

SERIOUS NON-FATAL COMPLICATIONS ASSOCIATED WITH EXTRADURAL BLOCK IN OBSTETRIC PRACTICE†

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SUMMARY

A retrospective study of serious non-fatal complications of extradural block in obstetric practice was carried out using a postal questionnaire. Two hundred and three obstetric units in the United Kingdom (responsible for 2580000 deliveries from 1982 to 1986 inclusive) responded. A total of 505000 extradural blocks were performed, 84% for relief of pain in labour and 16% for Caesarean section. Of 108 events reported, five were associated with permanent disability. Neuropathy involving a single spinal nerve, acute toxicity from the local anaesthetic, and problems associated with accidental dural puncture were the commonest complications. This investigation indicates the need for a prospective study. Although rare, serious complications could be reduced further by meticulous technique, while early diagnosis and treatment of untoward events would reduce the incidence of permanent disability.

KEY WORDS

Anaesthesia: obstetric. Anaesthetic techniques: extradural. Complications.

Extradural block has been in common use in obstetric practice for nearly 20 years and is used to relieve pain in labour in about 17% of mothers in the United Kingdom [1]. In addition, many thousands of mothers receive an extradural block for Caesarean section. Although the mortality associated with extradural block in obstetric practice in the U.K. is known from the Confidential Enquiries into Maternal Deaths, there are no accurate figures for morbidity, especially serious morbidity. Some of the more serious cases are reported in the media and most mothers are aware that they occur. As a result, they may enquire about the incidence of such problems as

permanent neurological damage, but their medical advisers (obstetricians, anaesthetists, general practitioners) are unable to give authoritative figures quantifying the risks.

While there is no substitute for a prospective study, it is of the greatest help in planning such a study to have some concept of the magnitude of the problem. As serious complications are likely to be known and remembered within individual obstetric units, it was decided to perform the following retrospective study. The Royal College of Obstetricians and Gynaecologists and the College of Anaesthetists have had a joint liaison committee for several years and the enquiry was planned and executed under its auspices.

METHODS

All obstetric units in the U.K. were sent two questionnaires. One asked for details of the extradural service in a unit and the results of this have been presented elsewhere [1]. The second asked for the incidence and nature of serious adverse events during and following extradural block. The anaesthetists completing the questionnaire were asked also if they were willing to provide, in a confidential and anonymous manner, brief clinical details of any of the reported cases, particularly those relating to prolonged neurological complications. Data were requested for the 5 years, 1982-1986 inclusive.

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†Prepared on behalf of the Joint Standing Committee on Obstetric Anaesthesia and Analgesia of the Royal College of Obstetrics and Gynaecologists and the College of Anaesthetists (B. M. HIBBARD, R.C.O.G. (Chairman), B. V. LEWIS, R.C.O.G., C. H. RODECK, R.C.O.G., M. ROSEN, C.A., A. P. RUBEN, C.A., D. B. SCOTT, C.A.).

With the exception of basic data such as the number of deliveries per year and the number of extradurals given for relief of pain in labour and for Caesarean section, information was requested on:

- (1) Acute hypotension leading to cardiac arrest.
- (2) Acute hypotension requiring urgent and vigorous resuscitation.
- (3) Neurological deficit involving the spinal nerves or spinal cord and lasting more than 1 month.
- (4) Other complications.

Further clinical details were requested from several responders.

RESULTS

Replies were received from 203 of the 271 obstetric units contacted. Altogether, these units delivered 516000 babies a year and thus represented 78% of the births reported in the annual returns from obstetric units to the Royal College of Obstetricians and Gynaecologists.

Annually, 101200 extradurals were given, 84700 for relief of pain and 16500 for Caesarean section. These figures have been approximated, as many units gave their data to the nearest 100 or 10. However, the total number of extradural blocks given during the 5-year period exceeded half a million (506000).

TABLE I. *Adverse events associated with extradural block*

Complication	No.	No. with permanent effects
Cardiac arrest	3	1 (brain damage)
Neuropathy involving spinal cord	1	1 (paraplegia)
Neuropathy involving a single spinal nerve	38	1 (quadriceps weakness)
Extradural abscess	1	? (still improving)
Extradural haematoma	1	? (still improving)
Urinary problems	6	0
Severe backache	5	0
Memory loss	1	0 (? from vasovagal faint)
Dural tap with:		
Prolonged headache	16	0
Cranial nerve palsy	5	0
Subdural haematoma	1	0
Acute toxicity (convulsions)	20	0
High or total spinal	8	0
Anaphylaxis	1	0
Total	108	5

TABLE II. *Other reported adverse events probably not associated with extradural block*

Complication	No.	Comment
Quadriplegia	1	Thrombosis of cervical haemangioma 10 days after delivery
Hypotension caused by cardiomyopathy	1	Heart transplant after delivery
Extradural abscess	1	Developed in diabetic 11 months after delivery
Facial weakness	1	?Multiple sclerosis

The complications reported are shown in tables I and II.

It became obvious that, while hypotension was not uncommon, its incidence and severity could not be ascertained by this retrospective study. If detected early and treated promptly hypotension may present little danger to the mother. If treatment is delayed, severe problems may arise, the most important being cardiac arrest. Three instances of cardiac arrest were reported. One was caused by acute systemic toxicity (see below). One mother suffered irreversible brain damage, and her severe hypotension following a "top-up" injection was thought to have been caused partly by inferior vena caval occlusion. The cause of the cardiac arrest in the third patient could not be determined from the data available.

Thirty-eight mothers suffered damage to a single spinal nerve or nerve root causing a neuropathy of limited duration (2 weeks to 3 months). This usually caused hypo-aesthesia in the skin distribution of the nerve and was associated occasionally with muscle weakness. In one patient the neuropathy appeared to be permanent. Not all nerve damage in labour is caused by extradural block, and one case of bilateral femoral nerve palsy was reported in a patient who did not receive an extradural.

Two patients developed serious and irreversible lesions of the spinal cord. One developed quadriplegia resulting from thrombosis of a congenital cervical haemangioma 10 days after delivery and any contribution from the extradural block must be considered doubtful. The second patient became rapidly and permanently paraplegic 12 h after delivery, having apparently recovered fully from the extradural block. The clinical picture was compatible with anterior spinal artery syndrome, but what caused it could not be determined.

There were two cases of post-extradural spinal cord compression, one resulting from a haematoma and one from an abscess. Both were evacuated surgically. At the time that these complications were reported, the patients had largely, although not completely, recovered from their neurological deficit, and both were said to be "still improving".

Acute toxicity with convulsions was reported in 21 mothers. All recovered fully, although transient cardiac arrest was thought to have occurred in one mother.

There was one classical allergic reaction with rash, hypotension and bronchospasm requiring urgent treatment. The local anaesthetic was suspected, but not proven, to be the allergen.

There were eight high or total spinal anaesthetics resulting from inadvertent subarachnoid injection of local anaesthetic. All the mothers recovered.

Prolonged and severe headache following accidental dural puncture was reported in 16 mothers. In six others who also had a dural puncture, there were neurological sequelae, five involving palsy of a cranial nerve (either the oculomotor or the abducent) and one with bilateral subdural cranial haematomata requiring surgical drainage some weeks later. All six patients recovered.

Retention of urine and incontinence which were of sufficient severity to be remembered by the anaesthetists were reported in six patients. All recovered fully. Such cases occur also after vaginal delivery without extradural block.

Backache is a common complaint in the puerperium, but it was severe and long lasting enough to be reported in five mothers.

One mother who developed hypotension and bradycardia complained of some memory loss of the perinatal period (approximately 5 days).

Several miscellaneous complications were described, in which it is reasonable to exclude any contribution from the extradural block. The quadriplegia was mentioned above. One patient who had cardiomyopathy became severely hypotensive after an extradural test dose. She subsequently received a heart transplant. A diabetic patient developed an extradural abscess 11 months after her delivery. One mother had left sided facial weakness which was thought to be caused by multiple sclerosis.

DISCUSSION

Almost all the complications reported in this study are well recognized as adverse events associated with extradural block. Fortunately, they are also uncommon (if hypotension not leading to cardiac arrest is excluded) and occur once in every 4000–5000 extradurals.

The acute problems that can occur during the extradural block itself include:

Hypotension. Arterial pressure may decrease rapidly from several causes, although sympathetic block is usually the trigger. By itself, sympathetic block is seldom the cause of serious hypotension in young healthy women, but, if other factors are present which themselves require a degree of sympathetic activity to maintain arterial pressure, acute decreases can follow [2]. Such factors include inferior vena caval occlusion produced in the supine posture, haemorrhage or hypovolaemia. Vasovagal fainting may occur also and is diagnosed by the marked associated bradycardia. Treatment is rapidly effective and includes the use of posture, vasopressors, i.v. fluids and atropine.

Unexpected widespread nerve block. This is usually caused by accidental subarachnoid injection, although subdural injection is possible also [3]. A high spinal block may ensue and can affect the muscles of ventilation (including the diaphragm). If the local anaesthetic drug reaches the cranial subarachnoid space, unconsciousness may result. Treatment consists of respiratory and cardiovascular support and, if diagnosis is accurate and quick, no permanent damage should ensue. The dose of local anaesthetic required to cause total spinal block with diaphragmatic paralysis in obstetric practice, need be given only for Caesarean section. The smaller doses given for pain relief are less likely to cause such problems, particularly if 0.5% bupivacaine is avoided for the initial injection. However, if given into the subarachnoid space, block may be unnecessarily high, and total spinal blocks have been reported. It is important that the anaesthetist should determine the maximum height of block after the initial main dose is given. Fortunately, when large doses of local anaesthetic are given at Caesarean section, the prolonged presence of the anaesthetist is ensured.

Acute toxicity with convulsions. This also is associated in most cases with Caesarean section, the local anaesthetic being accidentally injected i.v. Again, if the diagnosis is made expeditiously, no serious harm should befall the mother. Several deaths following cardiac arrest occurred about 10 years ago in the U.S.A., but this appeared to be caused mainly by the i.v. injection of large quantities of high concentration (0.75%) bupivacaine [4]. No such cases have been reported in the U.K., where all maternal deaths are reviewed and published. However, one transient cardiac arrest occurred in the present survey.

Cardiac arrest. This may occur secondary to hypotension or total spinal anaesthesia, or may result from acute toxicity. The contribution of inferior vena caval occlusion is often important and it also poses a major problem during resuscitation, which cannot be carried out effectively in the supine position. Vasovagal fainting may also cause cardiac arrest. Inadequate or delayed resuscitation may lead to permanent brain damage.

The less acute complications of extradural block which may have prolonged or permanent effects include:

Damage to a single spinal nerve. This may occur during location of the extradural space or during insertion of the extradural catheter [5], and is the commonest neurological complication. Paraesthesia with or without motor weakness is the presenting symptom and, while the majority of patients recover completely, a small number may be affected permanently.

Extradural haematoma or abscess formation. This may lead to spinal cord compression, and should be suspected if severe backache appears after the extradural block wears off, especially if accompanied by hypo-algesia and muscle weakness in the lower limbs. Urgent referral to a neurosurgical unit is indicated. Signs of extradural abscess are usually delayed for several days until the abscess has developed, and it may occur in patients who have not received an extradural block [6].

Paraplegia. In addition to cord compression, paraplegia may be caused by adhesive arachnoiditis (usually resulting from an accidental injection of the wrong solution) or from anterior spinal artery occlusion [7]. The sudden and catastrophic failure of blood supply to the spinal

cord is well recognized, but the causes are uncertain, including the contribution, if any, of the extradural block. It is of considerable interest that quadriplegia was reported in this study, because of thrombosis of a congenital cervical haemangioma, 10 days after the extradural block. In another patient, paraplegia occurred about 12 h after the last extradural injection, and after recovery of motor and sensory function. Although it is very easy to attribute these disasters to the extradural block if they are related closely in time, the mechanism is not obvious in many patients.

Dural puncture. This may cause severe and prolonged headache because of leakage of cerebrospinal fluid into the extradural space. The incidence of dural puncture in obstetric anaesthetic practice is about 1% of attempted extradural blocks. Fortunately, most cases either never develop a spinal headache, or they resolve spontaneously in a few days. However, if the decrease in CSF pressure is excessive, cranial nerve palsy can occur (usually the oculomotor or abducent nerves are involved, with resulting strabismus). Cranial subdural haematoma is a rare complication of lumbar puncture [8, 9]. One case was reported in this study. The use of an extradural injection of autologous blood (a "blood patch") is highly effective in spinal headaches and should be performed sooner rather than later [10, 11]. If dural puncture is known or suspected to have occurred, the patient should be warned to report back if the headache occurs after discharge. Spinal headache may not appear until the patient is fully ambulant at home.

The use of extradural block in obstetric practice is well established. It provides the most effective form of analgesia in labour, and allows those mothers who wish it to remain conscious at the birth of their baby when delivered by Caesarean section. In common with almost all medical interventions, it is not devoid of risk, although vigilance and attention to detail may reduce the complication rate further.

The study reported here indicates the magnitude and nature of non-fatal complications and emphasizes the need for a prospective study.

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