured catheter animation provides visual clue to the surgeon about direction the catheter tip is attempting to take. (Desai MM et al. Urol 2008; 72(1): 42 - 46.)*

## Conclusion

RIRS for renal stones with flexible ureterorenoscopy and Holmium laser is an effective treatment option for ESWL refractory renal calculi; it is especially useful in situations like patients with bleeding tendency or pregnancy. It has been demonstrated that treatment of patients with large stone burden is feasible, effective and safe. The future developments of RIRS would be digital imaging to improve the quality of vision and robotics to improve manoeuvrability.

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# Metabolic Aspects and Medical Treatment for Urinary Tract Stones

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## Pathophysiology of Stone Formation

Urinary tract stone formation is a complex event. The urine must be supersaturated (concentration above solubility product) with the stone-forming substances, such as calcium, oxalate, and uric acid. This can result from altered metabolism and abnormal excretion in urine. A supersaturated solution with concentration below formation product is metastable, and when the concentration exceeds the formation product, the solution is unstable and crystals will form. Citrate, magnesium, and large molecules like nephrocalcin and Tamm-Horsfall glycoprotein are all potent inhibitors of crystal growth and aggregation. Deficiency of inhibitors will increase the chance of stone formation even when the urine is in the metastable range.

Calcium stones may originate from subepithelial plaques composed of calcium phosphate crystals. They are first precipitated in the basement membrane of the thin loop of Henle and then accumulated in the subepithelial space of the renal papilla, forming the Randall plaques. The Randall plaques eventually erode through the papillary urothelium and constitute a stable anchoring surface for the growth of calcium oxalate stones. The non-crystalline components of stone account for about 2.5% of the stone by weight and are composed of a combination of mucoproteins, proteins, carbohydrates and urinary inhibitors.

## Classification of Urinary Tract Stones

Urinary tract stones can be broadly divided into calcium and non-calcium ones. Up to 75% of all urinary tract stones are calcium stones. Both uric acid and infection stones occur in approximately 10% of the time, whereas cystine stones are rare (1%). Stones associated with medications and their by-products such as triamterene, adenosine, silica, indinavir and ephedrine are very uncommon and usually preventable.

Urinary tract stones can also be differentiated based on the underlying metabolic or environmental abnormalities (Figure 1). A number of pathophysiologic derangements contribute to calcium stone formation, either alone or in combination, including hypercalciuria, hyperoxaluria, hypocitraturia, and hyperuricosuria. Uric acid, cystine, and struvite stones form in relatively unique settings: uric acid stones form only in an acid urine, cystine stones are the result of impaired renal reabsorption of cystine, and infection stones occur in alkaline urine produced by urease-producing bacteria.

| Underlying Conditions | Metabolic/Environmental Defect |
|---|---|
| *Absorptive hypercalcaemia* | |
| Type I/II | ↑ GI calcium absorption |
| Renal phosphate leak | ↓ renal phosphorus absorption |
| *Renal hypercalciuria* | ↓ renal calcium reabsorption |
| *Resorptive hypercalciuria* | Primary hyperparathyroidism |
| *Hyperuricosuric calcium stone* | Dietary purine excess, uric acid overproduction |
| *Hypocitraturic calcium stone* | |
| Isolated | Idiopathic |
| Chronic diarrhoeal syndrome | GI alkali loss |
| Distal renal tubular acidosis | ↓ renal acid excretion |
| Thiazide-induced | Hypokal·emia |
| *Hyperoxaluric calcium stone* | |
| Primary hyperoxaluria | Oxalate overproduction |
| Dietary/ enteric hyperoxaluria | ↑ dietary oxalate/ absorption |
| *Hypomagnesiuric calcium stone* | ↓ intestinal magnesium absorption |
| *Gouty diathesis* | Low urinary pH |
| *Cystinuria* | defective renal cystine reabsorption |
| *Infection stones* | Infection with urease-producing bacteria |
| *Low urine volume* | Inadequate fluid intake |

*Figure 1*

## Metabolic Evaluation

There have been lots of debates on the extent of metabolic evaluation required for patients with renal stones. An extensive metabolic evaluation may not be economically sound if it is applied to all first-time stone formers, unless the initial assessment puts them in a high-risk category for stone recurrence. The initial assessment should include a thorough medical history, including dietary and drinking habits. Patients should be screened for medical diseases that predispose them to stone diseases such as chronic bowel disease and gouty diathesis.

Baseline serum levels for blood urea, creatinine, calcium, phosphate, bicarbonate, and uric acid are checked. Urine microscopy for crystals, urine culture and pH are obtained. KUB may provide clues to the type of urinary tract stones. IVU or CT urogram is used to identify radiolucent stones and rule out anatomical abnormalities. Stone analysis is not always feasible or available, but this provides helpful information that can direct metabolic investigations and obviate the need for a more complex metabolic evaluation. For example, pure and mixed uric acid stones are strongly associated with a gouty diathesis and calcium phosphate dihydrate stones are associated with renal tubular acidosis. A more extensive metabolic evaluation, including 24-hour urine collection for volume, creatinine, calcium, oxalate and citrate, should be performed in patients with recurrent stone formation or

at increased risk for further stone formation (Figure 2) in order to identify the specific causes of stone disease and to direct a more specific medical treatment for these patients to prevent stone recurrence.

| |
|---|
| Recurrent stone formers |
| Strong family history of stones |
| Children |
| Intestinal disease (particularly chronic diarrhoea) |
| Pathological skeletal fractures and osteoporosis |
| Personal history of gout |
| Solitary kidney |
| Anatomic abnormalities |
| Renal insufficiency |
| Stones composed of cystine, urine acid, or sturvite |

*Figure 2 Indications for a metabolic stones evaluation.*

## Medical Treatment

There are short-term emergency medical management for renal colic and stone dissolution therapy, and long-term pharmacological treatment to prevent stone recurrence.

## Renal Colic

The cornerstone of renal colic management is analgesia, which can be achieved most expediently with parenteral narcotics such as morphine or non-steroidal anti-inflammatory drugs (NSAIDs). Anti-emetic agents such as metoclopramide and prochlorperazine may also be added. There is growing evidence that medical expulsion therapy (MET) can be efficacious especially for distal ureteric stones. Many randomised trials have confirmed the efficacy of MET in reducing the pain of stone passage, increasing the frequency of stone passage, and reducing the need for surgery. Tamsulosin (0.4mg daily), an α-1 selective adrenergic blocker that can relax the musculature of the distal ureter and lower urinary tract, has been the most common£\-adrenergic blocker studied. Some other studies have also demonstrated that Terazosin (4mg daily) and Doxazosin (4mg daily) are equally effective. In addition, calcium channel blockers like Nifedipine have also been shown to enhance stone passage. Overall, MET is associated with a 65% greater likelihood of stone passage.

## Stone Dissolution

Stone dissolution therapy is possible only with non-calcium stones. Uric acid and cystine stones can be dissolved by alkalinisation of the urine. Patients with uric acid stones can be treated with a combination of oral alkalinising agent, allopurinol and a high fluid intake. An oral alkalinising agent with potassium bicarbonate or potassium citrate is the preferred agent because sodium bicarbonate can lead to high sodium load. The dose should be adjusted to maintain an urinary pH between 6.5 and 7.0 to avoid the potential deposition at higher alkalinity of calcium phosphate around the uric acid stones, which would make them undissolvable. On the other hand, cystine will require for dissolution a pH of over 8, a target not achievable by oral alkali intake. Intrarenal alkalinisation may be performed under a low pressure system through a percutaneous nephrostomy tube or a retrograde catheter. Agents such as sodium bicarbonate and tromethamine (organic amine proton acceptor used as emulsifier in eye drops, not available in Hong Kong as pure agent) can be instilled directly to dissolve both uric acid and cystine stones. Likewise, after surgical removal of infective stones, residual fragments may be dissolved by urine acidification with hemiacidrin (a mixture of citric acid, gluconolactone and magnesium carbonate, not available in Hong Kong) irrigation. This agent should be employed only after urinary tract infection or colonisation has been brought under control, and careful monitoring of serum magnesium level is required.

## Stone Prevention

Over the past two decades, there has been dramatic advance in the minimally invasive and noninvasive managements of urinary tract stones. However, these surgical treatments can only remove the stones but cannot alter the course of the disease. First-time stone formers have often been estimated to have a 50% risk of recurrence within the subsequent 10 years. Long-term pharmacological treatment plays an important role to prevent stone recurrence. It is generally agreed that patients with uric acid, cystine and infection stones should always be treated pharmacologically. However, the cause of calcium stone disease is so variable that specific medical therapy should be reserved for high-risk patients.

### *Calcium Stones*

General advice about dietary and drinking habits should be reinforced for all patients regardless of the underlying cause of the calcium stone disease. The general recommendation is to maintain a high urine flow by a generous intake of fluids. The aim should be to obtain a 24-hour urine volume of at least 2 litres. Citrus juices like lemon and orange juices have long been used as an adjunct to water to provide an increased urine volume as well as increased urinary citrate excretion. Excessive consumption of animal protein increases urinary calcium, oxalate and uric acid excretion, and it is recommended that animal protein intake be limited to 0.8 to 1.0g/kg body weight per day. The daily sodium intake should not exceed 3 gm because a high consumption of sodium will increase calcium excretion by reducing tubular reabsorption. Urinary citrate is also reduced due to loss of bicarbonate and the risk of forming sodium urate crystals is also increased. Calcium intake should not be restricted as restriction probably leads to an increase in available intestinal oxalate and may subsequently increase oxalate absorption and hence calcium oxalate stone formation. The general recommendation of daily calcium requirement is 1000mg/day. Calcium supplements are not recommended except in cases of enteric hyperoxaluria, when additional calcium should be ingested with meals to bind intestinal oxalate. An excessive intake of oxalate-rich products should be limited or avoided to prevent an oxalate load. Spinach, cocoa and nuts are rich in oxalate. The intake of food particularly rich in urate should be restricted in patients with hyperuricosuric calcium oxalate stone disease, as

well as in patients with uric acid stone disease. The intake of urate should not exceed 500mg/day. Examples of food rich in urate include liver, kidney and sardine. It is anticipated that with these fluid and dietary measures alone, a significant number of patients may be able to normalise their urinary risk factors for stone formation. After 3 to 4 months of conservative management, patients should be re-evaluated for persistence of metabolic abnormalities. If the patient's metabolic or environmental abnormalities have been corrected, the conservative management can be continued and the patient should be followed regularly to monitor the efficacy of treatment and to encourage the patient's compliance. If, however, a metabolic defect persists, a more selective pharmacological therapy may be instituted.

The ideal pharmacological agent should halt the formation of calcium stones, be free of side effects and be easy to administer. These aspects are all of utmost importance in order to achieve a reasonably good compliance to the probable life-long therapy. The most commonly used pharmacological agents are thiazides, potassium citrate, and allopurinol.

*Thiazide* has a pronounced and well-documented effect in reducing the excretion of calcium in hypercalciuric patients. The hypocalciuric action of thiazide is mediated by increased reabsorption of calcium in the proximal as well as in the distal parts of the nephron. Thiazide might also decrease the excretion of oxalate, possibly by a reduced intestinal absorption of calcium. Hydrochlorothiazide can be given 50mg once or 25mg twice daily. Long-term treatment with thiazide and insufficient substitution with potassium might lead to hypokalaemia and a concomitant hypocitraturia. In addition, the effect of thiazide in reducing urinary calcium is counteracted by a high sodium intake. Long-term use of thiazide is to some extent limited by its side effects such as hypotension, weakness and impotence.

*Alkaline* citrate has been advised as the method of choice to increase the excretion of urinary citrate for patients with hypocitraturia. Citrate will form complexes with calcium. This chelation reduces the ion-activity products of both calcium oxalate and calcium phosphate. Citrate is also an inhibitor of growth and aggregation of these crystals. The alkali load also reduces the tubular reabsorption of citrate in the nephron. The simultaneous urinary alkalinisation and a high urine citrate excretion therefore favourably counteract urine crystallisation. Clinical studies indicated that potassium citrate (20 mEq twice or thrice daily) is effective in stone prevention. However, the compliance with alkaline citrate was shown to be no better than 50% due to its umpalatability, gastrointestinal upset and the high cost of the available commercial preparations.

Treatment with *allopurinol* to counteract the formation of calcium oxalate stones was introduced following the demonstration of a relationship between hyperuricosuria and calcium oxalate stone formation. Being a xanthine oxidase inhibitor, the synthesis of uric acid from hypoxantine is reduced. The effect of allopurinol on calcium oxalate stone formation may be mediated through the reduced salting-out effect, decreased risk of uric acid or urate crystals as promoters of calcium oxalate precipitation, and/or reduced excretion of oxalate. Therefore, allopurinol can be used for treating patients with hyperuricosuric calcium oxalate stone formation but it is not recommended for patients with other biochemical abnormalities. Allopurinol can be given 300mg daily with good tolerance, but severe side effects like Steven Johnson syndrome have been reported.

## *Uric Acid Stones*

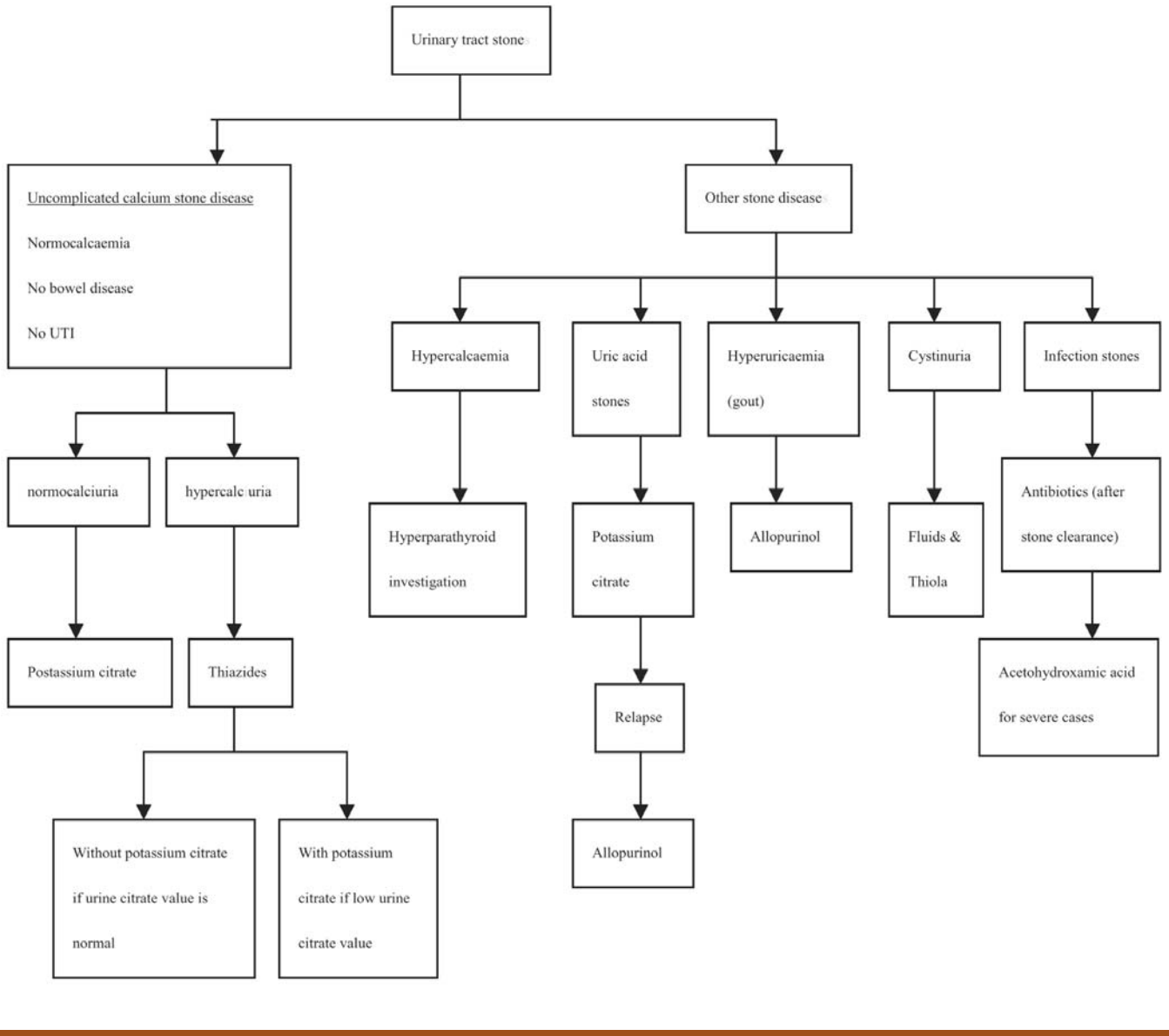
Uric acid stones form in urine highly supersaturated with uric acid. The most common urinary abnormality is a low urine pH, often occurring with a small urine volume. Patients should be advised to adequate fluid intake to maintain a 24-hour urine volume of approximately 2 to 2.5L. The intake of animal protein should not exceed 0.8g/kg/day. In addition, alkalinisation of the urine is mandatory and should preferably be carried out with potassium citrate. The pH should be increased to a level of 6.5 to 7.0. There might be a risk of calcium phosphate stone formation if the pH is raised to higher levels. A reduced excretion of urate can be accomplished with allopurinol when the 24-hour urate excretion exceeds 4mmol.

## *Cystine Stones*

There is no known inhibitor for cystine stones, and cystine stone formation is completely dependent on excessive urine cystine excretion. The objective of medical treatment is to reduce the urine concentration of cystine to below its solubility limit of 200 to 300mg/L. This requires a high fluid intake to attempt to produce a 24-hour urine volume of at least 3 litres, in order to reduce the supersaturation of urine cystine. In addition, the fluid intake should be evenly distributed during the day. A diet low in methionine (precursor to cystine) theoretically might reduce the urinary excretion of cystine but most of the cystine is endogenous and patient's compliance is usually poor. Restricted intake of sodium is probably more effective in reducing urinary cystine. As discussed before, increased solubility of cystine by oral alkali is not really practical, though this is usually given. When the combined effects of a high diuresis and alkalinisation are not enough to prevent stone formation, complex formation by chelating agents is necessary. Thiol compounds, such as D-penicillamine and α-mercaptopropionlgycine (MPG), are most commonly used. The latter compound seems to be associated with fewer side effects than penicillamine. The recommended daily dosage is 10-15mg/kg or 750mg/day. The administration of thiols should always be accompanied by pyridoxine to avoid vitamin B6 deficiency. A third alternative is captopril.

## *Infection Stones*

Infection stones compose of magnesium ammonium phosphate. These stones are caused by urease-producing micro-organisms. It is fundamental that the renal collecting system is cleared of stone materials to prevent recurrence. After complete surgical removal of the infection stones, recurrent infections with urea-splitting organisms should be prevented with improved bladder health, adequate urine drainage and suppressive antibiotics prophylaxis.




*Summarises the medical treatment of urinary tract stones.*

## Conclusion

It is very important that the patient should be motivated to comply with the general measures of life-long interference with dietary and drinking habits. When combined with selective medical therapy in patients with high risks of stone recurrence, a remission rate of more that 80% and overall reduction in individual stone formation rate of more than 90% can be obtained. A satisfactory response should require continued, dedicated compliance of patients with the recommended programme and a commitment by the physician to provide long-term follow-up and care.

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# Management of Urological Emergencies Caused by Urinary Calculi

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## Introduction

Urinary calculus is a common clinical condition in daily clinical practice. A recent survey showed that 10% of the Hong Kong population has a history of renal colic attack either on themselves or their close family members[1]. Most people in our society would know somebody who has suffered from renal colic attacks. Proven and suspected cases of urinary calculi contribute a significant amount of workload in public and private urology practice. A large proportion of these patients become aware of their stones only when the stones cause acute problems.

Emergencies caused by upper urinary tract calculi include renal colic, acute pyelonephritis with obstruction and renal pelvic rupture. Lower urinary tract calculi may cause acute urethral obstruction and retention of urine. This article is not an exhaustive description and discussion but rather a brief overview of some common clinical conditions in terms of diagnosis and management.

## Renal Colic

Renal colic is a common urological emergency. When the urinary system, usually the ureter, intends to expulse a stone by peristalsis, the intraluminal pressure generated will hit back into the kidney and the renal capsule. Together with urine excretion, this blows up the upper urinary tract and stimulates nerve fibres in the submucosa and renal capsule. The result is intense pain.

The classical description of "renal colic" is persistent unilateral loin pain that maximises in 30 minutes and may last for up to 24 hours before it gradually dies down. The pain may radiate to the lower abdomen and/or the genitalia. If the stone passes down to the uretero-vesical junction (UVJ), it may cause dysuria and urinary frequency. It also commonly causes minor bleeding from the urinary mucosa and leads to the classical description of "smoky urine' and positive test of red blood cells (RBC) in urine.

### *Diagnosis*

With the classical presentation, diagnosis can be made by plain X-ray of the kidneys, ureters and bladder (KUB) and positive test of RBC in urine. In about 10% of cases, the stone may be radiolucent or too small to be shown on plain X-ray. Ultrasonogram is free from radiation and can be done at the bedside. It can demonstrate dilatation of the collecting system caused by obstruction.

Stones in the kidney and upper ureter may show up as strong echoes with shadow. However, early obstruction may not produce hydronephrosis and it can be technically demanding to detect stones lower down in the ureter.

If the clinical diagnosis is still uncertain, Helical computerised tomography (CT) scan or contrast radiological study would be necessary.Intravenous urogram (IVU), a simple and readily available study, provides useful information including diagnosis of urinary stone, differential function of kidneys and road map of the pelvi-calyceal system.

With the increase in availability of CT scan, helical CT scan without contrast is more sensitive and specific than IVU to show urinary calculi along the urinary tract[2] and it avoids the potential complications associated with injection of intravenous contrast. In the emergency setting, helical CT also provides information on possible extrinsic causes of obstruction to the ureter, and on non-urological causes of flank pain. The examination is a very short procedure that can be completed within one breath hold. However, the radiation associated with CT scan is substantial and expertise is required to accurately interpret the scan.

CT urogram with contrast enhancement yields more information than IVU and non-contrast helical CT combined, giving good image on the renal parenchymal tissue and adjacent organs. It would be the single most definitive investigation for planning after the acute stage. The limitation would be its high radiation dose and high cost.

### *Clinical Management*

Pain from renal colic is so intense that people often compare it with labour pain. Non-steroidal anti-inflammatory drugs (NSAID's) are commonly used to relieve renal colic pain. Study showed that it is more effective compared with opioid analgesics and it generates less nausea[3]. Common choices include diclofenac sodium, ketorolac tromethamine and indomethacin. Intramuscular injection is an effective way to deliver adequate serum level and is commonly used. Rectal and oral route are also good alternatives.
Unless the patient passes out the stone by himself, dull aching is common after the acute attack. Definitive stone treatment is necessary.

Shock wave lithotripsy (SWL) provides effective treatment to small stones in the ureter that are not obstructing. Treatment in the acute phase can decrease

the length of stay of the patient and enhance the recovery phase[4,5].

For stones that have failed the shock wave lithotripsy or when the ureteric oedema is so bad that the stones cannot be passed by normal ureteric peristalsis, an intra-corporeal lithotripsy via ureteroscopy will be necessary.

Medical expulsion therapy is the latest trend. For small stones located in the lower ureter and UVJ, some studies showed that alpha-adrenergic blockers can increase the chance of spontaneous passage of the stones, although the result is not consistent[6,7]. It is believed that alpha blockers can relax the UVJ which shares common adrenergic innervations with the bladder neck. The agent first tested is tamsulosin[6]. Other agents include alfuzosin and terazosin are also studied[8,9]. Although the result on stone passage is not consistent among different studies, alpha blockers have the potential to decrease the total amount of analgesics needed.

## Acute Pyelonephritis with Stone Disease and Pyonephrosis

Acute pyelonephritis is a clinical diagnosis of fever, rigors, dysuria and ipsilateral loin pain, usually supported by features of infection in the urine. It usually represents an ascending infection of the collecting system and renal parenchyma. In some cases it may be associated with stones in the urinary tract. The collecting system is typically not obstructed. The mainstay of treatment is antibiotics. Investigation for and definitive treatment of any underlying abnormality in the urinary tract can be undertaken when the infection is controlled.

When bacterial infection comes into an obstructed urinary system, infected urine stays in the pelvi-calyceal system and forms pus. This condition, known as pyonephrosis, is a life threatening condition. Patients usually develop sepsis and may progress to septicaemic shock. With infection and obstruction, long-term renal damage is very likely.

### *Diagnosis*

Patients usually present with high swinging fever and unilateral loin pain. It is not uncommon that patients present right away in septicaemic shock without going through the usual picture of loin pain and fever. When an infected kidney is partially treated with antibiotics, the patient may present with uncontrolled swinging fever and dull loin pain.

Ipsilateral dilation of the pelvi-calyceal system in such patients will point to the diagnosis of pyonephrosis unless proven otherwise. However, in the very early stage, the system may be dilated only minimally or not at all.

### *Clinical Management*

Treatment of bacterial infection with adequate hydration and antimicrobial agents should be instituted without delay. Empirical choice of antibiotics is required should culture results be not yet available Drainage is the critical measure to reverse this adverse clinical course. External drainage by percutaneous nephrostomy is the orthodox approach. The pelvi-calyceal system is punctured by a nephrostomy needle under ultrasonic guidance. This is then followed by insertion of the percutaneous nephrostomy tube with or without fluoroscopic guidance, which depends on the extent of upper urinary tract dilatation. Successful drainage will be quickly followed by improvement of the clinical condition. Definitive treatment of urinary calculi will then follow when the patient's condition is stabilised.

Internal drainage with double J catheter inserted in a retrograde fashion through cystoscopy can also provide effective measures to alleviate the pressure in the obstructed system in the upper urinary tract[10]. With the development of hydrophilic guide wire and improvements in endoscopic expertise, the upper urinary tract can be effectively drained via its natural orifice with minimal traumatisation. Urethral catheter draining the urinary bladder after double J catheter insertion can provide effective dependent external drainage like that through a nephrostomy.

It should be noted that neither of these two drainage methods has been demonstrated to be consistently superior to the other. Retrograde ureteric internal drainage could be safely performed in patients with minimally dilated systems, with bleeding tendency or in pregnant patients. Percutaneous nephrostomy would be useful if retrograde drainage failed due to an impacted stone. The two methods are therefore complementary to each other.

## Renal Pelvic Rupture

When the ureteric peristalsis to overcome urinary calculi obstruction is very intense, the intraluminal pressure may be so high that it may cause rupture of the pelvi-calyceal system. There will be persistent pain and radiological study will show extravasation of contrast. If the leakage is severe, a collection of urine outside the urinary system, known as an urinoma, will form. This is a rare situation but it shows up in case reports from time to time[11,12].

### *Diagnosis*

With renal pelvic rupture, the pain is extraordinarily intense compared with normal renal colic. Ultrasonogram may show the urinoma as a cystic collection of fluid in close proximity to the renal pelvis. Intravenous contrast study will show leakage of urine in the delay film.

### *Clinical Management*

Management in this scenario varies according to its severity. For small perforations, the condition improves with conservative management. Although drainage with internal stenting by a double J catheter will provide a better environment for healing and less chance for progression of urinoma, manipulation with guide wire may change a minor perforation to a major one. Urinomas of a significant size will need to be drained. Operative repair may be necessary for major rupture. Definitive treatment will depend on the underlying stone disease.

## Urinary Retention Caused by Lower Urinary Tract Stones

Upper urinary tract stones that have managed to pass down through the UVJ into the bladder usually can travel through the urethral lumen with little difficulty. In case of urethral stricture, or if the stone grows in the urinary bladder, lower urinary tract calculi can cause acute urinary retention when they are stuck in the urethra. Common sites where stones stop include the prostatic urethra, membraneous urethra, and navicular part of the urethra that is just proximal to the external urethral meatus.

### *Diagnosis*

The classical symptoms of sudden interruption of the normal urinary stream followed by retention of urine speak for itself. For stones lodged in the distal part of the urethra, they can be palpated over the perineum or the penis. Plan X-ray will show opacities in the pelvic view along the course of the urethra.

### *Clinical Management*

In the emergency management of acute retention of urine, urethral catheterisation is usually necessary. Stones in the proximal part of the urethra can sometimes be pushed back into the bladder by the catheter. If transurethral catheterisation fails, the supra-pubic route is the alternative.

To provide definitive treatment, rigid urethrocystoscopy is performed. Stones in the proximal part of the urethra can be pushed back into bladder for lithotripsy. For stones in the distal part of the urethra, they can be removed after dilatation of the navicular part of the urethra. Flexible endoscopy and lithotripsy are feasible but would be more time consuming.

## Conclusion

Urological emergencies due to calculi are common clinical conditions that most clinicians of different specialties will encounter from time to time. Being familiar with this clinical problem can facilitate early diagnosis and referral for specialist care.

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## Upcoming Certificate Courses of the Federation of Medical Societies of Hong Kong

| Date | Course No | Course Name | Target Participants | CME/CNE |
|---|---|---|---|---|
| 8 Oct 09 - 12 Nov 09 (Every Thu) | C146 | Certificate Course on Management of Common Psychiatric Disorders | Medical and Health Professionals | 9 CNE Points / CME Accreditation in application |
| 4 Nov 09 - 9 Dec 09 (Every Wed) | C145 | Certificate Course on Sports Medicine & Emergencies | Medical and Health Professionals | 9 CNE Points / CME Accreditation in application |
| 17 Nov 09 - 29 Dec 09 (Every Tue) | C152 | Certificate Course in Obstetrics 2009 | General Practitioners, Midwives, Nurses and Health Care Providers who are interested in Obstetrics | 9 CNE/PEM Points / CME Accreditation in application |

## 'Cares for the Foundation Silver Hair' Certificate Programme - Hong Kong Housing Society

In December 2008, the HKFMS Foundation Limited joined with the Hong Kong Association of Gerontology and the Agency for Volunteer Service to co-organise a certificate programme 'Cares for the Silver Hair' for staff of the Hong Kong Housing Society(HKHS). The programme was to enhance the skills of the Property Management Staff in carrying out their job duties in housing estates, especially wherein their serviced clients were the elderly.

The Foundation contributed 2.5 of the 8 modules in the certificate programme. Topics covered were:

- Communicating with Elderly who have Suicide Ideation
- Communicating with Elderly with Bereavement

Delivered by Ms Faye Chan, Program Development Director, Society for the Promotion of Hospice Care

- Conflict Management - Harmonizing Elderly Relationship
- Communicating with Elderly who have Dementia
- Communicating with Elderly who have Depression

Delivered by Ms Margaret Suen, Supervisor, Medical Social Work Department, Caritas Medical Centre

- Infection Control and Measures in Housing Estate

Delivered by Ms Cecilia Li, Shatin Hospital

Following the teaching sessions that ended in March 2009, the programme participants were required to work on an action learning project to implement what they had learnt in the teaching sessions. Of the three teaching topics that the Foundation delivered, they had chosen the following project:

隨著社會發展及資訊進步，長者比他們的上一代對「死亡」持較開放的態度，願意認識多一點並嘗試討論，請計劃一個活動協助屋邨內的同工認識長者面對喪親的反應及其需要，並介紹有關社區資源。

The programme participants organised an event at Cho Yiu Estate targeting the elderly population in the community.

Among other action learning projects, our student group won the best project for the programme and were awarded at the graduation ceremony on 10 July 2009. Congratulations to our students.

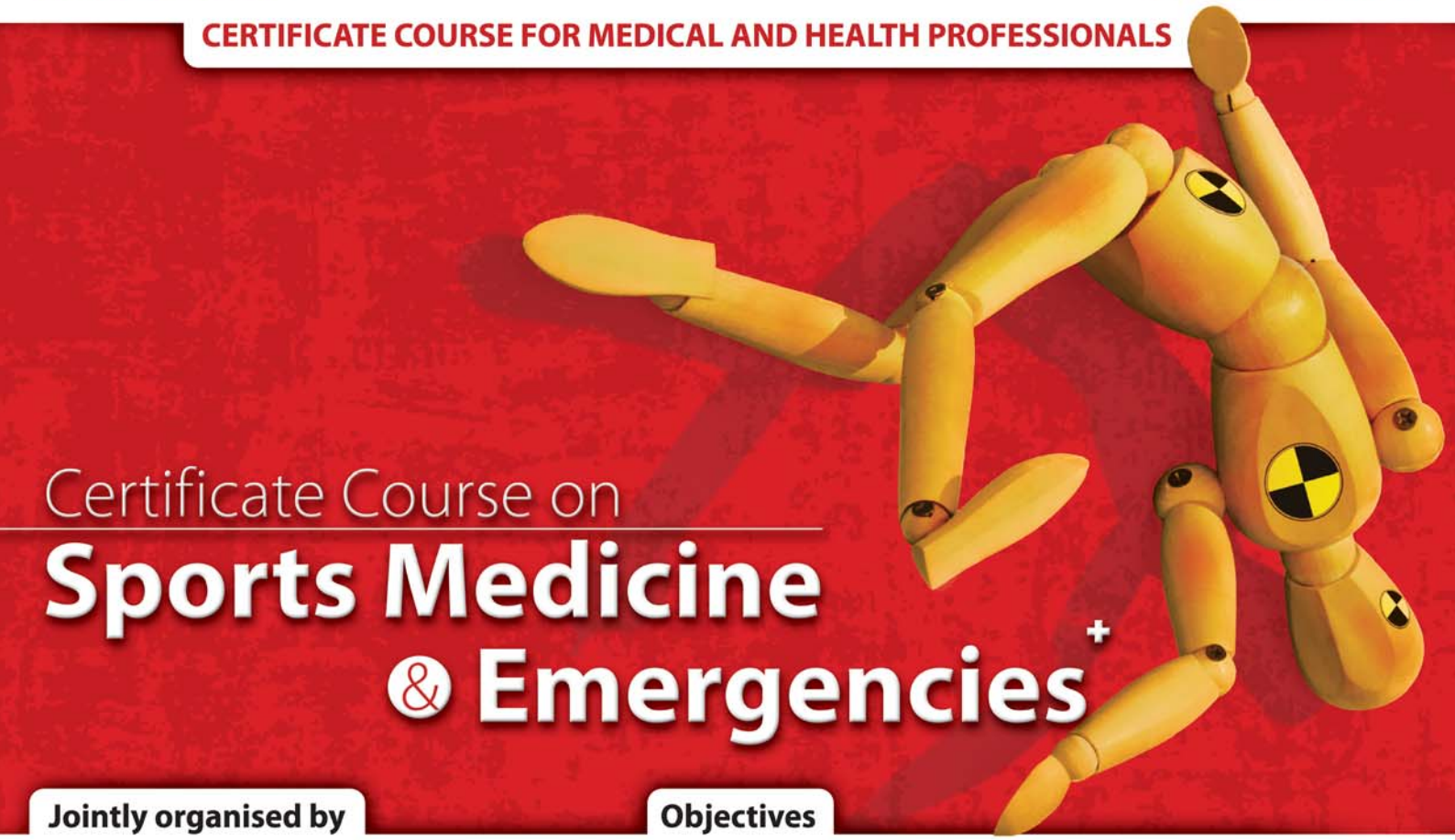
*Our student group presented their project at the graduation ceremony*

*The winning team and Dr. Raymond Lo, 1st Vice President of HKFMS Foundation; Ms. Margaret Chan, Director (Corporate Services) of HKHS; Mr. Daniel Cheung, Senior Manager (Learning & Development) of HKHS*

The Foundation had a successful collaboration with the Hong Kong Housing Society and looks forward to future collaborating opportunities with them.

**Course No. C145** **CME / CNE Course**

**CERTIFICATE COURSE FOR MEDICAL AND HEALTH PROFESSIONALS**



# Certificate Course on
# Sports Medicine & Emergencies+

## Jointly organised by

The Federation of Medical Societies of Hong Kong
香港醫學組織聯會

Hong Kong Society for Emergency Medicine and Surgery
香港急症醫學會

## Objectives

### *Want to know what Sports Medicine is about?*

We are a group of emergency physicians who are interested in sports medicine. We will present an overview of many aspects of Sports Medicine and related Emergencies. You will learn the role of pitch-side doctor, basic knowledge of sports injuries and their management.

| | |
|---|---|
| Dates | 4 November 2009 – 9 December 2009 (Every Wednesday) |
| Time | 7:00 p.m. – 8:30 p.m. |
| Venue | Lecture Hall, 4/F., Duke of Windsor Social Service Building, 15 Hennessy Road, Wanchai, Hong Kong |
| Language Media | Cantonese (Supplemented with English) |
| Course Fee | HK$750 (6 sessions) |
| Certificate | Awarded to participants with a minimum attendance of 70% |
| Enquiry | The Secretariat of The Federation of Medical Societies of Hong Kong |
| Tel. | 2527 8898 |
| Fax | 2865 0345 |
| Email | info@fmshk.org |

| Date | Topic | Speaker |
|---|---|---|
| 4 November 2009 | Introduction to Sports Medicine and Common Injuries in Contact Sports | Dr. Ken WU |
| 11 November 2009 | Mind your head ! | Dr. Kwan-Leong AU YEUNG |
| 18 November 2009 | Challenges to your leg's limit: Marathon runner and Trailwalker | Dr. Man-Kam HO |
| 25 November 2009 | Pitch-side assessment and management | Dr. Chi-Wai CHAU |
| 2 December 2009 | Medical Emergency in Sporting Grounds | Dr. Willis KWOK |
| 9 December 2009 | Theory and practical tips for weight training | Dr. Ben Siu-Pan NG |

## CME / CPD Accreditation in application

A total of 9 **CNE** points for the whole course and the points will be awarded according to the number of hours attended.

+ Application form can be downloaded from our website: http://www.fmshk.org +

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| | | | | 1 | ★ Joint Surgical Symposium - Esophageal Perforation & Gastroparesis<br>2 | ★ HKMA Trailwalker the 6th Training Session<br>3 |
| ★ 3rd Season Photo Sharing Session<br>4 | ★ Certificate Course on Update in Respiratory Care (Code no: TC-RC-0901)<br>5 | ★ FMSHK Officers' Meeting<br>6 | ★ The Role of Lowering Insulin Resistance in Type 2 Diabetes<br>7 | ★ HKMA Structured CME Programme with Hong Kong Sanatorium & Hospital Year 2009 - Update in the Management of Endometriosis<br>★ Certificate Course on Interpretation of Electrocardiography (Code no: TC-ECG-0902)<br>★ Certificate Course on Management of Common Psychiatric Disorders<br>★ HKMA Council Meeting<br>8 | 9 | 10 |
| ★ HKMA Swimming Gala<br>★ HKMA Certificate Course on Family Medicine 2009<br>11 | ★ Certificate Course on Update in Respiratory Care (Code no: TC-RC-0901)<br>12 | ★ FMSHK Executive Committee Meeting<br>13 | ★ HK Neurosurgical Society Monthly Academic Meeting - Neuroplasticity: The Ultimate Transformer<br>★ Role of RAAS Blockade in Vascular and Organ Protection<br>14 | ★ Certificate Course on Interpretation of Electrocardiography (Code no: TC-ECG-0902)<br>★ Certificate Course on Management of Common Psychiatric Disorders<br>15 | 16 | ★ HKMA CME - Infectious Diseases<br>★ HKMA KECN-UCH CME Course for Health Personnel 2009 - (1) Management of Fall in the Elderly (2) Fear of Fall<br>★ HKMA CMS3.0 Training Workshop<br>★ Refresher Course for Health Care Providers 2009/2010<br>17 |
| ★ HKMA Trailwalker the 7th Training Session<br>★ HKMA/New Mastering Your Risk - 2009 Extended Programme<br>18 | ★ Certificate Course on Update in Respiratory Care (Code no: TC-RC-0901)<br>19 | 20 | ★ HKMA/New Mastering Your Risk - 2009 Extended Programme<br>★ HKMA - Shatin Doctors Network - Certificate Course on Osteroporosis<br>21 | ★ Certificate Course on Interpretation of Electrocardiography (Code no: TC-ECG-0902)<br>★ Certificate Course on Management of Common Psychiatric Disorders<br>★ Certificate Course of Treating Alzheimer's Disease in Community (V) - Round up Workshop<br>★ FMSHK Foundation Meeting<br>22 | ★ Annual Scientific Meeting in Anaesthesiology 2009<br>23 | ★ HKMA/New Mastering Your Risk - 2009 Extended Programme<br>★ Annual Scientific Meeting in Anaesthesiology 2009<br>★ 11th Beijing / Hong Kong Medical Exchange Conference<br>24 |
| ★ HKMA/New Mastering Your Risk - 2009 Extended Programme<br>★ Annual Scientific Meeting in Anaesthesiology 2009<br>★ 11th Beijing / Hong Kong Medical Exchange Conference<br>★ HKMA Structured CME Programme with PMH Year 2009 (9) - 1) Radiology<br>25 | 26 | ★ HKMA/New Mastering Your Risk - 2009 Extended Programme<br>27 | ★ HKMA/New Mastering Your Risk - 2009 Extended Programme<br>28 | ★ Certificate Course on Interpretation of Electrocardiography (Code no: TC-ECG-0902)<br>★ Certificate Course on Management of Common Psychiatric Disorders<br>★ HKMA/New Mastering Your Risk - 2009 Extended Programme<br>29 | 30 | ★ HKMA/New Mastering Your Risk - 2009 Extended Programme<br>★ 3rd Joint Scientific Meeting of The Royal College of Radiologists and Hong Kong College of Radiologists and 17th Annual Scientific Meeting of Hong Kong College of Radiologists<br>31 |

# Medical Diary of October

| Date / Time | Function | Enquiry / Remarks |
|---|---|---|
| **2** 8:00 am - 9:00 am **FRI** | **Joint Surgical Symposium - Esophageal Perforation & Gastroparesis**<br>Organised by: Department of Surgery, The University of Hong Kong & Hong Kong Sanatorium & Hospital, Chairman: Dr. Angus C.W. CHAN, Speakers: Prof. Simon LAW & Dr. CHAN Siu-Yin, Venue: Hong Kong Sanatorium & Hospital | Department of Surgery, Hong Kong Sanatorium & Hospital<br>Tel: 2835 8698 Fax: 2892 7511<br>1 CME Point (Active) |
| **3** 7:00 am **SAT** | **HKMA Trailwalker the 6th Training Session**<br>Organised by: The Hong Kong Medical Association, Venue: MacLehose Stage 1-3 | Ms. Dora HO<br>Tel: 2527 8285 |
| **4** 2:00 pm **SUN** | **3rd Season Photo Sharing Session**<br>Organised by: The Hong Kong Medical Association, Venue: HKMA Head Office, 5/F, Duke of Windsor Social Service Building, 15 Hennessy Road, Wanchai, Hong Kong | Ms. Dora HO<br>Tel: 2527 8285 |
| **5** 6:30 pm - 9:30 pm **MON** *(12,19)* | **Certificate Course on Update in Respiratory Care (Code no: TC-RC-0901)**<br>Organised by: College of Nursing, Hong Kong | Secretariat<br>Tel: 2572 9255 Fax: 2838 6280<br>24 CNE / PEM Points |
| **6** 8:00 pm - 10:00pm **TUE** | **FMSHK Officers' Meeting**<br>Organised by: The Federation of Medical Societies of Hong Kong, Venue: Gallop, 2/F., Hong Kong Jockey Club Club House, Shan Kwong Road, Happy Valley, Hong Kong | Ms. Paulina TANG<br>Tel: 2527 8898 Fax: 2865 0345 |
| **7** 1:00 pm **WED** | **The Role of Lowering Insulin Resistance in Type 2 Diabetes**<br>Organised by: The HKMA Shatin Doctors Network, Chairman: Dr. WONG Kin Wah, Speaker: Dr. LEE Ka Kui, Venue: Jasmine Room, Level 2, Royal Park Hotel, Shatin | Miss Alice TANG<br>Tel: 2527 8285 |
| **8** 2:00 pm **THU** | **HKMA Structured CME Programme with Hong Kong Sanatorium & Hospital Year 2009 - Update in the Management of Endometriosis**<br>Organised by: The Hong Kong Medical Association, Speaker: Dr. YUEN Pong Mo, Venue: The HKMA Dr. Li Shu Pui Professional Education Centre, 2/F, Chinese Club Building, 21-22 Connaught Road Central, Hong Kong | Miss Viviane LAM<br>Tel: 2527 8452<br>1 CME Point |
| 6:30 pm - 9:30 pm *(15,22,29)* | **Certificate Course on Interpretation of Electrocardiography (Code no: TC-ECG-0902)**<br>Organised by: College of Nursing, Hong Kong | Secretariat<br>Tel: 2572 9255 Fax: 2838 6280<br>24 CNE Points |
| 7:00 pm - 8:30 pm *(15,22,29, Nov 5,12)* | **Certificate Course on Management of Common Psychiatric Disorders**<br>Organised by: The Federation of Medical Societies of Hong Kong & The Hong Kong College of Psychiatrists, Speakers: Various, Venue: Lecture Hall, 4/F, Duke of Windsor Social Service Building, 15 Hennessy Road, Wanchai, Hong Kong | Ms. Erica HUNG<br>Tel: 2527 8898 Fax: 2865 0345<br>Website: www.fmshk.org<br>9 CNE Points /<br>CME/CPD Accreditation in Application |
| 8:00 pm | **HKMA Council Meeting**<br>Organised by: The Hong Kong Medical Association, Chairman: Dr. H.H. TSE, Venue: HKMA Head Office, 5/F., Duke of Windsor Social Service Building, 15 Hennessy Road, Wanchai, Hong Kong | Ms. Christine WONG<br>Tel: 2527 8285 |
| **11** 2:00 pm **SUN** | **HKMA Swimming Gala**<br>Organised by: The Hong Kong Medical Association, Venue: La Salle College | Ms. Dora HO<br>Tel: 2527 8285 |
| 2:00 pm | **HKMA Certificate Course on Family Medicine 2009**<br>Organised by: The Hong Kong Medical Association, Speakers: Dr. Kenny KUNG & Prof. CHAN Kwok Wai, Queen Elizabeth Hospital, Kowloon | Miss Viviane LAM<br>Tel: 2527 8452<br>3 CME Points |
| **13** 8:00 pm - 10:00 pm **TUE** | **FMSHK Executive Committee Meeting**<br>Organised by: The Federation of Medical Societies of Hong Kong, Venue: Council Chambers, 4/F., Duke of Windsor Social Service Building, 15 Hennessy Road, Wanchai, Hong Kong | Ms. Paulina TANG<br>Tel: 2527 8898 Fax: 2865 0345 |
| **14** 7:30 am **WED** | **HK Neurosurgical Society Monthly Academic Meeting - Neuroplasticity: The Ultimate Transformer**<br>Organised by: HK Neurosurgical Society, Chairman: Dr. YUEN Shing Chau, Speaker: Dr. LAU Chi Yan Jane, Venue: Seminar Room, G/F, Block A, Queen Elizabeth Hospital, Kowloon | Dr. Y.C. PO<br>Tel: 2990 3788 Fax: 2990 3789<br>2 CME Points |
| 1:00 pm | **Role of RAAS Blockade in Vascular and Organ Protection**<br>Organised by: The HKMA Shatin Doctors Network, Chairman: Dr. YUE Wing Shun, Speaker: Dr. MAK Yiu Kwong Gary, Venue: Jasmine Room, Level 2, Royal Park Hotel, Shatin | Miss Alice TANG<br>Tel: 2527 8285 |
| **17** 1:00 pm **SAT** | **HKMA CME - Infectious Diseases**<br>Organised by: The Hong Kong Medical Association, Chairman: Dr. CHOI Kin & Dr. YUNG Wai Hung Raymond, Venue: Lai Chi Kok, Kowloon | Miss Viviane LAM<br>Tel: 2527 8452<br>2.5 CME Points |
| 1:30 pm | **HKMA KECN-UCH CME Course for Health Personnel 2009 - (1) Management of Fall in the Elderly (2) Fear of Fall**<br>Organised by: Hong Kong Medical Association Kowloon East Community Network & United Christian Hospital, Chairman: Dr. LEUNG Man Fuk, Speakers: Dr. YIM Ting Kwan & Ms. FUNG Oi Kuen, Venue: Lecture Theatre, G/F, Block P, United Christian Hospital, Kowloon | Miss Alice TANG<br>Tel: 2527 8285 |
| 2:00 pm | **HKMA CMS3.0 Training Workshop**<br>Organised by: The Hong Kong Medical Association, Chairman: Dr. HO Chung Ping, MH, Speaker: Mr. Clifford TSE, Venue: Lecture Theatre, G/F, Block M, Queen Elizabeth Hospital, Kowloon | Miss Alice TANG<br>Tel: 2527 8285 |
| 2:30 pm | **Refresher Course for Health Care Providers 2009/2010**<br>Organised by: The Hong Kong Medical Association and Our Lady of Maryknoll Hospital, Speaker: Dr. LAU Siu Wah Herrick, Venue: Training Room II, 1/F., OPD Block, Our Lady of Maryknoll Hospital, 118 Shatin Pass Road, Wong Tai Sin, Kowloon | Ms. Clara TSANG<br>Tel: 2354 2440<br>2 CME Points |
| **18** 7:00 am **SUN** *(21,24,25,27,28,29,31)* | **HKMA Trailwalker the 7th Training Session**<br>Organised by: The Hong Kong Medical Association, Venue: MacLehose Stage 6-10 | Ms. Dora HO<br>Tel: 2527 8285 |
| | **HKMA/New Mastering Your Risk - 2009 Extended Programme**<br>Organised by: The Hong Kong Medical Association, Speakers: Dr. Andy CHEUNG & Dr. Justin CHENG, Venue: The HKMA Dr. Li Shu Pui Professional Education Centre, 2/F, Chinese Club Building, 21-22 Connaught Road Central, Hong Kong | Miss Viviane LAM<br>Tel: 2527 8452<br>2.5 CME Points |

| Date / Time | Function | Enquiry / Remarks |
|---|---|---|
| **21 WED** 2:00 pm | **HKMA - Shatin Doctors Network - Certificate Course on Osteroporosis**<br>Organised by: HKMA - Shatin Doctors Network, Venue: Shatin | Miss Alice TANG<br>Tel: 2527 8285 |
| **22 THU** 1:45 pm | **Certificate Course of Treating Alzheimer's Disease in Community (V) - Round up Workshop**<br>Organised by: The Hong Kong Medical Association, Tin Shui Wai Community Network, Hong Kong Alzheimer's Disease Association and Lundbeck Institute Hong Kong, Chairmen: Dr. David DAI & Dr. MOK Chun Keung, Speaker: Dr. MOK Chun Keung, Venue: Ballroom C & D, Harbour Plaza Resort City, 18 Tin Yan Road, Tin Shui Wai, New Territories | Miss Alice TANG<br>Tel: 2527 8285<br>2 CME Points |
| 8:00 pm - 10:00 pm | **FMSHK Foundation Meeting**<br>Organised by: The Federation of Medical Societies of Hong Kong, Venue: Council Chambers, 4/F., Duke of Windsor Social Service Building, 15 Hennessy Road, Wanchai, Hong Kong | Ms. Paulina TANG<br>Tel: 2527 8898<br>Fax: 2865 0345 |
| **23 FRI** *(24,25)* | **Annual Scientific Meeting in Anaesthesiology 2009**<br>Organised by: The Hong Kong College of Anaesthesiologists & The Society of Anaesthetists of Hong Kong, Chairman: Dr. S.T. TAN, Venue: The Hong Kong Academy of Medicine Building | ASM 2009 Secretariat<br>Tel: 2559 9973 Fax: 2547 9528<br>Email: asm2009@icc.com.hk,<br>Website: http://www.anaesthesiology.hk |
| **24 SAT** *(25)* | **11th Beijing / Hong Kong Medical Exchange Conference**<br>Organised by: The Hong Kong Medical Association, Venue: Sichuan Provincial People's Hospital, Chengdu, Sichuan | Ms. Candy YUEN<br>Tel: 2527 8285 |
| **25 SUN** | **HKMA Structured CME Programme with PMH Year 2009 (9) - 1) Radiology**<br>Organised by: The Hong Kong Medical Association, Speaker: Dr. YUNG Wei Tak Alfred, Venue: G8 Hall, Princess Margaret Hospital, Kowloon | Miss Viviane LAM<br>Tel: 2527 8452<br>2 CME Points |
| **31 SAT** *(Nov 1)* | **3rd Joint Scientific Meeting of The Royal College of Radiologists and Hong Kong College of Radiologists and 17th Annual Scientific Meeting of Hong Kong College of Radiologists**<br>Organised by: The Royal College of Radiologists & Hong Kong College of Radiologists, Venue: Hong Kong Academy of Medicine, Jockey Club Building, 99 Wong Chuk Hang Road, Aberdeen, Hong Kong | Secretariat<br>Tel: 2871 8788 Fax: 2554 0739<br>Email: enquiries@hkcr.org<br>Website: http://www.hkcr.org |

## Meetings

| | |
|---|---|
| 1/11/2009 | **OSHK A-Z Symposia Series "B" - Symposium: "B" Isphosphonate-Related Osteonecrosis of the Jaw and the New OSHK Guidelines on Osteoporosis Management**<br>Organised by: The Osteoporosis Society of Hong Kong, Venue: Shanghai Room, Level 8 Langham Place Hotel, Mongkok, Kowloon, Enquiry: Secretariat, Tel: 2881 4295, Fax: 2159 7242 |
| 5/11/2009 - 7/11/2009 | **17th Asia Pacific Optometric Congress (APOC)**<br>Organised by: Asia Pacific Council of Optometry, The Hong Kong Society of Professional Optometrists, Zhongshan Ophthalmic Center, Sun Yat-sen University& The Hong Kong Polytechnic University, Venue: The Hong Kong Polytechnic University and Hong Kong Convention and Exhibition Centre, Enquiry: Ms. Ivy YEUNG, Email: secretariat@asiapacificoptometry.org, Website: http://www.asiapacificoptometry.org/17thapoc.html |
| 8/11/2009 | **International Symposium on Hepatology 2009 / 22nd Annual Scientific Meeting**<br>Organised by: The Hong Kong Association for the Study of Liver Diseases, Venue: Hong Kong Convention and Exhibition Centre, Enquiry: Ms. Melissa LEUNG, CMPMedica Pacific Limited, Tel: 2116 4348, E-mail: melissa.leung@asia.cmpmedica.com |
| 9/1/2010 | **Hong Kong Surgical Forum - Winter 2010**<br>Organised by: Department of Surgery, the University of Hong Kong, Queen Mary Hospital & Hong Kong Chapter of American College of Surgeons, Venue: Underground Lecture Theatre, New Clinical Building, Queen Mary Hospital, Pokfulam, Hong Kong, Enquiry: Forum Secretariat, Tel: 2855 4855 / 2855 4886, Fax: 2819 3416, Email: hksf@hkucc.hku.hk, Website: http://www3.hku.hk/surgery/forum/php |

## Courses

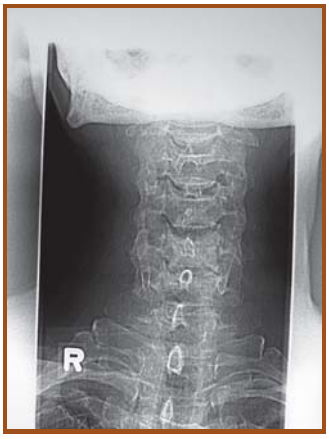
| | |
|---|---|
| 20-22/11/2009 | **Advanced Trauma Life Support (ATLS) Student Course**<br>Organised by: Department of Surgery, Queen Mary Hospital & Hong Kong Chapter of the American College of Surgeons, Venue: The Jockey Club Skills Development Centre, C3, Main Block, Queen Mary Hospital, Pokfulam, Hong Kong, Enquiry: Course Administrator, Tel: 2855 4885 / 2855 4886, Fax: 2819 3416, Email: hnsrg@hkucc.hku.hk, Web site: http://www.hku.hk/surgery |
| 20-21/11/2009 | **Advanced Trauma Care for Nurses (ATCN) Provider Course**<br>Organised by: Department of Surgery, Queen Mary Hospital & Hong Kong Chapter of the American College of Surgeons # The Jockey Club Skills Development Centre, C3, Main Block, Queen Mary Hospital, Pokfulam, Hong Kong Enquiry: Course Administrator Tel: 2855 4885 / 2855 4886 Fax: 2819 3416 Email: hnsrg@hkucc.hku.hk Web site: http://www.hku.hk/surgery |
| 12-13/12/2009 | **Advanced Medical Life Support (AMLS) Provider Course**<br>Organised by: Department of Surgery, Queen Mary Hospital & Hong Kong Chapter of the American College of Surgeons, Venue: The Jockey Club Skills Development Centre, C3, Main Block, Queen Mary Hospital, Pokfulam, Hong Kong, Enquiry: Course Administrator, Tel: 2855 4885 / 2855 4886, Fax: 2819 3416, Email: hnsrg@hkucc.hku.hk Web site: http://www.hku.hk/surgery |

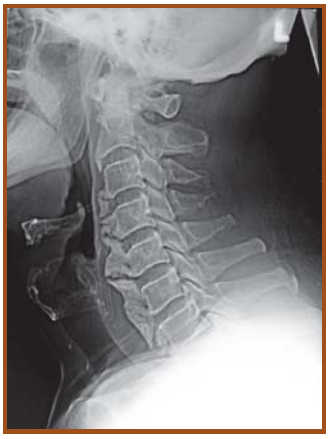
# Radiology Quiz

**Dr. WK TSO**

*COS, Department of Radiology, Queen Mary Hospital*

Dr. WK TSO



## Clinical Data:

- M/77
- Dysphagia

## Questions:

- What do you find on the AP and lateral cervical spine radiographs?
- What is your diagnosis?

# Answer to Radiology Quiz

## Answer:

Ankylosing Hyperostosis (Forertier's Disease)

## Radiographic Findings:

Exuberant anterior and lateral osteophytes are seen on the cervical spine. Some of them are partially separated from the anterior vertebral margins by a radiolucent line at the bodies of C5 and C6. The spurs approximate the oesophagus and the trachea.

## Discussion:

Spondylosis of the cervical spine is most likely to cause severe symptoms because of the relatively narrow cervical canal and the intervertebral foramina. Exuberant anterior and lateral osteophytes are termed ankylosing hyperostosis or Forestier's disease, and may fuse together.

Peripheral joint manifestations may sometimes be associated with this condition. It is now termed diffuse idiopathic skeletal hyperostosis. It affects middle age and elderly patients. When the cervical spine is involved, dysphagia due to anterior displacement of the oesophagus results.

**Dr. WK TSO**

*COS, Department of Radiology, Queen Mary Hospital*

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Reference:
1. Smith RD, Yokoyama H, Averill DB et al. Reversal of vascular hypertrophy in hyperten sive patients through blockade of angiotensin II receptors. JASH 2008; 2 (3):165-172.

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