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Use of loss of resistance, to carbon dioxide, in identifying the epidural space

The use of air, in localizing the epidural space, has been associated with suboptimal or "patchy" anesthesia as well as the rare occurrence of venous and cerebral air emboli. Saline has been documented to be superior and devoid of these side effects.[1,2] However, saline, being virtually incompressible with respect to air, is significantly more difficult to use for localization of the epidural space.

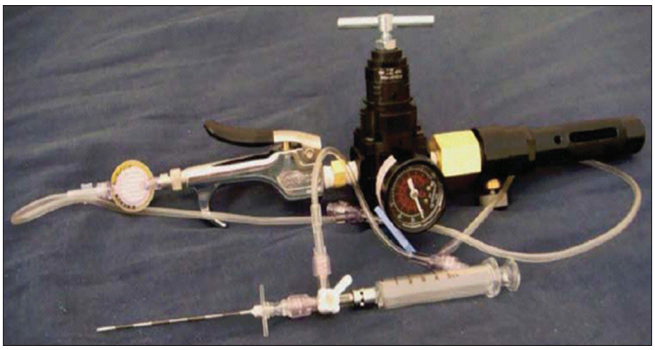

Figure 1: This device allows for a syringe to be filled, with CO_2, to assist in epidural space localization

Carbon dioxide (CO_2) would allow for the same ease of localization as air. This occurs as the bulk modulus of CO_2 is almost identical to that of the air.[3,4] It thus has a similar "feel" when used for identification of the epidural space. CO_2 is also readily absorbed across cell membranes and is more rapidly eliminated, from tissues, than air.[5,6,7] Furthermore, CO_2 is actively transported, utilizing carbonic anhydrase, from the cerebral spinal fluid.[8]

A preliminary device has been developed, which allows for CO_2 to be uncomplicatedly administered, through a three-way stopcock, into a traditional glass syringe. This device is illustrated in the [Figure 1].

Preliminary testing of this technique, on cadaveric bovine spinal sections, has demonstrated that CO_2 may be a reasonable alternative, to both air and saline, for epidural space localization. Further research is necessary to fully assess the potential benefits, and limitations, of this technique.

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Safe practices in epidural catheter tunneling

Sir,

To avoid inward or the outward migration of epidural catheters, different catheter fixation techniques are reported with variable success, e.g., coiling the catheter under a transparent dressing, different types of dressing, adhesive foam, catheter clamp, or using medication port of intravenous bags.[1] The subcutaneous tunneling of epidural catheter has also been described to secure epidural catheter in easy steps and without added cost of device or apparatus.[2] However, a possibility of needle sticks to clinician and also the shearing of the epidural catheter are apprehended while needle is passed subcutaneously.[3] We would like to emphasize on points from our article that the epidural needle should be placed subcutaneously in paraspinous space by keeping needle tip approximately 1.5–2 cm away from the entry of epidural catheter [Figure 1a,b]. The subcutaneous passage of Touhy needle can also be facilitated by giving slight curvature to needle [Figure 1, inset]. It helps in controlling its subcutaneous placement and brings it out of skin. The use of needle guard, as shown in Figure 1a, is another method to improve the safe practices in subcutaneous tunneling technique.[3] The use of needle guard at exit point of the needle tip from skin prevents needle stick injury and/or catheter shearing. It also provides counterpressure on skin to take out the needle tip in controlled manner. These simple practices improve the safety of the epidural catheter fixation by subcutaneous tunneling method for long term use.

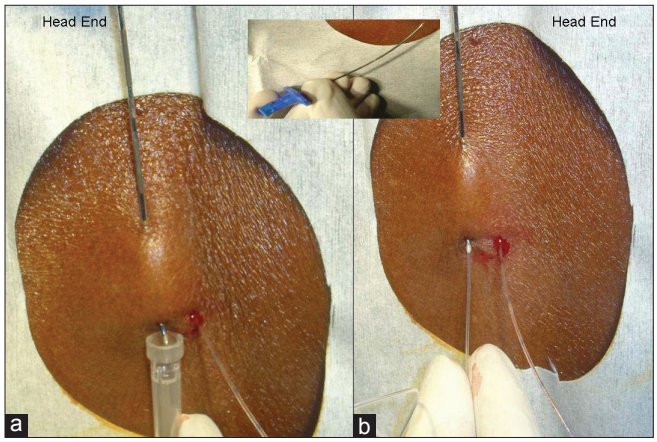

Figure 1: (a) Image showing the use of needle guard to protect needle tip from any injury to catheter; (and#61664;) showing the direction of needle movement in subcutaneous plane. (b) showing the direction of epidural catheter being thread into the needle to pulled back in subcutaneous tunnel. Inset showing the slight curve given to Touhy needle for its easy placement.

Epidural catheter contributing to epidural abscess is uncommon (incidence of 0.01–0.1%).[4] The safety from infection can be ensured by restricting the duration of epidural catheter in situ to 4 days.[5] There can be few indications for an extended period of epidural block, and reassessment of the risk/benefit ratio would certainly be wise after 4 days, if not sooner. It has been suggested that the administration set and filter should be changed after 3 days and that the anesthetist who placed the catheter must take full part in any decision to leave it for longer.[4] It would be interesting to have a randomized controlled trial comparing different fixation methods.

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