KU-S01

Innovation Takes the Lead

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Innovation is the creation, development and implementation of a new product, process or service, with the aim of improving efficiency, effectiveness or competitive advantage. There are four different types of innovation – Incremental, Disruptive, Architectural and Radical Innovations – and various institutes fit with these ways differently. Why innovation is so important? According to my book (co-author, Professor Ralph Clayman, Emeritus Professor, University California of Irvine), Complete Dean - The wisdom of Leadership. By the experiences from 35 United States Medical University president and Dean (they have an average experience of 9.8 years in that position) all agree that there are three most important characters to become a great leader. First, they must have perseverance personality. Secondarily, they can nourish other people and the last not the least element for leadership is that they all have the ability of innovation. Innovation is a gift from God, yet it is trainable. Young brain is more innovative than old one. Innovativeness is the gateway to the future. Innovativeness can be sacrificed by the authority. Only innovative mentors will have innovative students. In recent three decades, the emergence of minimally invasive technique (laparoscopic and robotic surgery), precision medicine and Artificial Intelligence (AI) assisted medicine are the best examples of how innovation takes the lead in the medical field, including medical ultrasonography.

KU-S02

Magnetic Resonance Imaging/Ultrasound-fusion Biopsy

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Previous standard TRUS is not reliable at detecting PCa and the diagnostic yield of additional biopsies performed on hypoechoic lesions is negligible. Magnetic resonance imaging (MRI) has good sensitivity for the detection and localisation of clinical significant cancers. Magnetic resonance imaging (MRI)-transrectal ultrasound (TRUS) fusion is an new technique for prostate biopsy. This technique combines the superior sensitivity of MRI for targeting suspicious lesions with the practicality and familiarity of TRUS. MRI/TRUS fusion biopsy was introduced into Shin Kong Wu Hu Memorial hospital since 2021. MRI/ultrasound fusion biopsy has demonstrated favorable detection rates of clinical significant prostate cancer (PCa) among men with elevated prostate specific antigen(PSA) level. Perform mpMRI before prostate biopsy is currently suggested by European association of urology. We reported the current evidence of MRI/ultrasound fusion biopsy and how we perform the fusion biopsy with KOELIS Trinity in Shin Kong Wu Ho-Su Memorial Hospital.

KU-S03

New Advance in High Intensity Focused Ultrasound (HIFU)

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The incidence and prevalence of prostate cancer is increasing around the world. Among of newly diagnosed prostate cancers, 70% are organ-confined and may be suitable for a local, potentially curative therapy, mainly including surgery and radiation therapy. The morbidity associated with surgical and/or radiation treatment is significant. Thus it is necessary to find a procedure as minimally invasive as possible. Several new therapeutic options are available now including high

intensity focused ultrasound (HIFU), which appears to be an attractive, evolving way to treat prostate cancer either as a primary care or as a salvage option. HIFU is a very promising technology for focal therapy of prostate cancer.

Two devices are currently available for the treatment of prostate cancer: Sonablate® and Ablatherm®. The recommendations and updated guidelines on the use of HIFU for prostate cancer as a primary treatment concern patients with localized relatively small prostate cancer (clinical T1-T2 stage Nx/0 M0 prostate cancer) who are not suitable for surgery whatever the reasons (e.g. old age, life expectancy <10 years, and major co-morbidities) or those refusing to undergo surgery. Recently, the indication of the use of HIFU includes re-treatment of HIFU, and salvage HIFU after radiotherapy. Many clinical evidences suggest that HIFU could be an excellent option for selected patients. The risk of urethrorectal fistula, which was the possible one significant complication in the early stages of HIFU development, has been reduced significantly (incidence between 0 and 0.5%) for primary procedures in contemporary series.

KU-S04

KU-S05

Advanced Cryoablation

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Cryoablation is a minimal invasive technique with the advantage of less damage to collagenous tissue and collecting system as compared to other thermal technique. Under imaging guidance, the ablation zone could be monitored and controlled, and unnecessary injury to adjacent normal structure could be thus avoided. Cryoablation has been accepted as a safe and effective technique for treating various tumors including renal, bone, lung, prostate and other soft tissue malignancy.

In this presentation, we will introduce the physics, guiding technique, indication and treatment effect of cryoablation, focusing on renal and prostate. The challenges and opportunities of cryoablation will be addressed.

KU-F01

Influence of Intra-abdominal Dialysate on the Measurement of Inferior Vena Cava Diameter and Collapsibility

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Background: The influence of intra-abdominal fluid on inferior vena cava (IVC) size is not well studied. To study the effect of intra-abdominal fluid on IVC diameter, we assessed the IVC size measured by ultrasound before and after draining out dialysate during one exchange of dialysate in day time.

Materials and Methods: Seventeen patients undergoing continuous ambulatory peritoneal dialysis (CAPD) aged from 31 to 81 years were enrolled in the study. The anteroposterior IVC diameter was measured 2.0 cm below the diaphragm in the hepatic segment in supine position during normal respiration. Collapsibility index (CI) was calculated by (IVCe [expiration] diameter − IVCi [inspiration] diameter)/IVCe diameter × 100 %. Three phases of US scanning were performed during one exchange in daytime. Phase I, before dialysate drain out, Phase II, after dialysate drain out, Phase III after dialysate refill in abdomen. IVC diameter was measured with B-mode and M-mode using a 4-Mhz curvilinear ultrasound probe.

Results: Seventeen CAPD patients (mean age

59.5±11.7 years, male 11, female 6) were evaluated in an outpatient dialysis unit. The mean drained-out volume was 1921±377 ml; the mean filled-in dialysate volume was 1712±359 ml. The net drained-out volume was 209 ± 106 ml.

Following dialysate drain, mean IVCe increased from 1.21±0.59 cm to 1.62±0.53 cm ($p<0.005$), mean ICVi increased from 0.95±0.58 to 1.04±0.55 cm (p 0.241). The mean CI increased from 28.9 ± 16.9% to 41.6 ± 20.4% ($p<0.05$).

Following dialysate refill in mean IVCe decreased from 1.62±0.53 cm to 1.25±0.53 cm ($p<0.005$), mean IVCi decreased from 0.99±0.57 cm to 0.90±0.57 cm (p 0.272). The mean CI decreased from 41.6±20.4 % to 30.5±24.6 % ($p<0.05$).

Conclusions: Drained-out and refill-in intra-abdominal dialysate did significantly alter IVCe or CI measurements, no significantly alter in IVCi. Performing ultrasound measurements of the IVCe and CI with intra-abdominal fluid is likely to produce clinically meaningful changes. This may be due to decreased intra-abdominal pressure and decompression of the IVC by relief of intra-abdominal fluid.

Keywords: Ultrasound; Inferior vena cava; collapsibility index; Peritoneal dialysis

KU-S06

Prevention of Acute Kidney Injury by Low Intensity Pulsed Ultrasound via Anti-inflammation and Anti-apoptosis

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The therapeutic effects of low intensity pulsed ultrasound (LIPUS) on renal ischemia/reperfusion injury (IRI) with acute kidney injury (AKI) are still unclear. A renal tubule cell model under H2O2 or hypoxia/reoxygenation (H/R) conditions with or without LIPUS pre-treatment (1 MHz, 30 and 100 mW/cm2, 15 min) was used to test the in vitro effects of LIPUS. An AKI mouse model of unilateral IRI with nephrectomy of the contralateral kidney for 48 h with or without LIPUS treatment (3 MHz, 100 mW/cm2, 20 min/day) 5 day before IRI were used to investigate the in vivo effects of LIPUS. LIPUS significantly protected the renal tubule cell viability and prevented inflammatory signals against H2O2 challenge. LIPUS could inhibit the apoptosis-related molecular signals and increase the protein levels of endogenous antioxidant enzymes, α-Klotho, and Sirt1 in renal tubule cells after H/R challenge. LIPUS alleviated the increases in the serum levels of blood urea nitrogen, creatinine, and cystatin C, renal pathological changes and apoptosis-related molecular signals, and impaired antioxidant enzymes in AKI mice. The IRI-induced inflammatory responses in the kidneys and spleens could be reversed by LIPUS. These findings suggest that LIPUS treatment displays the benefits for renal protection in IRI-induced AKI mice.

KU-S07

Application of Tissue Aspirate Parathyroid Hormone Assay for Imaging Suspicious Neck Lesions in Patients with Complicated Recurrent or Persistent Renal Hyperparathyroidism

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Background: Accurate pre-reoperative localization is essential for the management of patients with persistent or recurrent renal hyperparathyroidism. However, parathyroid scans and sonography are still insufficient. The purpose of this study is to clarify the role of tissue aspirate parathyroid hormone (PTH) assay for suspicious neck lesions on imaging in patients with recurrent or persistent renal hyperparathyroidism.

Methods: Between September 1995 and December 2014, patients undergoing localization studies for recurrent or persistent renal hyperparathyroidism were enrolled. Echo-guided tissue aspirate PTH assays were performed for suspicious neck lesions with uncertain or discrepant localization findings, lesions with unusual locations or numbers, and lesions over previously explored areas.

Results: Fifty tissue aspirate PTH assays were performed in 32 patients. Thirty-nine lesions were positive and 11 were negative. Thirteen of the 39 positive lesions were not identified by parathyroid scans, and 71.8% (28/39) had uncertain parathyroid sonography findings. Excluding one false negative lesion, the other (10/10) negative lesions had uncertain parathyroid sonography findings and one had a positive parathyroid scan. Thirty-five assay-positive and one assay-negative lesions in twenty-six patients were proved to be parathyroid tissues through neck explorations. Accordingly, the tissue aspirate PTH assays had a 100% positive predictive value. Of the reoperated lesions, 16.7% were ectopic, 22.2% were intrathyroid, 25.0% were parathyromatosis, and 36.1% were located over previously explored areas.

Conclusions: Tissue aspirate PTH assay is a safe and reliable pre-reoperative adjuvant tool to further clarify suspicious neck lesions on imaging and effectively avoid negative neck exploration in patients with complicated persistent or recurrent renal hyperparathyroidism.

KU-P01

The Role of Sonography in Clinical Practice Guidelines for Diagnosis of Erectile Dysfunction between Europe, Japan, and Taiwan

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Objectives: To assess the role of sonography in different clinical practice guidelines (CPGs) for erectile dysfunction (ED).

Materials and Methods: The printed and online materials in CPGs for diagnosis of ED by Taiwan Urological Association (TUA), European Association of Urology (EAU), and Japanese Society for Sexual Medicine (JSSM) were reviewed. The focus was on diagnosis aspect.

Results: The latest versions of CPGs for erectile dysfunction of TUA, EAU, and JSSM were available in 2020, 2021, and 2018, respectively. In TUA, sonography is not suggested or discussed for patients diagnosing ED. In EAU, dynamic duplex ultrasound of the penis is a second-level diagnostic test that specifically studies the hemodynamic pathophysiology of erectile function and it is usually applied in those conditions in which a potential vasculogenic etiology. Peak systolic blood flow > 30 cm/s, end-diastolic velocity < 3 cm/s and resistance index > 0.8 are considered normal by EAU. In JSSM, color Doppler ultrasound is recommended with detailed normal value of maximal peak systolic velocity (>30 cm/sec) and resistance index (0.8) after prostaglandin E1 injection for vasculogenic ED.

Conclusions: In this limited review, differences exist in different CPGs. Sonography is a noninvasive tool but with limited usefulness based on different CPGs. The study may do some help for revision of Taiwanese clinical guideline.

(Key words: Erectile dysfunction, Clinical practice guideline, Doppler)