DO THORACIC EPIDURAL CATHETERS GO CEPHALAD OR CAUDAD?

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Introduction: The effectiveness of an epidural catheter is limited by its position. If the level of insertion is too high or low, or if the catheter advances caudad instead of cephalad, the predicted spread of analgesic agents will not occur in the surgical dermatome resulting in sub-optimal pain management. A previous study has demonstrated over 50\% of catheters tended to travel caudad despite an upward turned needle bevel in the thoracic epidural space\textsuperscript{1}. This appeared not to be the case in our institution so we undertook a study 1) to determine the likelihood of the orientation of a thoracic epidural catheter in the epidural space and 2) to assess how accurate anesthesiologists are in determining the level of insertion of the catheter.

Methods. Ethics approval was obtained from the hospital and UBC ethics board. Thoracic epidurals were placed in 61 patients undergoing thoracotomy. The method and level of insertion was left to the discretion of the attending anesthesiologist. The method of catheter inserted was randomized to: Braun Perifix FX, Arrow flextip plus, and Sims Portex multiorifice. They were advised to leave 5cm of catheter in the epidural space. The approach used (midline vs paramedian), the level of insertion, number of attempts and any complications were noted. An antero-posterior chest radiograph was performed in the PACU prior to which 0.5-1.0 ml radio-opaque contrast was injected to fill the catheter. The therapeutic effect of the epidural catheter was documented in the PACU. A blinded radiologist interpreted the radiographs noting the level of insertion of the catheter and the orientation of the catheter in the epidural space. These readings were correlated to the anesthesiologists’ documented levels of insertion.

Results. Of 61 radiographs that were reviewed, 45 catheters advanced cephalad (74\%) and 8 remained at the level of insertion (13\%). 8 could not be interpreted due problems with penetration of the radiograph. None of the catheters appeared to travel caudad. 33 of 61 catheters were inserted at the same level or within 1 interspace of the stated thoracic level (54\%). 15 were within 2 interspaces (25\%) and 5 were 3 or more inter-spaces off where the catheter was actually inserted (8\%). Measures of concordance were shown not to be significant (0.06).

Discussion. Of the interpretable films, 88\% thoracic epidural catheters naturally oriented themselves cephalad and none in a caudal manner. This is different than previously suggested\textsuperscript{1} and more like what we suspected in our practice. Possible explanations include midline vs paramedian approach as well as the catheter material. It is encouraging to be able to predict the direction of the catheter once placed. Virtually all (95\%) approaches were paramedian and there was no difference in orientation between the types of catheter used. Approximately 80\% of catheters were within 2 interspaces. Anesthesiologists need to ensure accurate level of placement in all patients.

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