POSITIVE BALANCE NIGHT SYNDROME

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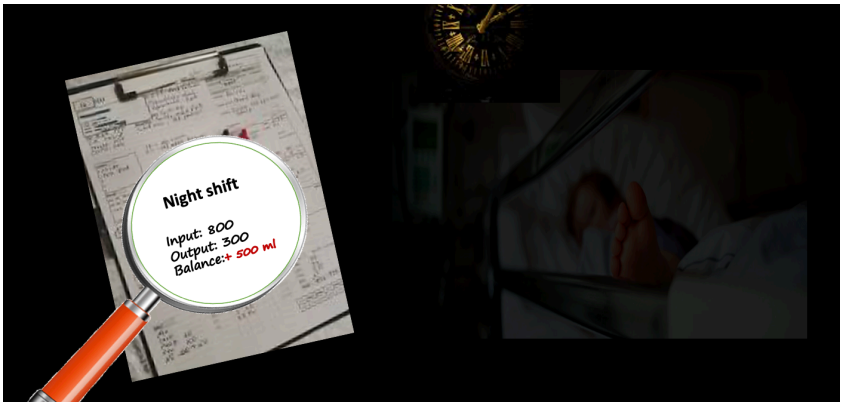
You rounded in the morning in Pediatric Intensive Care unit (PICU), and one of the plans was to target a negative balance of 100ml in 24 hrs. You advised titrating furosemide infusion up and down to achieve this goal since his renal function was normal. The following day, you found fluid balance during night hours to be positive 500ml, and you wondered if furosemide does not like to work in the dark, or the kidneys were tired and took a nap!

The patient was admitted with septic shock and was resuscitated with 80ml/kg of crystalloid before starting norepinephrine infusion that squeezed his vessels a bit until the coronaries smiled happily with more water supply and sniffs of Oxygen. Now he has fluid overload and severe ARDS. The lung did not like it as she struggles to breathe below the water! She is always lecturing everybody that the water either saves you when you are thirsty or kills you when you are drowning. Hence, you have to be cautious and do not rush to pour all the water in the hospital in your patient every time the heart rate climbs up or the blood pressure steps down. He may not need a lot of water but a lick of epinephrine or a small portion of norepinephrine. Since his hemodynamic looks good now, you need at least to keep him on euvolemic status. You have to keep in mind that



the excess fluid that was given during resuscitation still did not evaporate! How will it evaporate if you do not even allow the sun to shine in your PICU during the day? Not to do anything really with the water but to restore sleep - wake cycle that may help to prevent delirium. It seems the progressive accumulation of positive balance will mandate me to suck all the water out slowly and continuously (Slow Continuous Ultrafiltration, SCUF) to make the floating tissues happy. This results in more invasive line and more extended stay with us. What was I talking about? Yeah, I was supposed to talk about a syndrome! Wait, do not call a geneticist yet!

Positive Balance Night syndrome!

It is a funny description I use for when a patient in PICU accumulates fluid throughout the night unnoticed without action, and you find his balance positive in the morning despite the goal of keeping him euvolemic or in a negative balance. Some patients are on diuretics with room to increase , but still, they accumulate more and more fluid without increasing the dose. It is typically happening between midnight and 6 AM. Physicians who do 24 hours duty in PICU are usually exhausted by midnight physically

Learning points

(1) Fluid overload in critically ill children is associated with increased morbidity and mortality.

(2) In ARDS, it is recommended to prevent positive fluid balance after initial resuscitation and stabilization.

(3) Be cautious about the amount of fluid needed for resuscitation. Use objective measures to assess the need and response to fluid boluses like IVC assessment, cardiac index, cardiac contractility, and fluid overload signs.

(4) Norepinephrine increases blood pressure by acting on α receptor, causing vasoconstriction (increases systemic vascular resistance).

(5) Delirium is an under-diagnosed problem in PICU. Prevention is essential, and non-pharmacological management includes restoration of the sleep-wake cycle. Open the curtain during the day and close the lights during the night.

and mentally, especially if it was a hectic day. It is nap time as well, so even if it is not busy at that time, do not tell me you do not sneak to the on-call room to put your head in the pillow while waiting for the pager to peep again for a new consult from the emergency room or for a cardiac arrest activation. I had sneaked a lot before and mainly because the nurses kicked me out nicely while calculating every drop (IN) and every drop (OUT) and while obsessively emptying all drops in the urinary catheter to the bag. I cannot deny that occasionally, my planned 30 minutes nap after midnight unexpectedly extended to 6 AM when I rushed to see the fluid balance!! Increasing furosemide was too late as the balance was already documented in red color as positive 500ml!! It was nothing other than **Positive Balance Night syndrome!** Why the nurse did not alert you for accumulating fluid? It was either the plan was not clear for her or not communicated well, or she was very kind and did not like to disturb you at night. The other possibility, the input and output charting was not done hourly as expected, or there was a miscalculation of the balance that was detected only by the in-charge nurse in the morning while taking handover from bedside nurses.Whatever the reason, we need to get rid out of the swiss cheese! Mom came in the morning and, once she saw her child's face and hand very puffy, became upset. During the handover, I became shocked and frustrated as our fluid balance goal was not achieved. The patient's lung was not happy either, and I could not blame her for increasing the Oxygenation index from 15 to 18. She cried a lot when we thought about inserting a chest tube for increasing pleural effusion!

Anyway, I think we can still close the lights in PICU during the night so patients can sleep better, but probably we should not close our eyes entirely from fluid balance! As a team, all of us should take a turn as a goalkeeper! To keep our planned goal alive till the next morning!