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LETTER TO THE EDITOR

Cephalic Angulation of Epidural Needle Insertion may be an Important Factor to Safely Approach the Epidural Space: A Mathematical Model

Regarding the mathematical study by Inoue et al. ¹, it is appropriate to mention the study by Cheng ² published more than half a century ago, in which the research team measured circular epidural space (ES) width and dura mater (DM) thickness. According to Cheng ², ES axial width at L2-L3 is 6 mm. Thus, if the puncture is performed at an angle of 30-degree to the skin, the puncture safety margin (Image 1 A) ¹ will be 12 mm ($\sin 30^\circ = 6 \text{ mm/A}$). In this line of thought, with a 45-degree puncture angulation, ES safety margin (SM) will be 8.6 mm, which is smaller than that of the 30-degree puncture. In the thoracic and cervical regions, there is a reduction in the epidural space, as well as the angle of the median and paramedian punctures, due to bony anatomy of spinal apophyses guiding the puncture angulation. Because there is no data on the incidence of thoracic DM perforation, it is supposed to be lower than that of the lumbar DM. It is likely that many anesthesiologists, based on Euclidean reasoning, prefer the latter for the following reasons: 1) to facilitate access to the ES; 2) it results in greater SM (Image 1) ¹; 3) prevent DM perforation; 4) consume less time for blockade performance ³; and 5) facilitate catheter insertion. This reasoning is also applicable in peripheral regional anesthesia ^{4,5}, provided that a profound anatomical parameter is recognized, as shown in Images 1 and 2 of previous studies ^{4,5}.

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References

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