CORRESPONDENCE

Umbilical Venous Catheter Position Formula: Best is yet to Come!

Despite umbilical venous catheter (UVC) insertion being a common procedure in the neonatal units, the ideal formula for an optimal position is still an illusion for the neonatologists. The study by Krishnagowde, *et al*. [1], recently published in *Indian Pediatrics* [1], is a step forward in this direction. We have few concerns, clarification of which will be useful for the readers.

1. The authors compared Shukla's formula [2] (UVC length inserted (in cm) = (birth weight×3+9)/2) +1) with their proposed JSS formula (UVC length (in cm) = 6.5 + weight in kg) and showed that Shukla's formula has higher rates (65.5%) of 'short of length to an acceptable position' as compared to JSS formula (29.2%). Calculating length of insertion with each formula, the length of insertion is much more with Shukla's formula as compared to JSS formula; the difference widening as the weight of infant increases. Thus, logically Shukla's formula should have led to deeper insertion as compared to JSS in this study. Shukla's formula has been earlier shown to lead to higher rates of over-insertion of UVC; therefore, revised formula (UVC length inserted (in cm) = (birth weight×3+9)/2) has been suggested [3].

2. The authors have used an anteroposterior (AP) view *X*-ray for confirming the position of the tip of the UVC. A recent study has shown that the radiograph has only moderate accuracy in detecting the position of the tip of UVC [4]. The last portion of the ductus venosus runs in the sagittal plane and, therefore, it can be correctly visualized only in lateral view. Moreover, rising concern of radiation exposure and increased availability of the ultrasound machine makes the bedside echocardiography the modality of choice. Ultrasound is shown to be superior in localizing the exact position of the catheter and can help in the real-time adjustment of the tip [4]. Therefore, the studies comparing new formula with the existing one should use a better standard (like echocardiography) to make the study more robust. In the absence of the facility or skills for bedside ultrasound, a lateral view should be combined with anteroposterior to increase the diagnostic accuracy.

3. The authors did not mention the time interval between the insertion of the catheter and chest radiograph acquisition. The catheter migration after a few hours is not unusual in the clinical practice, and delay in acquiring radiograph may show increased rates of malposition [5].

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AUTHOR'S REPLY

We thank the reader for careful examination of our study. The clarifications are as follows:

1. The formula used for comparison with JSS Formula in our study was modified Shukla formula, which generally falls short of JSS formula.

2. Though ultrasound is increasingly being used to report the tip of the umbilical venous catheter, it is not universal due to availability of machines/skilled personnel. Regarding usage of *lateral view*, we differ regarding it being better. We have recently conducted a retrospective analysis of 140 *X*-rays for inter- and intra-rater agreement between horizontal-dorsal-decubitus (lateral) *vs* supine *X*-ray in determining the optimal localization of the tip position. This study showed a fair agreement