

block in labour with inspection of the puncture site revealing fluid leakage.

With regard to Carrie and Russell's epidurograms from 'some years ago', a very clear white line has been drawn on their illustrations to represent the course of the dye-filled epidural catheters. However, even with the current generation of neuro-radiological contrast it is extremely difficult reliably to visualise epidural catheters in the back, and we wonder if their representations of gently looping catheters are artefactual. It seems unlikely that a catheter inserted through a straight needle could adopt such a loop in the rigid confines of the back ligaments and musculature, even away from the midline, as a brief inspection during a lumbar laminectomy may confirm. Whilst the Lockit Clamp may be the ideal skin fixation for the non-obese patient, an efficient 'non-slip' catheter with suitable eye positions is still to be developed to overcome the occasional instance of dislodgement.

Finally, and with some amusement, we wish to point out a typographical 'gaffe' in one of Carrie and Russell's references (4), with regard to the spelling of the name of one of the current authors!

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A reply

We are grateful for the opportunity to reply to the letter by Drs Collier and Gatt commenting on our study (Carrie and Russell. *Anaesthesia* 2000; 55: 1231–3), although regret the need to defend our findings. The whole point of reporting the study was to demonstrate the remarkable ability of epidural

catheters to loop in the soft tissues of the back, thus explaining the phenomenon of continuous epidurals becoming ineffective while apparently unmoved at skin level. Whatever Collier and Gatt's difficulties may be in visualising their epidural catheters radiologically, we had no such problems, the catheters being perfectly clear to junior anaesthetists and midwives looking at the films. Their extraordinary suggestion that we had imagined the catheter images and that our 'representations of gently looping catheters are artefactual' would negate the whole point of our report and comes dangerously close to questioning our professional integrity. The 'clear white lines' which we drew on the X-rays were to indicate the paths of the catheters, which unfortunately were not so obvious when greatly reduced in size and reproduced for publication.

We would repeat our conclusion that if fixed firmly to the skin, epidural catheters may cease to function due to their ability to be pulled out of epidural space and loop in the soft tissues of the back. Consequently, a catheter such as that designed by Collier and Gatt in which the three lateral eyes lie within 4 mm of the tip is potentially advantageous when compared with one where the lateral eyes are more proximal.

The typographic error that converted 'Gatt' to 'Gaff' was not under our control. The spelling was correct in the manuscript submitted to *Anaesthesia*, but as readers are probably aware, correspondents are not given the opportunity to see proofs of their letters before publication.

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Failed epidural in an obese patient – blame it on Pythagoras!

There is much debate regarding the optimal length of epidural catheter to feed into the epidural space. Although

individual practice varies slightly, there is evidence that 4–5 cm maximises success rate and minimises insertion complications [1]. I present a case that suggests that this is insufficient in some obese patients.

A 26-year-old primigravid patient presented in spontaneous labour at term requesting epidural analgesia. She was 115 kg but otherwise fit and well with an uneventful pregnancy. Her spinous processes were palpable and an epidural was sited on the first attempt at L_{3/4}. It was 7.5 cm from the skin to the epidural space. The epidural was fixed in place with a Lock-IT epidural catheter clamp (SIMS Portex) to the skin at 11.5 cm. After a test dose (4 ml 2% lidocaine), a top up of 15 ml 0.1% bupivacaine with 2 µg.ml⁻¹ fentanyl was given and an infusion of the same solution was started at 10 ml.h⁻¹. This produced good analgesia, which lasted for approximately 90 min. At that time she had a block to T₈ on the left and T₁₂ on the right (tested with ethyl chloride). Further top up of 10 ml of the same solution was given but with no effect on block height or analgesia. The catheter site was examined and the catheter still found to be tethered at 11.5 cm. Her epidural was removed and re-sited without difficulty at L_{1/2}. Once again the epidural block was good following the initial bolus dose but wore off after 1 h despite an infusion as before. It failed to improve following a further 10 ml bolus dose. Inspection of the catheter site showed it to be still in place. The patient did not wish to have another epidural sited and received 150 mg intramuscular pethidine and had an uneventful vaginal delivery 90 min later.

Both epidurals initially worked well but later behaved as if they had fallen out. When inspected, both remained well fixed to the skin with no external evidence of catheter migration. It was 7.5 cm from the skin to the epidural space, suggesting that there should have been 4 cm of catheter remaining within the epidural space. The fact that both epidurals failed would suggest that there was no catheter remaining in the epidural space, implying significant catheter migration.

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A possible explanation is that the epidurals were sited with the patient's skin taught across her flexed lumbar spine. After the epidural was inserted, the patient sat back and the adipose tissue on her back was no longer stretched out of the way. The distance from skin to epidural space is therefore likely to increase significantly. An increase of 2 cm would leave only 2 cm of catheter within the epidural space. A shear force across her back produced by moving on her bed could easily have moved the skin site laterally relative to her spine. A 6-cm lateral movement of the skin site relative to her spine would have pulled the remaining 2 cm of epidural catheter out of the epidural space. (Pythagoras' theory: In right-angled triangles the square upon the hypotenuse is equal to the sum of the squares of the two remaining sides.)

On examination the following day, the patient was indeed found to have very lax tissues overlying her lumbar spine. With relatively gentle traction, the skin overlying her lumbar spine could be pulled more than 10 cm laterally.

Epidural catheter migration has been positively correlated to body mass index [2]. In obese patients with significant adipose deposition across their back, I would advocate inserting a minimum of 6 cm of epidural catheter within the epidural space to reduce the chance of catheter migration leading to epidural failure.

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Advantages and disadvantages of the Arrow Flex Tip Plus™ epidural catheter

Dr Goyal (Goyal. *Anaesthesia* 2001; 56: 94–5) has drawn attention to the usefulness of an Arrow FlexTip Plus™ epidural catheter, which contains a stainless-steel coil. As Dr Goyal points out, compared with conventional non-reinforced catheters, it is easier to insert the Arrow catheter with a lower incidence of paraesthesia or penetration of epidural veins [1]. However, there have been several reports of breakage of the Arrow catheter after difficulties in its removal [2–5]. Our previous *ex vivo* study has shown that the Arrow catheter snaps at a significantly lower weight than other conventional non-reinforced epidural catheters [2]. We report here another case of difficulty in removing an Arrow epidural catheter immediately after its insertion.

A 29-year-old nurse was scheduled for urgent Caesarean section. With the patient in the right decubitus position and her back bend forward, the L₂–3 epidural space was easily located via a median approach using a 17-gauge Arrow Tuohy needle. A new 19-gauge Arrow catheter was passed through the needle until the 13-cm mark on the catheter just entered the Tuohy needle (that was 5 cm into the epidural space), and the needle was removed. Without changing the patient's position, attempts were made to withdraw the catheter so that the distal 3-cm segment of the catheter was remaining in the epidural space. However, it was impossible to stretch. Changing the patient's position did not relieve the problem. The patient was informed and the catheter was left in place. Nevertheless, injection of 2 ml of 2% mepivacaine (after negative aspiration of blood or cerebrospinal fluid) produced regional analgesia. Another 15 ml of mepivacaine in divided doses were injected and adequate analgesia was obtained. Epidural analgesia was maintained after surgery. Two days later, attempts were made to remove the catheter, but it was still difficult. Changing the patient's position did not solve the problem. However, the next day it

became possible to remove the catheter with mild resistance and there was no breakage of the catheter. This case indicates that it can be difficult to withdraw the Arrow epidural catheter, even immediately following uncomplicated insertion. If it is difficult to remove the catheter, it should be left in place and further attempts be made later.

The advantages of the Arrow epidural catheter should be weighted against its disadvantages.

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A new interest in an old remedy for headache and backache for our obstetric patients: a sphenopalatine ganglion block

Recently, we started using a sphenopalatine ganglion block [1] to treat our obstetric patients for moderate to severe