

IT CAN BE THAT SIMPLE: UTILITY OF BEDSIDE ULTRASONOGRAPHY IN THE INTENSIVE CARE UNIT

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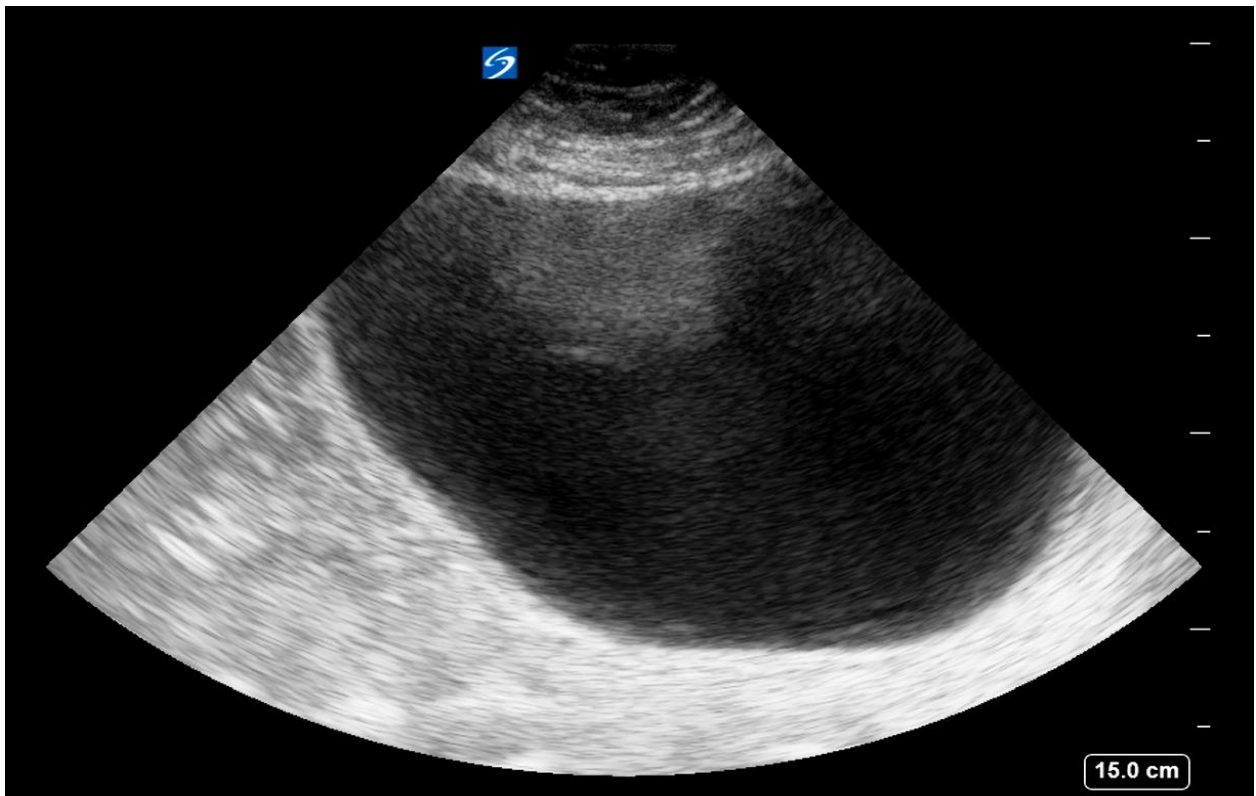
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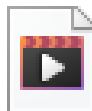
Case history:

A 68 years old male with a history of chronic obstructive pulmonary disease (COPD) was brought to the emergency room (ER) after he was found to be obtunded at home. He was given IV Naltrexone in the field for suspected opioid overdose. This improved the mental status, but he continued to have shortness of breath. In ER, he was noted to be lethargic and minimally responsive. He was intubated for hypercapnic respiratory failure and placed on mechanical ventilation. He was admitted to the intensive care unit. His nasopharyngeal aspirate was positive for Influenza A/H3 for which he was started on Oseltamivir. He was also treated with intravenous steroids and nebulized bronchodilators for a COPD exacerbation along with antibiotic coverage for community acquired pneumonia. Midazolam drip was used for sedation and fentanyl drip for pain control were used while on mechanical ventilation. Attempts for liberation from the ventilator were unsuccessful due to increased work of breathing. On the 9th day of hospitalization, patient was noted to be increasingly agitated, tachypneic and tachycardic on the ventilator. Examination revealed increased respiratory rate of 35-40 per minute with a heart rate of 130 beats per minute. The blood pressure was elevated to 170/110 mm of Hg. Chest examination revealed equal air entry on both sides, with no wheezing or crackles. Heart sounds were normal with no murmurs. Abdominal examination revealed no obvious distension. An external urinary collecting device (condom catheter) was being used which is draining urine around 20 cc per Kg body weight overnight. The Fentanyl and Midazolam drips were titrated up and a 3rd sedative, Dexmedetomidine was added to ensure patient was well sedated. The following morning, as a part of daily physical examination a bedside ultrasonography was performed. Lung ultrasound showed normal A line pattern with no pleural effusions or consolidation. Focused echocardiogram showed normal left and ventricular function and chamber size. Inferior vena cava size and caliber was normal. There was no evidence of deep vein thrombosis. Examination of the abdomen showed a distended bladder extending to the umbilicus (Figure 1 and Video 1). Review of fluid balance of the previous 24 hours showed a positive fluid balance of 2300ml with intake of 3200ml and output of 900ml. In view of acute urinary retention, an indwelling urinary catheter was placed which collected 1000ml of urine immediately. It was noted that after this intervention, the sedation requirements significantly reduced.

Figure 1: Ultrasound image using phased array probe in the abdomen preset. Probe positioned with index marker on probe pointing cranially. Probe positioned just below the umbilicus, showing a large hypoechoic structure consistent with enlarged urinary bladder.



Video 1: Video acquisition using a phased array probe. Index marker on the probe pointing cranially and probe placed in the midline just below the umbilicus. Video showing an enlarged hypoechoic structure consistent with distended urinary bladder.



Play Video.avi

https://drive.google.com/file/d/1dDLUb1RE6mNCP2JT2baz1fZ6Yv_zvwTO/view

Discussion:

Use of indwelling urinary catheter is associated with increasing incidence of catheter associated urinary tract infections (CAUTI).¹ There is a reported incidence of 1.4-1.7 CAUTI per 1000 days of indwelling catheter use according to surveillance data submitted to CDC National Healthcare Safety Network.¹ As a part of intervention bundle to prevent CAUTI, external urinary collection devices are increasingly used, in the critically ill patients.² On the other hand interventions made to reduce CAUTI and use of alternatives to indwelling catheters were associated with increased incidence of urinary retention and associated complications.³ Critically ill patients are routinely given analgesia and sedation to prevent pain and anxiety while they are intubated. It is observed in various studies, that use of sedatives and hypnotics is one of the risk factors for acute urinary retention in critically ill patients.⁴ Increased sedation use is also associated with adverse clinical outcomes like prolonged need of ventilation and

ICU stay.⁵ When a patient becomes agitated while on sedation, the doses of sedatives are usually titrated up. In the absence of new findings that can cause, pain, anxiety, respiratory distress, increasing requirements of sedation are attributed to tolerance to medication. Our patient was also given increasing doses of sedation to alleviate anxiety. But the reason for patient becoming agitated was acute urinary retention, over-distention of the urinary bladder and discomfort resulting from this. Increasing sedation in fact can set up the vicious cycle of increasing the urinary retention and resulting discomfort and agitation. Portable bedside ultrasonography is being increasingly used by clinicians for rapid identification of various conditions in critically ill patients.^{6,7} Bedside ultrasonography is most commonly used in Emergency room and intensive care units. In our case, finding the over-distended bladder while doing the bedside ultrasonography was unexpected especially as the patient was not oliguric. It was however, very valuable in identifying the cause of distress and treating it. This helped in management of discomfort and to break the vicious cycle.

Thus, we conclude that acute urinary retention should be considered as a potential cause for new onset agitation or distress in a critically ill patient especially when patient is on sedation. Acute urinary retention cannot be reliably excluded in patients who are having adequate urine output even though it is evident by collection in the external collecting devices. Portable bedside ultrasonography is a useful tool in diagnosing the causes of acute distress, one of which is acute urinary retention. It needs to be incorporated into routine practice for evaluating the critically ill patients.

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