Computerized axial tomo-epidurographic and radiographic documentation of unilateral epidural analgesia

Andre P Boezaart
MBChB M Prax Med DA(SA) FFA(SA) M Med (Anaesth)

A 23-year-old primigravid patient who received epidural analgesia for pain of labour presented with persistent, apparently irremediable, unilateral analgesia. Computerized axial tomo-epidurography demonstrated absence of circumferential spread due to lateral placement of the catheter. Transforaminal escape of contrast medium into the paravertebral area had occurred and anterior and posterior midline partitioning of the epidural space was obvious. All the usual measures to the promote contralateral analgesia, except re-insertion of the catheter, had been tried without success.

Unexpected hemianalgesia is an uncommon complication of epidural analgesia.[1-3] Ducrow[4] estimated the incidence of persistent unilateral block to occur in 0.54 per cent of patients receiving epidural analgesia.

Computerized axial tomo CT-Epidurography has been used to study the anatomy of the epidural space.[5] This report used the technique to document the reasons for failure of lumbar epidural anaesthesia to provide adequate analgesia for labour.

Case report

A 23-year-old primigravid Caucasian required epidural analgesia for pain relief in labour. She was healthy and there was no history of previous instrumentation to or surgery of the lumbar spinal area, nor was there a history of meningitis. A 16G Tuohy needle was inserted between the second and third lumbar vertebrae. The epidural space was identified at 5 cm from the skin by loss of resistance to air technique. A midline approach, with the patient in the right lateral position, was used. After placement of the epidural catheter, neither blood nor cerebrospinal fluid could be aspirated. Two ml of lidocaine two per cent with adrenaline 1/200,000 was injected, via the catheter, to exclude the possibility of intrathecal or intravascular injection. After injection of 10 ml bupivacaine 0.25 per cent a unilateral block resulted on the patient's right side within 20 minutes. Slow injection of 10 ml of the same drug was added after positioning the patient on her left side, followed 20 minutes later by 10 ml of lidocaine one per cent. Analgesia remained confined to the right side. The epidural route was not used again during labour but the catheter was left *in situ*. Analgesia was supplemented with intravenous meperidine.

Two hours later the patient was delivered vaginally of a healthy infant. Analgesia was supplied by bilateral pudendal nerve infiltration with 20 ml one per cent lidocaine. After informed consent was obtained from the patient 15 ml iopamidol (200 mg · ml^{-1}) was injected via the epidural catheter. A right paravertebral collection of contrast medium was visible on a radiograph of the lumbar spine (Figure 1).

Following this CT-epidurography was performed (Figure 2). This demonstrated a partition separating the epidural space into a left and right compartment, both anteriorly and posteriorly. Contrast medium showed marked paravertebral spread on the right side limited ventrally by the aorta.

Discussion

Usubiaga[6] demonstrated that local anaesthetic agents follow three routes of dispersion along the path of least

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Department of Anaesthesia, University of the Witwatersrand, Johannesburg Hospital, Johannesburg, Republic of South Africa.

Address correspondence to: Dr. A.P. Boezaart, Panorama Mediclinic 222, Rothschild Boulevard, Parow 7500, Republic of South Africa.

FIGURE 1

resistance with posterior placement of the catheter. These routes are longitudinal (craniocaudal), lateral (escaping via an intervertebral foramen) and circumferential (around the dura). The first two determine the extent and quality of the epidural blockade and the last is unimportant if the catheter is placed posteriorly in the epidural space. With anterior or anterolateral placement of the catheter the circumferential route becomes important as contralateral anaesthesia depends on backflow of anaesthetic solution along the circumference of the dura.[1] Craniocaudal spread still determines the extent of the blockade and because anterior trabeculations limit anterior contralateral dispersion, ipsilateral transverse spread remains mostly confined to the site of injection. Most of this then leaves the epidural space via intervertebral foramen.

Circumferential spread (and thus contralateral analgesia) is inversely proportional to the magnitude of transforaminal espace which is, in turn, a function of age.[1]

Contralateral analgesia can be sought by increasing the volume of the local anaesthetic (causing more overflow), slowing down the speed of injection (causing less longitudinal spread), positioning the patient on the non-anaesthetized side (gravity) or withdrawing the catheter a few centimetres (moving the tip posteriorly).[1]

At least five causes of unilateral analgesia have been identified. These are slow injection while the patient is in the lateral position, which favours dependent side analgesia;[2] congenital abnormalities;[2,5,7] acquired midline adhesions;[2] passage of catheter into paravertebral area via intervertebral foramen;[8,9] and ventral palcement of the catheter.[1]

In the patient described, only 3 cm of the catheter lay within the epidural space, hence total transforaminal escape was not likely.[9,10] A multi-orifice catheter was used so it is possible that the distal one or two orifices were in a paravertebral area, while the proximal orifices remained in the epidural space.

At least four of the five possible causes for hemianalgesia – patient positioned on right side; congenital anterior and posterior midline partitions; partial passage of catheter into a paravertebral area; and lateral placement of the catheter, could have been present in this case. Lateral placement of the Tuohy needle could be anticipated on account of the relatively long distance, 5cm, from skin to the epidural space in this thin patient. Narang[11] reported a significant correlation between skin to epidural space distance and the incidence of unilateral analgesia. CT-epidurography clearly demonstrated the presence of anterior and posterior partitioning of the epidural space and this explains why efforts to achieve contralateral analgesia were unsuccessful. Retrospectively it is clear

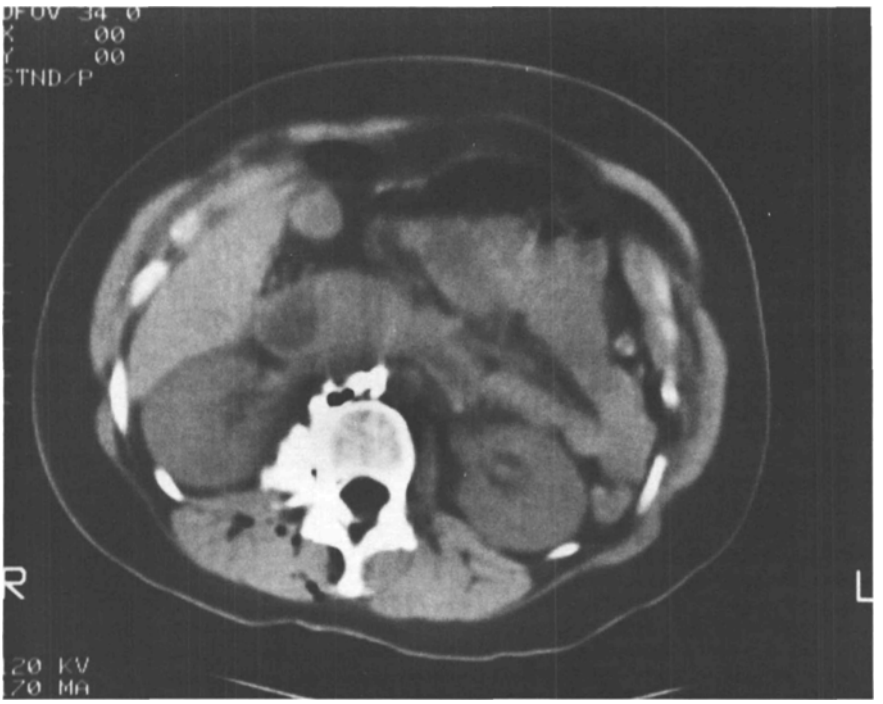

FIGURE 2

that the only remedy for this dilemma would have been to insert a catheter into the left epidural space.

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Résumé

Une primipare de 23 ans ayant reçu une analgésie par voie épidurale lors de l'accouchement a accusé une analgésie unilatérale persistante et irrémédiable. Une tomo-épidurographie axiale "computarisée" a démontré que l'absence d'extension circonférentielle de l'analgésie était due à une localisation latérale du cathéter. Une fuite du produit de contraste à travers le foramen vers la région paravertébrale est survenue expliquant la partition de l'espace épidural. Toutes les mesures habituelles pour remédier à cette situation furent essayées sans succès à l'exception de la ré-insertion du cathéter.