A PULSATILE PRESSURE WAVEFORM IS A SENSITIVE MARKER FOR CONFIRMING THE LOCATION OF THE THORACIC EPIDURAL SPACE

Umedaly HS1, Lennox PH1, White SA1, Grant RP1, Fitzmaurice BG1, Evans KG2

Departments of Anesthesia1 and Surgery2, Vancouver General Hospital and University of British Columbia, Vancouver, British Columbia, Canada

Introduction: The loss of resistance technique is widely used for the location of the epidural space. However, failed pain management can occur due to the false loss of resistance and the epidural catheter advancing into a space other than the epidural space. Testing the epidural catheter prior to induction of anesthesia consumes precious operative time. Furthermore, when failed epidural anesthesia is only recognized post operatively, significant uncontrolled pain may occur as well as prolonging the intubation time particularly after thoracic surgery. Thus, immediate confirmation of the epidural space would be beneficial. There is a characteristic pressure waveform that can be transduced to confirm placement of the catheter in the epidural space. This technique has been used to determine whether the catheter has remained in the epidural space after several days of use1. We devised this study to see how reliably this pressure waveform can be reproduced through both the Tuohy needle and the epidural catheter when loss of resistance was found in the thoracic epidural space and correlated this with successful outcome of epidural analgesia.

Methods. Ethics approval was obtained from the hospital and university ethics board. Thoracic epidurals were placed in 67 patients undergoing thoracotomy. Loss of resistance to air or saline was used to locate the epidural space. At this point, the tuohy needle was transduced with a standard pressure system, the presence of a pulsatile waveform was sought and a hard copy printed. The catheter was then positioned 5cm into the epidural space, transduced and a hard copy printed. Any difficulty or complication was noted. Epidural analgesia was instituted prior to surgical incision with a local anesthetic-opioid combination. In the PACU, it was determined whether or not the epidural catheter was clinically functioning as evidenced by effective pain management and a dermatomal loss of cold sensation. Each tracing through the needle and the catheter was examined and read as pulsatile or non-pulsatile.

Results. In 65 out of 67 cases (97%), a pulsatile waveform was visible through the Tuohy needle as confirmation of being in the epidural space. In 2 cases, there was no pulsation in the waveform, one being due to a disconnection in the stopcock in the transduction system and the other for no apparent reason. In 41 of 67 catheters (60.3%), a pulsatile waveform was obtained and in the remainder, no pulsation was visible. In all cases, the epidural analgesia was effective in the PACU. The sensitivity of an epidural waveform as a test through the tuohy needle on encountering the epidural space is 97.01%.

Conclusion. This characteristic waveform is a sensitive indicator when transduced through the tuohy needle to confirm placement in the epidural space. It is less reliable when transduced through the catheter probably due to the inherent characteristics of the design of epidural catheters in relation to optimal damping and orifice size. Immediate confirmation of the site of the thoracic epidural needle and thus catheter placement may be cost effective and prevent failed thoracic epidural pain management.

Reference: