

health will be maintained while the duties are restructured, and employing authorities are being asked to review their consultant requirements to achieve a consultant led service.

The increase in the numbers of consultants previously recommended by the British Paediatric Association<sup>4</sup> is supported in the report; this will mean a further increase in training grades. In future, training in paediatrics at all levels will need to include work in hospitals and the community, and doctors in career grades, too, will increasingly work in both settings. Census data for 1990 and 1992 from the British Paediatric Association showed that there were too few paediatric medical staff with sufficient experience to provide emergency cover in many acute paediatric units. This problem could at least partly be relieved if full use was made of all the medical resources available, a point emphasised recently by the Audit Commission.<sup>5</sup> One danger is that the community service could lose out to the acute workload of the hospital service, and this would need to be monitored by either the purchasing authority or the consultant paediatricians.

What will be the future for the clinical medical officer? They will be offered three choices: direct regrading, seeking a training post, or retaining their posts. Senior clinical medical officers may also apply for consultant posts. The report recommends a relaxation of the 10% restriction on staff grade numbers and a mechanism to allow appointment (in certain circumstances) to a consultant post without advertisement. It

also envisages a long term need for non-consultant career grades, but when the consultant led combined child health service has been brought into full operation many of these posts may well be supplanted by training grades. Nevertheless a way will need to be found to provide continuity of care for the child and family in certain specialised aspects of the work.

The working party's proposals are of great importance to all doctors working in the child health service, and when implemented they will represent a major step towards achieving a combined child health service. The next hurdle is the problem inherent in services located in two or more separate trusts in hospitals and the community. Then, when a combined child health service has been achieved, the interface with primary care can be addressed—an issue already explored in a stimulating study by the consortium Caring for Children in the Health Services.<sup>6</sup>

K L DODD  
Consultant paediatrician

Derbyshire Children's Hospital,  
North Street,  
Derby DE1 3BA

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## Dural puncture and headache

### *Avoid the first but treat the second*

Two papers in this week's journal highlight the morbidity that may result after accidental (p 883<sup>1</sup>) or deliberate (p 917<sup>2</sup>) dural puncture. The dura mater is a tough but leaky membrane supporting the more delicate but waterproof arachnoid mater. "Dural puncture" generally refers to puncture of both membranes. Puncture of the dura alone can go unrecognised and can cause problems unexpectedly when the arachnoid later tears.<sup>3</sup>

It is a popular misconception that rate of accidental puncture of the dura of around 1% is inevitable when less experienced anaesthetists attempt epidural insertion. Coupled with this is the erroneous belief that headache after dural puncture always gets better of its own accord. In this issue MacArthur and colleagues report an incidence of accidental dural puncture in an obstetric unit of 1.6%, the rate reportedly being inversely related to the anaesthetist's experience (p 883).<sup>1</sup> Such rates have been condoned in standard texts from the same stable,<sup>4</sup> and indeed a rate of 2.6% has been reported for American residents in anaesthesia.<sup>5</sup>

Such rates, however, are not inevitable and are unacceptable. Indeed, in a recently published survey of the epidural records for 1969 to 1988 from the Birmingham Maternity Hospital the accidental dural puncture rate fell from greater than 7% initially to 0.4-0.5% in the later years.<sup>6</sup> Moreover, the rate was unrelated to the anaesthetist's grade. As Doughty pointed out, inadvertent dural puncture is avoidable and almost always due to human error.<sup>7</sup> With careful teaching, new trainees attending a two week course under his supervision achieved an accidental dural puncture rate of 0.4% and, following his footsteps, others have achieved a rate of 0.3%.<sup>8,9</sup>

Though teaching and close supervision by an experienced and properly trained epiduralist contribute to these good results, another factor is the technique itself. The epidural space is generally detected by its low resistance to injection of fluid compared with that of the surrounding ligaments—the so called loss of resistance technique. Those who use an airfilled syringe to detect loss of resistance regard a dural puncture rate of 1-2% in training as inevitable, whereas those who use a saline filled syringe achieve better results.<sup>8,9</sup> This is confirmed in the Birmingham survey.<sup>10</sup>

Proponents of the air technique say that detecting dural puncture is easier because cerebrospinal fluid dripping from the needle cannot be mistaken for saline just injected. But it is more important to use a technique that will minimise the occurrence of dural puncture than one that will facilitate diagnosis. In practice the diagnosis is no more difficult with saline than with air.<sup>10</sup> Moreover, using air has other undesirable side effects<sup>9</sup> and should therefore be eschewed.

Accidental dural puncture deserves attention because its sequelae can be serious. Headache may, however, occur after any dural puncture and results from low intracranial pressure after leakage of cerebrospinal fluid—the larger the needle the more frequent and severe the headache.<sup>11</sup> Headache is reduced when the split made by the needle bevel is parallel to the longitudinal dural fibres.<sup>9</sup> Immediate, but usually temporary, relief follows the injection of a large volume of fluid into the lumbar epidural space, displacing cerebrospinal fluid from the spine to the cranium.

Young people and women are more susceptible to headache after dural puncture than others, with obstetric patients the

most susceptible of all.<sup>11</sup> Thus in parturient women who suffer accidental dural puncture with a 16 gauge Tuohy needle with the bevel transverse the rate of headache is more than 70%.<sup>12</sup>

The 20 or 22 gauge needles commonly used for lumbar puncture are generally considered unacceptable for spinal anaesthesia. Even the 6% rate of headache recorded with a 24 gauge needle<sup>11</sup> can be reduced to 1% with use of a hair-like 29 gauge needle, though wielding this requires considerable skill. Much more practical is to eliminate the cutting bevel and to use a needle with a side hole and a nose cone like Concorde's (a pencil point needle such as the Whitacre or Sprotte). A 24 gauge pencil point needle can even be used to sample cerebrospinal fluid, though syringe aspiration may be required. Such needles are 10 times the price of bevelled needles but cost effective if they reduce hospital stay.

Although many such headaches, particularly those occurring after the use of smaller needles, will resolve spontaneously, some may not. At this week's survey shows, symptoms after accidental dural puncture may persist for months in nearly a quarter of cases. Persistent symptoms were also reported long ago after spinal anaesthesia.<sup>11</sup> The initial low pressure headache can apparently become chronic, whether due to sensitisation in the central nervous system<sup>13</sup> or to some other cause. A dural leak certainly can persist and, if neglected, sometimes has sinister consequences.

In this issue Whiteley and colleagues describe a case in which a large subdural haematoma followed a mistreated headache after spinal anaesthesia with a 25 gauge bevelled needle.<sup>2</sup> This case is by no means unique: death from bilateral subdural haematoma 40 days after accidental dural puncture has been described in a woman whose headache was treated with diazepam and relaxation exercises,<sup>14</sup> and in one survey of 14 cases of subdural haematoma after deliberate or accidental dural puncture four patients died.<sup>15</sup> A recent Medline search linking lumbar puncture with subdural haematoma yielded 31 references to cases in which subdural haematomas (both cranial and spinal) occurred not only after spinal anaesthesia and accidental dural puncture but also after myelography, discography, and diagnostic lumbar puncture<sup>16,17</sup> (list available on request). Survival depended on early diagnosis followed by neurosurgery. Each case was reported as unusual—it is time that subdural haematoma was recognised as a serious risk of a neglected dural puncture leak and not merely as a rarity.

Deaths have also been reported due to medullary<sup>16</sup> and tentorial<sup>18</sup> coning after diagnostic lumbar puncture and spinal anaesthesia respectively in patients without raised intracranial pressure or other risk factors. Again neglected headache was a common factor.

The correct diagnosis must therefore be made promptly but may not be self evident. The onset of headache is often delayed for one to three days or even longer,<sup>11</sup> commonly after early discharge from hospital.<sup>19</sup> It may occur after an apparently normal epidural,<sup>13</sup> or the patient may not understand that a spinal anaesthetic has been used during general anaesthesia. General practitioners, health visitors, and hospital staff therefore all need to recognise the symptoms. The headache, which may affect any part of the cranium, is usually severe and accompanied by photophobia. There may also be dizziness, nausea, neck ache, and occasionally auditory and visual symptoms.<sup>11</sup> Traction on the sixth cranial nerve can cause double vision.

All these relatively non-specific symptoms are provoked by sitting or standing and relieved by lying down. In history taking this aspect must be established with precision. If in doubt the diagnosis can be confirmed by magnetic resonance imaging, but less expensive confirmation may be obtained by

abdominal compression.<sup>12</sup> The patient, if lying in bed, sits up until the headache returns and is then clasped round the waist from behind, the abdomen being squeezed tightly. Compression should be increased gradually, unlike in the Heimlich manoeuvre. Compression of the inferior vena cava causes the epidural veins to become engorged, displacing cerebrospinal fluid into the cranium and relieving a low pressure headache. This response is diagnostic, particularly as it is totally unexpected by the patient.

After the diagnosis has been established the headache must be treated. Symptomatic treatment including hydration, vasopressin, analgesics, and caffeine,<sup>12</sup> though popular, may be dangerous if they mask the symptoms. Treatment must be designed to diminish and not enhance the flow of cerebrospinal fluid and to stop the leak, allowing healing to take place. To this end a combination of epidural infusion of crystalloid, elective forceps delivery (to avoid straining, which increases cerebrospinal fluid pressure), and bed rest have been found to reduce the frequency of headache in parturient women.<sup>10</sup> An abdominal binder is also helpful.<sup>12</sup> Although up to 24 hours' bed rest after lumbar puncture delays the onset of headache rather than prevents it,<sup>20</sup> there is little doubt that headache is common after minor procedures followed by early mobilisation.<sup>19</sup> Prolonged bed rest, however, is out of fashion for several reasons, and a more active approach has become mandatory.

Dural healing may be promoted by applying an epidural blood patch.<sup>12</sup> In this procedure<sup>21</sup>—10–20 ml of non-anticoagulated autologous blood is injected into the epidural space with full aseptic precautions. The backache that may result is more than offset by the dramatic relief of headache. The chances of success, which are high,<sup>12</sup> are improved if this procedure is preceded and succeeded by a few hours of bed rest. A second blood patch may occasionally be required. Withdrawing a needle from the subarachnoid space and injecting blood at the point where the flow of cerebrospinal fluid stops is unsafe, because the blood may be injected subdurally; the services of a skilled epiduralist who can avoid a second dural puncture are therefore required.

The rate of accidental dural puncture in an epidural service should be audited. A rate of 1% or more should not be viewed with complacency but rather indicates the need for better training. The undoubted value of epidural analgesia in labour to both the mother and the baby<sup>22</sup> should not be undermined by an unacceptable morbidity. Headache after dural puncture with a large needle should be treated promptly with an epidural blood patch, provided that bacteraemia is absent. After fine needle puncture a headache persisting for more than a week may also merit a blood patch. Neglected dural leaks often lead to litigation and can have disastrous consequences.

FELICITY REYNOLDS  
Professor of obstetric anaesthesia

St Thomas's Hospital,  
London SE1 7EH

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## Managing miscarriage medically

### Early studies suggest that it works

The accepted management of miscarriage is to ensure that the products of conception are completely evacuated from the uterus as soon as possible in order to minimise blood loss and the risk of infection. Surgical curettage under general anaesthesia has long been the method of choice and currently accounts for about three quarters of emergency gynaecological operations performed in Britain.<sup>1</sup>

With the development of the antiprogestone mifepristone and the new synthetic prostaglandins as a safe and effective method of terminating early pregnancies<sup>2</sup> evaluation of such drugs for the management of miscarriage is the next logical step. Two pilot studies from Aberdeen have addressed this issue. In the first study 60 women with a missed abortion or an anembryonic pregnancy received mifepristone and the prostaglandin E1 analogue misoprostol, both given orally.<sup>3</sup> Patients were admitted to a day ward to be given the prostaglandin. Only three patients failed to abort and required surgical intervention; two others later required curettage but no products of conception were found. Side effects related to the prostaglandin (nausea, vomiting, and diarrhoea) were rare, and only seven women needed parenteral analgesia. No infective sequelae were reported.

In the second study 44 women with a clinical and ultrasonographic diagnosis of incomplete or inevitable abortion were given a single dose of either intramuscular sulprostone or oral misoprostol; complete abortion was achieved in 42 women (p 894).<sup>4</sup> Only two patients required parenteral analgesia. More than half of the women resumed normal activities immediately, and most did so after three days.

As the authors point out, a medical approach to such a common gynaecological condition has implications for both the health service and patients. It would substantially reduce the surgical workload resulting from miscarriage, thereby freeing time on routine operating lists for other cases. It would greatly reduce the need for out of hours operations, although this can be achieved by establishing an early pregnancy assessment unit with rapid access to ultrasonography.<sup>5</sup>

Furthermore, the use of gynaecological beds would be optimised as patients would be admitted specifically for treatment. Time spent waiting for a convenient space on a theatre list and then recovering from general anaesthesia would be saved. In selected cases such treatment might be evaluated in the community, possibly being extended to

general practice, although the wider use of these abortifacient drugs requires detailed assessment.

Medical management would also reduce the morbidity related to general anaesthesia and surgery (cervical trauma, perforation, and uterine adhesions), although the incidence of complications after surgical evacuation is low. Some women might also prefer a medical to a surgical procedure, which is the case with the early termination of pregnancy.<sup>6</sup> In this study fewer women who had undergone medical termination than had had surgery indicated a preference for the same method in the future, if it was required. Most women, however, who had experienced both methods preferred the medical approach. Clearly, detailed studies of consumers' wishes in various settings are needed to determine which method is preferable in managing miscarriage.

Medical methods will not suit all women. Those who are bleeding heavily on admission will require emergency curettage to stop the bleeding, and prostaglandins will be contraindicated in some women—for example, those with asthma or heart disease. Nevertheless, these initial studies are encouraging and certainly merit further studies to establish the optimum drug regimens for the various clinical manifestations of miscarriage and the gestation for which medical methods are best suited.

Ultimately, the merits of medical treatment should be judged alongside surgical evacuation in prospective randomised trials. If, as these initial studies suggest, surgical and medical treatments are equally efficacious, cost may be the decisive factor.

PETER MACROW  
Research fellow  
MAX ELSTEIN  
Professor

University Hospital of South Manchester,  
Manchester M20 8LR

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