ES-S01

An Evolution of Emergency Life Support – echo-Assisted Life Support (eALS®)

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Advanced Life Support (ALS) is a series of guidelines published and updated by the International Liaison Committee on Resuscitation (ILCOR). These guidelines provide medical service providers to deal with emergency conditions such as cardiac arrest, acute coronary syndromes, stokes, and conditions needed first aids. Among these guidelines, those about the management of cardiac arrest are most important and most emphasized, and many training courses are developed. In most clinical scenarios, finding out the possible cause of the current emergent condition is emphasized by the suggestions but usually is challenged. The guidelines and training courses usually provide conventional ways – history, physical examinations, or point-of-care bedside rapid tests. However, these methods often provided limited information, so a novel method needs to be developed to help ALS providers to achieve the possible causes of cardiac arrest more quickly.

Ultrasound (US) is an increasingly used diagnostic tool in emergency and critical care daily practices. Several protocols such as RUSH, BLUE, and US-CAB were introduced in recent years. Besides the traditional methods such as history taking, physical examinations, electrocardiogram, capnography, and chest x-rays, the US probe is the extension of medical providers' hands to access patients. Therefore, we designed echo-assisted life support (eALS®) based on the currently existing ALS provider courses. The eALS® mainly aimed at 3 important critical situations: cardiac arrest, chest pain/dyspnea, and shock. Many ultrasound technical skills and protocols were integrated into these situations to help medical providers to find out the possible cause quicker and more accurately, and furthermore, to save more lives.

ES-S02

The Application of Optic Nerve Sheath Diameter in Neuroprognosis of Cardiac Arrest Survivors

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Neuroprognosis is crucial in post-arrest care. Ultrasound measurement of optic nerve sheath diameter (ONSD) can be used as a non-invasive way to reflect intracranial pressure and predict the neurological outcome of cardiac arrest (CA) survivors. Comparing to other modalities, it can be performed repeatably at the bedside. However, the cut-off value of ONSD for neurological outcomes among CA survivors varied. It is also influenced by sex and eyeball transverse diameter (ETD). Here we present a prospective case-control study to investigate the sonographic ONSD and ONSD/ETD ratio among CA survivors, comparing with normal volunteers.

We enrolled adult non-traumatic CA survivors admitted to the emergency intensive care units at NTUH between October 2019 and March 2021. Patients with ophthalmologic operations, history of a brain tumor or brain surgery, could not obtain consent from the patient or a legal representative, were excluded. Healthy volunteers aged more than 20 years were recruited. Each CA survivor had 4 age- and sex-matched control of healthy volunteers. The examination was performed for CA survivors on post-ROSC day 1, day 3, and day 7. Also, it was performed on day 1, day 3 and day 7 of the enrollment for normal volunteers.

Of 30 CA survivors included in the analysis, 10 (33.3%) had favorable neurological recovery. Both ONSD (p=0.041) and ONSD/ETD ratios (p=0.003)

were significantly larger in CA survivors with poor neurological recovery using a mixed model repeated measurement. There was no significant difference in terms of day post-ROSC and the value of ONSD (p=0.450) and ONSD/ETD ratio (p=0.641). Comparing with normal volunteers, cardiac arrest survivors with favorable neurological recovery had no difference in the value of ONSD (p=0.394) and ONSD/ETD ratios (p=0.112).

In conclusion, ONSD and ONSD/ETD were associated with neurological outcomes in CA survivors. ONSD/ETD ratio might be a better index for neuroprognosis among CA survivors.

ES-S03
Ultrasonography in Assessing Subglottic Diameter

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Proper endotracheal tube (ETT) size selection and identification of potentially difficult airways are important to reduce laryngeal injury during intubation. However, controversies exist concerning transverse subglottic diameter-the narrowest part of the airway-and the distance to pre-epiglottic space. Because few studies have reported the distance from skin to the midpoint of the epiglottis (DSE) among normal individuals, whether the DSE varies between individuals and by ethnicity remains uncertain. The present study aims to investigate the sonographic subglottic diameter and DSE among healthy Chinese adults. Healthy volunteers were recruited at National Taiwan University Hospital between October and November 2019. Exclusion criteria included pre-existing airway or respiratory diseases, neck tumors, and a history of neck operation. Age, sex, height, weight, body mass index (BMI), sonographic DSE, and transverse subglottic diameter were recorded. A total of 124 participants were enrolled. The average age was 32.5 ± 10.4 years and 63 participants (51%) were males. The subglottic diameter was positively associated with sex (males, 14.40 mm; females, 11.10 mm, p < 0.001) and BMI (underweight, 12.13 mm; normal weight, 12.47 mm; overweight, 13.80 mm; obese, 13.67 mm, p = 0.007). Moreover, the DSE was shorter in males (male, 16.18 mm; females, 14.54 mm, p < 0.001) and participants with increased BMI (underweight, 13.70 mm; normal weight, 15.06 mm; overweight, 16.58 mm; obese, 18.18 mm, p < 0.001). As compared with other ethnicity, a smaller size of subglottic diameter and a shorter DSE were noted among Chinese participants, and we suggest that a relatively smaller size of endotracheal tube selection should be considered in tracheal intubations.

ES-S04
The Impacts of POCUS Game in Ultrasound Education

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Gamification is the application of game elements in non-game contents. Gamification adds features of games such as targets, regulations, entertainment, excitement, feedback, reward and progress to the real educational environment. Point-of-care Ultrasound (POCUS) had been used as a key modality for patient care and considered a core competency for residency training. Resident must own the ability to perform and interpret POCUS examinations, and implement this into clinical decision making. Sono Games was a novel activity designed by the Academy of Emergency Ultrasound for educational assessments. It was conducted in an interactive and friendly competitive way and held annually since 2012.

The committee of Ultrasound of Taiwan Society of Emergency Medicine hosted POCUS game in annual meeting since 2016 with the goals of assessing and improving emergency medicine residents' point-of care ultrasound knowledge,

hands-on skills and integration of knowledge into clinical decision making. The questions enrolled in each station could be classified into four categories: basic knowledges, technical, diagnostic and management. POCUS game became one of the most popular activities in the annual meeting in recent years. The competitive nature of the event was successful at generating interest and excitement for point-of-care ultrasound education. More and more emergency medicine residents joined this activity and spent their time in preparing for the game actively. The teaching courses for performing POCUS have been held much frequently after the initiation of the POCUS games. POCUS game brings physicians in training from different hospitals together and achieves the goal of promoting ultrasound education.

ES-S05
New Approach to Bed Side Ultrasound for Gastrointestinal Organ

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1. Transducer placement for GI tract
    How to perform GI tract US scan with the right positioning of transducer
2. Retroperitoneal vs. intraperitoneal
    Retroperitoneal GI organs have fixed position in abdomen and intraperitoneal GI organs have " floating " position in abdomen.
    Retroperitoneal GI organs are easier target for US scan, whereas intraperitoneal GI organs need certain skills to scan
3. Layering of GI tract
    Layering of GI tract is a useful method to differentiate disease process in GI tract.
4. Hypoechoic appearance = pathological finding
    Hypoechoic texture of GI tract usually means pathological problems and worthy of more detailed scanning
5. Hyperechoic gas as contrast
    Hyperechoic gas is served as a useful contrast

to define GI tract disease
6. Contrast enhanced ultrasound
    Modern US contrast scan is amazing in differentiate GI tract disease formerly difficult for conventional US scan to define

ES-P01
Usage of Point-of-Care Ultrasonography for Rapid Diagnosis of Acute Renal Infarction

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Acute renal infarction is a rare form of vascular emergency. Although major risk factors of renal infarction are due to cardio-embolic event such as atrial fibrillation, valvular or ischemic heart disease, renal artery thrombosis/dissection and coagulopathy, prevalence of idiopathic acute renal infarction can as high as 59%

Renal infarction is a rare condition with published rates of 1.4% for 14,411 autopsies published in 1940 and 0.007% per 250,000 visits at an emergency department. The incidence of renal infarction is probably higher since clinical diagnosis of renal infarction is frequently missed or delayed given the fact that fact that its presentation can mimic other more common pathologies such as acute pyelonephritis or renal colic. Computed Tomography (CT) is the gold standard diagnostic tool. However, Point-of-Care Ultrasonography (POCUS) imaging is useful in rapid exclude other etiology of acute flank pain, detection of perfusion deficit of renal cortex, and ascertaining sonographic evidence of renal infarction for rapid diagnosis and making effective treatment in this vascular emergency in early stage.

one case contributed to this emergency is presented. The history, physical examination and clinical imaging findings for clinical assessment are briefly described. Point-of-Care Ultrasonography (POCUS) was used to exclude other etiology and identify the pathological changes. The role of POCUS in rapid rule in acute renal infarction has been emphasized in clinical settings.

collecting system or perinephric tissues. The risk factor is usually associated with uncontrolled diabetes mellitus or ureteral obstruction. The majority of pathogens are Escherichia coli and Klebsiella pneumonia. Although computed tomography scan is mostly used to confirm the diagnosis and extent of disease, Point-of-care ultrasound not only provides real-time images at the bedside, but also helps physicians increase the suspicion of the disease to early diagnosis and treatment.

ES-P02
Woman with Abdominal Pain and Vomit

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Case report: A 57-year-old female presented to the emergency department with abdominal pain and vomit for 3 days. She was well oriented, with body temperature of 36.5 degree Celsius, blood pressure of 133/80 mmHg and tachycardia of 118 beats/min. On physical examination, abdominal palpation showed tenderness without peritoneal sign, knocking pain was revealed over right costovertebral angle. Laboratory data revealed leukocytosis (13140/ul) with neutrophil segment predominant and C-reactive protein level was 45.486 mg/dl. Urinalysis revealed pyuria and bacteriuria. Laboratory investigations also showed thrombocytopenia (10000 /ul) and acute renal dysfunction. The patient was newly diagnosed with type 2 diabetes mellitus due to blood glucose showed 460 mg/dl. Point-of-care ultrasound showed loss of corticomedullary differentiation over right kidney and hyperechoic foci with reverberation artifact near the hilum. Plain abdomen X-ray revealed gas collection over the medial side of the right kidney. Computed tomography scan of the abdomen was obtained and showed right acute pyelonephritis, hydronephrosis without urolithiais and the free air formation near the hilum of the right kidney.

Diagnosis: Emphysematous pyelonephritis. Percutaneous pigtail catheter drainage for right hydronephrosis was performed and urine culture revealed Escherichia coli. After further antibiotics treatment with meropenem, the patient completely recovered. Emphysematous pyelonephritis is an rare and life-threatening disease, which was first described by Kelly and MacCallun in1898. The mechanism is an acute necrotizing infection over renal parenchyma and surrounding tissues, resulting in the gas production in the renal parenchyma,

ES-P03
Point-of-Care Application of Diaphragmatic Ultrasonography in the Emergency Department for the Prediction of Development of Respiratory Failure in Community-acquired Pneumonia: A Pilot Study

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Background: Community-acquired pneumonia (CAP) is a fatal infection. However, there is no effective tool for respiratory failure prediction. Diaphragmatic ultrasonography (DUS) is a novel technique developed in the ICU setting to assess the diaphragmatic function by measuring the diaphragm thickening fraction (DTF) and diaphragm excursion (DE). This study aimed to evaluate the accuracy of DUS in predicting respiratory failure in patients with

CAP and its feasibility in the emergency department (ED) setting.

Materials and methods: This was a single-center prospective cohort study. Patients aged 20 years or older who visited the ED with moderate or severe CAP (PSI ≥4) were enrolled. The exclusion criteria were respiratory failure at the initial presentation. The DTF and DE were measured at the bedside using a portable machine by two emergency physicians. The PSI, CURB-65, and IDSA/ATS severity criteria were also collected. The outcome was respiratory failure within 30 days.

Results: A total of 50 patients were enrolled. The mean age was 78 years, and 56% were men, 26% progressed to respiratory failure. The average PSI, CURB-65, and IDSA/ATS minor criteria were 123 ± 26.10, 1.92 ± 0.94, and 1.4 ± 1.09, respectively. The DTF was shown to have a significant correlation with respiratory failure in the univariate logistic regression model, but the DE was not. Every 1% increase in DTF reduced the odds of respiratory failure by 6.6%. The optimal cut-off value of DTF was 23.95%, with an accuracy of 80% and a negative predictive value of 88.57%. In the multivariate analysis, the DTF was also shown to be an independent predictor of the outcome. There was strong agreement between the two raters.

Conclusion: We conclude that the DTF is a reliable and accurate tool to predict respiratory failure in patients with CAP. It can also be safely and conveniently used in ED.