

# THE ROLE OF THE ANAESTHETIST IN ECLAMPSIA \*

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The aetiology of eclampsia remains obscure, and the methods of treatment controversial, so that it may seem presumptuous for an anaesthetist to become involved in such a thorny problem. Yet anaesthetics have been invoked as an essential part of the treatment of eclampsia since the birth of modern anaesthesia. Channing<sup>1</sup> in the U.S.A. (1848) and Simpson<sup>2</sup> in Scotland (1849) both recommended chloroform as a means of controlling fits, while Braun<sup>3</sup> in Vienna wrote extensively on the subject, publishing his findings in 1857, which afterwards appeared in a monograph form under the title 'Uraemic Convulsions'.<sup>3</sup> This title gives a clue to the features of the condition which were then considered important. Today, disturbance of renal function and convulsions are regarded as seriously as ever, but hypertension claims an even greater attention.

Essentially all forms of treatment aim at reducing the blood pressure, avoiding fits, and preventing renal damage. Ultimately, this implies the prevention of oxygen lack in any system of the body, and by no means of less importance, in the foetus. How far modern treatment succeeds in achieving these aims must be open to question since every year brings a new method. Perhaps this should be interpreted as a struggle for perfection, although more often than not it implies dissatisfaction with existing results, not only in terms of the ultimate outcome for mother and foetus, but

also in terms of maternal morbidity and length of hospitalization.

In almost every case, sedation is the method of choice for lowering the blood pressure. This implies loss of consciousness, foetal depression and a diminished renal filtration pressure, since vasospasm has not necessarily been relieved. All three have obvious consequences, of which the anaesthetist no less than the obstetrician is fully aware. In an effort to avoid these hazards, at least in part, continuous conduction analgesia has been used with some measure of success.

## RATIONALE OF THE METHOD

The rationale of this approach is simple. It is based on the assumption that all the ills that beset an eclamptic patient are the direct consequence of a high blood pressure. If that blood pressure can be reduced, as it can be in any subject by an extensive local analgesic block, then the following results may be expected, viz. (1) Prevention of fits, which are merely a symptom of a hypertensive encephalopathy, (2) the removal of a circulatory load from the heart, and (3) the alleviation of spasm in the renal vessels, which will allow filtration to occur at a lower pressure.

Further, these effects can be produced without rendering the patient unconscious, and without causing foetal depression. Whether the hypertension is the cause or effect of eclampsia may be disregarded since, happily, delivery

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makes the condition virtually self-limiting. The object is therefore to establish as far as possible an artificially normal physiology until this desirable state is effected more permanently by the body itself.

As a means of relieving anuria from other causes, splanchnic and spinal blocks have been employed since 1923,<sup>4</sup> but as far as can be ascertained, Paramore<sup>5</sup> was the first to try spinal analgesia as a specific treatment for eclampsia. However, it was not until spinal and extradural blocks could be maintained continuously that such a method became practicable.<sup>6</sup> The same remarks apply equally to the use of local analgesia as a means of relieving the pain of labour, although the value of doing so, especially in patients suffering from cardiac or respiratory disease, was recognized by several workers nearly 30 years ago.<sup>7,8</sup> Thus it was not until 1949<sup>9</sup> that a satisfactory technique was developed and tried which overcame the earlier difficulties. But already Hingson and others<sup>10</sup> had reported good results in 74 cases, claiming a 3.9% maternal mortality rate. This compares favourably with other methods; for example, the Queen Charlotte Hospital in London reports a 7% maternal, and a 23% foetal mortality rate when heavy sedation with morphine, chloral and paraldehyde forms the basis of treatment.<sup>11</sup> The first case of eclampsia to be treated with continuous spinal block in the United Kingdom was reported in 1949<sup>12</sup> and gave grounds for some encouragement. Since that time other cases have received similar treatment, but without exception all have been gravely ill and have failed to respond to more conservative measures. Such material can hardly be expected to provide a dramatic success rate, although in fact there was only one maternal death in a series of 10 cases, and that occurred from an extraneous cause a week after the cessation of treatment and at a time when it was felt that recovery was assured.

All too often it is forgotten that an essential feature of eclampsia is fits. But these in themselves may only represent a response to a variety of insults in a person predisposed to convulsions of any type.<sup>13</sup> They usually succeed in evoking some form of vigorous intervention, an anomalous situation of bolting the stable door after the horse or, in this particular case, the blood pressure has been allowed to run riot. It would seem that the rising blood pressure may 'trigger off' the convulsion, but in the meantime it may have led, surreptitiously perhaps, to other injuries, of which cerebral haemorrhage, cortical necrosis of the kidney, heart failure, pulmonary oedema and placental insufficiency are the most catastrophic.<sup>14</sup>

This is not an *apologia* for an unsatisfactory form of treatment, but rather an explanation of the problems which must be faced in the gravely ill eclamptic patient, for it is probably in such cases that continuous local analgesia is most useful, since the inherent risks of the procedure *may not* be justifiable in the mild case which responds to conservative measures. I stress the words *may not* because, although the treatment will be adequate, it is not always possible to provide the perfect conditions required if safety and success are to be assured.

#### ANALGESIC TECHNIQUE

Spinal, caudal and lumbar extradural blocks offer a choice of three routes by which continuous conduction analgesia may be maintained. Of these, the caudal approach is the

least satisfactory since, as also when it is used as a form of analgesia in normal obstetrics, there is rarely a significant effect on the blood pressure.<sup>15</sup> Thus the choice lies between spinal and lumbar extradural analgesia. In both, a length of plastic tubing is inserted through a Tuohy needle, so that it may be conveniently directed into the subarachnoid or extradural space, and the needle then removed. The site of puncture is carefully sealed with paraffin gauze impregnated with penicillin to minimize the chances of infection spreading along the track of the tubing. The remainder or proximal part of the tubing is fastened to the patient's back by a length of adhesive strapping, so that the free end, to which a syringe remains attached, can be brought over the shoulder or placed under the pillow. An injection of local analgesic solution may then be made whenever desired. Lignocaine (xylocaine), 1% is the most universally useful solution, and the volume injected will depend on the individual response of the patient. Initially 2-3 ml. should be tried if the injection is intrathecal, and 15-20 ml. if it is extradural. Thereafter the dose may be varied in accordance with the needs of the patient and should be repeated whenever the blood pressure starts to rise again.

#### Response to Analgesia

The fall of blood pressure will depend on the level of analgesia achieved; but the blood pressure rather than the analgesia must determine whether or not the block is sufficiently extensive. Once the blood pressure has been controlled, sedation is no longer necessary to prevent convulsions, and the routine nursing care of the patient becomes easier. However, even greater attention to blood pressure, pulse rate and pressure is needed, and these must be charted graphically for rapid reference. It has been suggested that the establishment of a conduction block will increase the urinary output immediately, and this can be further aided by causing the blood pressure to 'swing'. In our experience this has not been the case, and the daily urine secretion by normal obstetric patients, eclamptics treated with heavy sedation, and eclamptics treated with continuous conduction analgesia, have been almost identical. In all instances the output increased after delivery had taken place unless permanent renal damage was present. Attempts to make the blood pressure 'swing' were not only ineffective in this respect, but tended to precipitate heart failure. Warning of this is given by a progressive fall in the pulse pressure and a rise in the pulse rate.<sup>16</sup>

As the time for delivery approaches, the blood pressure becomes more labile and it is increasingly difficult to control. The previous level of analgesia must often be increased, and injections made more frequently and with larger volumes of solution.

#### Complications of the Method

By far the commonest complications that will be encountered during the management of a patient under continuous conduction analgesia are hypotension and paralysis of the muscles of respiration. Thus at all times the means to combat respiratory depression, overdosage with the local analgesic, and too violent falls in blood pressure, must be immediately available. In addition, since sphincters will be paralysed, regular emptying of the bladder and rectum become necessary, and measures must be taken to guard against such peripheral injuries as foot-drop.

But the greatest hazard of all, and the one which must be taken into account before deciding on this form of treatment, is infection. No efforts must be spared in trying to avoid this danger, and unless the sterility of the initial technique can be guaranteed, the method is absolutely contraindicated. Precautions to prevent the spread of the infection along the track of the tubing have already been mentioned, and this is of very real importance when the patient's back and bedding may become contaminated with liquor or faeces; and finally—and this is a difficult technical problem—the prevention of contamination of the free end of tubing which might result in organisms being pumped into the patient by subsequent injections.

#### *Comparison of Spinal and Extradural Analgesia*

Before comparing these two approaches one must assume that there will be no overriding technical difficulty in establishing either the one or the other. Both types of block are capable of lowering the blood pressure efficiently, although the results of an extradural injection take rather longer to become apparent. Also, after about 24 hours, it will be found that the volume of solution to be injected into the extradural space must be progressively increased and there is thus a risk of toxic reactions from overdosage with the local analgesic.

An extradural abscess is considered less seriously than meningitis, so that once more the risk of potential infection may become the overriding factor in the choice of methods. Neither complication can be viewed with complacency but, since extradural analgesia can be expected to give as good results as spinal analgesia with a slightly greater safety factor, it should be considered the method of choice. In some instances, however, when treatment must be maintained for more than 24 hours, extradural analgesia may become less effective in controlling the blood pressure. If this happens, the extradural catheter can be removed and continuous spinal analgesia established instead. But such a change should not be undertaken lightly, for now the subarachnoid tap must be made through a potentially infected extradural space.

#### CONCLUSIONS

The establishment of anaesthesia for operative delivery in eclampsia or for the immediate control of convulsions has not been discussed, because the difficulties are reasonably clear cut. No one doubts the existence of these problems,

yet it is not easy to find a solution, or even to suggest a routine, which at the same time will avoid undue foetal depression, prevent the aspiration of stomach contents, and on occasion provide deep anaesthesia, albeit for a short space of time. Almost any anaesthetic technique can be satisfactory, but the really important factor is the competence of the anaesthetist. On this point there can be little disagreement.

In describing the technique of continuous conduction analgesia I have attempted to suggest a way in which the skilled anaesthetist may be of service to the obstetrician in the gravely ill patient. It is not suggested that the method should be applied indiscriminately since it carries risks which cannot be accepted for mild degrees of eclampsia. However, when the situation is sufficiently grave and the life, not only of the foetus but of the mother also is at stake, then the relative merits of continuous conduction analgesia can be viewed in their proper perspective. By calling on the anaesthetist at such a time the obstetrician may perhaps save the life of his patient, besides sparing himself much mental anguish.

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