

The Great Value of Basic Critical Care U/S While Preparing for Intubation of Critically Ill Patient in ER

Walid Shibl* and Ali Mohammed Alsaihati

QCH, Ministry of Health, Saudi Arabia

***Corresponding Author:** Walid Shibl, ICU Consultant, QCH, Ministry of Health, Saudi Arabia.

Received: September 01, 2019; **Published:** October 31, 2019

Abstract

Purpose: To evaluate the role of Basic Critical Care U/S in decreasing post intubation hypotension in critically ill patient with high shock index [SI] in ER.

Methods: We use phase array probe 3.2 MH to visualize the heart, lung and IVC and high frequency probe 12MH to visualize the lung.

Case Report: We were consulted to intubate a 76-year-old female patient admitted to ER with a diagnosis of aspiration pneumonia because of worsening hypoxemia, because she a high SI 1.2, we did a Basic Critical Care U/S while preparing for intubation.

We found a lot of reversible factors which could lead to a very bad consequences with hemodynamic deterioration if we proceeded to sedation and intubation before correction.

We found severe hypovolemia as evidenced by very narrow and totally collapsing IVC despite severe heart failure, we found severe stress myopathy with EF 10%, and moreover, we found RT side pneumothorax.

We corrected all these factors by giving IVF boluses, Dobutamine IVI, and inserting RT side chest tube, after that we safely sedate and intubate the patient without any drawbacks.

Conclusion: Basic Critical Care U/S can save a lot of lives if we did while preparing for intubation in a critically ill patient with high SI in ER or ICU and we recommend a big study to prove that.

Keywords: Shock Index; Post Intubation Hypotension; BLUE Protocol; RUSH Protocol

Abbreviations

SI: Shock Index; PIH: Post Intubation Hypotension; PIA: Post Intubation Cardiac Arrest

Introduction

Hypotension is a common complication after intubation in ER and ICU, There are several definitions describing post-intubation hypotension [PIH] in the literature. A clinically relevant definition describes it as a decrease in systolic blood pressure (SBP) to ≤ 90 mmHg, a decrease in SBP of $\geq 20\%$ from a baseline, a decrease in mean arterial pressure (MAB) to ≤ 65 mmHg, or the initiation of vasopressors within the 30-minutes following intubation [1].

PIH occurs in up to one-quarter of ED intubations and associated with high mortality and extended ICU care [2,3].

The incidence of PIH in ICUs is between 20 and 46% for intubated patients and is associated with poor outcomes [4,5].

The most common predictor of such complications is the shock index (SI), the shock index (SI) is defined as heart rate divided by the systolic blood pressure (SBP), with a normal range from 0.5 to 0.7. It was first introduced by Allgöwer and Burri in 1967 as a simple tool assessing the intensity of hypoperfusion states [6].

Regarding post-intubation cardiac arrest, a retrospective study revealed that intubation-related cardiac arrest represents 23.3% of all non-traumatic arrests in the ED, and the authors concluded that post-intubation cardiac arrest occurred more frequently than was commonly recognized [7].

The studies demonstrated that a pre-intubation SI value of approximately 0.8 or more predicts the risk of PIH and the SI value of approximately 0.9 or more predicts the risk of post-intubation cardiac arrest [8-10].

Unfortunately, SI can predict PIH, but has nothing to do with management and prevention.

Ultrasound machine is portable, noninvasive, and the images are easily reproducible [11].

Ultrasound is emerging in most EDs as it is used in point of care imaging for trauma as well for guided interventions [12]. The ACLS, 2015, mentioned the different methods for identification of ETT placement including ultrasonography. In addition, lung sliding sign on ultrasound of the thoracic cavity can identify movement of the lung [13] moreover, U/S is very important in diagnosis of all causes of shock, Rapid Ultrasound in Shock (RUSH) is a recent emergency ultrasound protocol that integrates pulmonary evaluation with cardiac, abdominal, and venous examination [14,15].

We used to do rapid basic critical care U/S, including IVC, Heart, Lung U/S before intubation of Critically ill patient with SI of 0.8 or more in ED.

We present here a case of a 76-year-old female patient admitted in RR because of diagnosis of aspiration pneumonia, she received broad-spectrum antibiotics, salbutamol nebulization, chest physiotherapy, but, she deteriorated with dropping of oxygen saturation and they needed us to intubate.

Her SI was 1.2, so, we proceed for basic critical care U/S preparing for intubation.

Basic Critical Care U/S revealed hypovolemic state, severe LT ventricular failure as well as RT side Pneumothorax, we manage all before safe intubation to be done.

Case Report

A 76-year-old female patient was admitted to our Resuscitation Room [RR] with a diagnosis of aspiration pneumonia, she was treated with Broad-spectrum Antibiotics, IVF, salbutamol nebulization and chest physiotherapy without improvement.

ER team call the ICU Team for intubation, when we saw the patient, she was disoriented with a RASS scale -3, hemodynamically BP 100/60, HR 120/min without inotropes, RR 35/min with O₂ Saturation 85% on 15L NRM.

Heart: S1S2S3.

Lung: Diminished breath sound RT side.

Abdomen: Soft, lax.

We used to do Basic Critical Care U/S in any critically ill patient with SI equal or more than 0.8 to manage any reversible cause of hemodynamic instability or acute respiratory failure while preparing for intubation, we find this strategy of great value in preventing post intubation hypotension and cardiac arrest in ER.

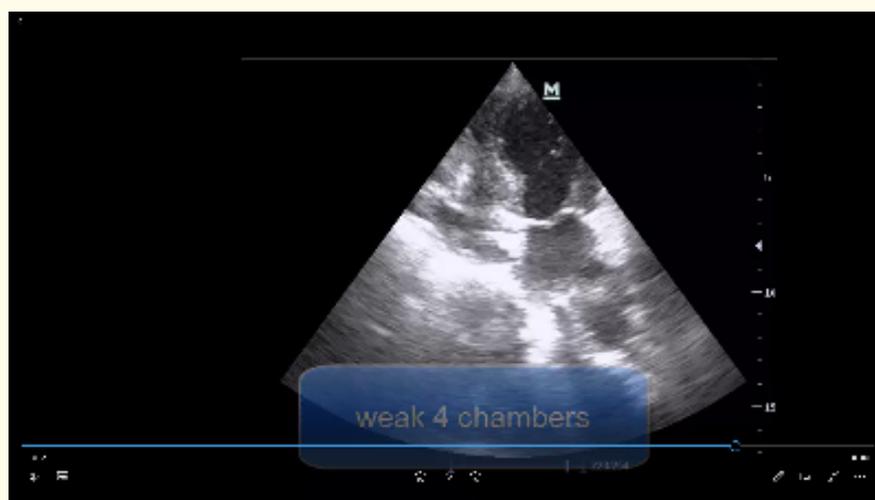
We did our Basic Critical Care U/S for this patient while preparing for intubation.

First: IVC, we try to get an idea about volume status by looking at the IVC.



Figure 1: IVC is narrow and totally collapsing denoting hypovolemia.

Second: Heart, Echo revealed apical ballooning and severe LT ventricular dysfunction with visual assessment of EF 10 - 15%.



<https://www.dropbox.com/s/k2982txbce8u235/weak%204%20chambers%20final.mp4?dl=0>

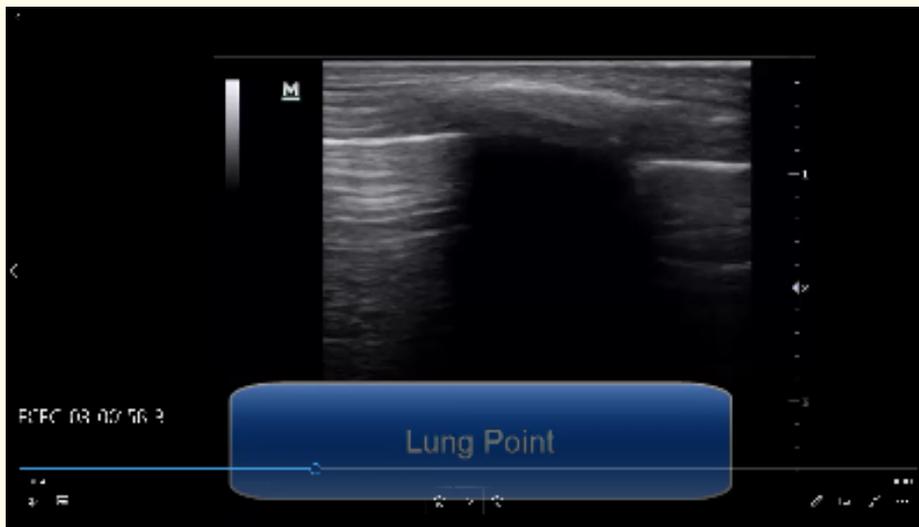
Figure 2: 4-chambers view reveal apical ballooning and EF 10%.

Third, lung U/S revealed RT side pneumothorax as evidenced by absent lung sliding, barcode sign, and lung pulse.



<https://www.dropbox.com/s/fmerhbalbrixl8x/RT%20side%20no%20sliding.mp4?dl=0>

Figure 3: RT side no pleural sliding.



<https://www.dropbox.com/s/49vlelmatdmp90p/lung%20point.mp4?dl=0>

Figure 4: RT side lung point.

Discussion

The process of endotracheal intubation and positive pressure mechanical ventilation can lead to hemodynamic instability with post intubation hypotension as well as post intubation cardiac arrest, sedative, analgesia and muscle relaxant abolish sympathetic activity and positive pressure ventilation decrease venous return, both mechanism can lead to hypotension especially in critically ill patient in ER and ICU [17,18].

The most common parameter used to predict post intubation hypotension and arrest is SI which is the heart rate over systolic BP with the value of 0.8 or above put the patient in high risk category.

SI predict but not manage the patient at risk.

Basic Critical Care U/S is one of the most important tool in management of shock and can diagnose all diseases affecting the SI like hypovolemia, heart failure, obstructive shock as well as acute respiratory failure.

We used to do Basic Critical Care U/S in all critically ill patient with SI more than 0.8 before intubation.

We present a case who admitted to ER with a diagnosis of aspiration pneumonia, she did not respond to antibiotics, IVF, salbutamol nebulization and chest physiotherapy, they called us for intubation, the patient SI was 1.2, so, we started Basic Critical Care U/S while preparing for intubation.

We started by First assessment of IVC, we found it narrow 0.5cm and 100% collapsible with inspiration denoting a low CVP of 3mmhg according to American Society of Echocardiography guidelines 2016.

Second, we did 2-dimentional Echocardiography and found apical akinesia and ballooning with very bad EF 10% and the patient did not have any history of heart disease which is going with stress myopathy.

Third, lung U/S revealed absent of sliding on the RT lung with barcode sign and lung point which confirmed the diagnosis of RT side pneumothorax.

Proceeding with sedation and intubation before correcting all these factors would be causing great harm to our patients.

We gave a boluses of IVF, 1 litre of NS, started dobutamine IVI before sedation as well as inserting RT side chest tube before proceeding to intubation.

BP as well as O₂ saturation was maintaining throughout all the process of sedation and intubation.

Basic Critical Care U/S is accessible, noninvasive, repeatable, radiation free and can quickly diagnose most of critical diseases increasing SI and predict the PIH, PIA.

U/S is the most important tool in management of all causes of shock [14,15].

Through BLUE protocol, U/S can discover 90% of causes of acute respiratory failure [16].

To the best of our knowledge no one investigate the value of quick Basic Critical Care U/S while preparing for intubation in high risk patient with high SI.

Conclusion

Basic Critical Care U/S has a great role in discovering most of the diseases which increase the SI and doing it in case of Critically ill patient with high SI while preparing for intubation can save a lot of lives.

Bibliography

1. Green RS, et al. "Evaluation of the incidence, risk factors, and impact on patient outcomes of postintubation hemodynamic instability". *Canadian Journal of Emergency Medicine* 14.2 (2012): 74-82.
2. Heffner AC, et al. "The frequency and significance of postintubation hypotension during emergency airway management". *Journal of Critical Care* 27.4 (2012): 417.e9-13.
3. Franklin C, et al. "Life-threatening hypotension associated with emergency intubation and the initiation of mechanical ventilation". *American Journal of Emergency Medicine* 12.4 (1994): 425-428.
4. Smischney NJ, et al. "Incidence of and Risk Factors for Post-Intubation Hypotension in the Critically Ill". *Medical Science Monitor* 22 (2016): 346-355.
5. Green RS, et al. "Postintubation hypotension in intensive care unit patients: A multicenter cohort study". *Journal of Critical Care* 30.5 (2015): 1055-1060.
6. Allgöwer M and Burri C. "Shock-index". *German Medical Monthly* 13.1 (1968): 14-19.
7. Ko BS, et al. "Prevalence and outcomes of endotracheal intubation-related cardiac arrest in the ED". *American Journal of Emergency Medicine* 33.11 (2015): 1642-1645.
8. Heffner AC, et al. "Predictors of the complication of postintubation hypotension during emergency airway management". *Journal of Critical Care* 27.6 (2012): 587-593.
9. Koby A, et al. "Using pre-Rapid Sequence Intubation Shock Index as a predictor of post-intubation hypotension, mortality, and duration of intubation". Conference: Florida College of Emergency Physicians Symposium by the Sea, At Omni Amelia Island Plantation Resort, Amelia Island, FL (2015).
10. Smischney NJ, et al. "Ketamine/propofol admixture (ketofol) at induction in the critically ill against etomidate (KEEP PACE trial): study protocol for a randomized controlled trial". *Trials* 16 (2015): 177.
11. Galicinao J, et al. "Use of bedside ultrasonography for endotracheal tube placement in pediatric patients: A feasibility study". *Pediatrics* 120.6 (2007): 1297-303.
12. Ustic A. "Role of ultrasound in the airway management of critically ill patients". *Critical Care Medicine* 35.5 (2007): S173-S177.
13. Sim SS, et al. "Ultrasonographic lung sliding sign in confirming proper endotracheal intubation during emergency intubation". *Resuscitation* 83.3 (2012): 307-312.
14. Perera P, et al. "The RUSH exam: Rapid ultrasound in shock in the evaluation of critically ill patient". *Emergency Medicine Clinics of North America* 28.1 (2010): 29-56.
15. Perera P, et al. "The RUSH Exam 2012: Rapid ultrasound in shock in the evaluation of critically ill patient". *Ultrasound Clinics* 7 (2012): 255-278.

16. Daniel A Lichtenstein and Gilbert A Mezière. "Relevance of lung ultrasound in the diagnosis of acute respiratory failure: the BLUE protocol". *Chest* 134.1 (2008): 117-125.
17. Nolan JP and Kelly FE. "Airway challenges in critical care". *Anaesthesia* 66.2 (2011): 81-92.
18. Jaber S., *et al.* "Clinical practice and risk factors for immediate complications of endotracheal intubation in the intensive care unit: a prospective, multiple-center study". *Critical Care Medicine* 34.9 (2006): 2355-2361.

Volume 3 Issue 11 November 2019

©All rights reserved by Walid Shibl and Ali Mohammed Alsaihati.