Critical Ultrasounds: a foreword

Critical Care Ultrasounds (CCUS) has now been recognized as an essential part of critical care practice (1). CCUS is best defined as the ultrasound procedures performed at bedside by intensivists for diagnostic procedures as well as for guidance of therapeutic management and invasive procedures. CCUS applications have been described in depth in several consensus and review papers (2,3). It includes (non-exhaustive list) echocardiography, lung ultrasounds, abdominal ultrasounds, vascular ultrasounds, and cerebral ultrasounds.

CCUS is now integral part of the training of intensive care doctors. In most cases a basic training and rapid bedside screening approach is sufficient to establish the diagnosis. For some applications such as advanced critical care echocardiography (4) or transcranial Doppler, a more advanced training is required (2).

CCUS is of major help in orienting the diagnosis and management. In patients presenting in the emergency department, CCUS was critical in establishing the diagnosis in 45% of the patients and was even the sole procedure to allow definitive diagnosis in 15% of these (5). While the impact on outcome of the use of CCUS has not been tested formally in randomized control trials, observational data suggest that cardiac ultrasounds may be associated with improved outcomes (6). Even in absence of formal trials demonstrating the definitive benefit of CCUS on outcome, it seems logical to apply a technique that allows rapid definitive diagnosis at bedside.

Lung ultrasound had gained popularity over the years. With the pioneer work of Dr. Daniel A. Lichtenstein, lung ultrasound has now become a standard in lung and pleura evaluation of the critically ill patient (7). Lung ultrasound can be used to diagnose or rule out pneumothorax, pleural effusion, lung edema and lung consolidation. In expert hands, it can be used to optimize ventilatory setting, assessing lung recruitment and why not in the future titrate the PEEP. Recent emphasis has been put on its use in detecting weaning associated pulmonary edema (8) or diaphragmatic dysfunction (9).

Echocardiography has now become a standard in the differentiation of shock states and in guiding resuscitation (10). In more advanced hands, echocardiography can be used to perform the full hemodynamic evaluation (11). In addition to measurements of cardiac output, echocardiography can estimate filling pressures, pulmonary artery pressure, and heart-lung interactions. It also helps managing the need for fluids. Echocardiography, mostly by a transthoracic route, accounts for half of the daily ultrasonographic assessments in critically ill patients (1).

In trauma patients, the FAST and FAST extended are considered as the first evaluation to conduct in an unstable patient. While definitive diagnosis cannot always be done, its use as a screening tool and for patient orientation is of paramount value (12).

Vascular are of paramount importance for line insertion as well as for the diagnosis of venous thrombosis. Compared with landmark techniques, ultrasound guided line insertion is associated with a lower number of failed attempts and less complications (13). It can be used for central lines, peripheral lines and arterial lines insertion. Evaluation of deep venous thrombosis is also part of vascular US (14).

Cerebral ultrasounds are also integral part of the evaluation of the critically ill patient, helping to assess the presence of mass lesions (especially in children and young adults), cerebral edema and hypertension, and vasospasm (15).

The indications are more numerous every year. In this issue of the journal, some aspects of CCUS will be developed with more details like lung ultrasounds, echocardiography for the management of shock, ARDS and the patients under ECMO.

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Footnote

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