

CONTINUOUS EPIDURAL ANAESTHESIA IN MULTIPLE FRACTURES OF THE RIBS*‡

MAURICE TRAHAN, M.D.†

IN OUR SURROUNDINGS, continuous epidural is used frequently to relieve vasospastic diseases of the extremities, which are the result of arterial, venous, or a combination of venous and arterial dysfunction; to improve the circulation of blood in arteriosclerotic lower extremities; as treatment for acute or sub-acute pancreatitis; and in many other conditions.

Since March 11, 1960, we have had the opportunity to introduce catheters for continuous epidural anaesthesia in cases of multiple broken ribs. The aim is to relieve the patient of pain and to increase his pulmonary ventilation. The most intensive pain is due primarily to atelectasis. The atelectasis that we usually see in these patients is pulling on the lungs, and is the main cause of pain, much more than the broken ribs.

We insert the catheter, between lumbar 1 and 2, cephalad. We prefer the lateral position, the use of a 3-inch, 16-gauge Tuohy spinal needle, and a no. 3 nylon ureteral X-ray opaque catheter, with bilateral openings. For analgesic drugs, 0.15 per cent Pontocaine® is used on most occasions for the following reasons: it gives an analgesia of the sensitive nerves for three hours or more, it contains no preservative that could be irritant, and it causes less catheter obstruction by its crystalization. On the first injection, 15 to 30 c.c. are necessary to relieve pain. Afterwards, 10, 15, or 20 c.c. every six or eight hours for four to eight days are sufficient. Following the epidural block, we inject Wyamine®, 5 to 15 mg. I.M. to prevent the possible fall of blood pressure due to sympathetic paralysis.

The following cases illustrate our results in patients treated in this manner.

Case 1

A man, aged 47 years, was wedged between two trucks. With thoracic and abdominal injuries he was admitted to the hospital on March 11, 1960. The patient was exhausted, anxious, agitated, afraid to move, and remained seated. His respiration, 24 per minute, was superficial. An X-ray showed fractures of the third, fourth, fifth, sixth, seventh, eighth, and ninth ribs on the right side and of the ninth rib on the left side, with atelectasis of the right lung. Temperature was normal. Three hours after the patient's arrival, we introduced a catheter for continuous epidural, and injected 35 c.c. Pontocaine solution. Tactile analgesia was present from thoracic 2 to thoracic 10. The motor fibres were not involved. The analgesia appeared in less than five minutes and lasted for three to four hours. From then on, we injected 20 c.c. every eight hours for three days, and

*Presented at the Annual Meeting of the Canadian Anaesthetists' Society, May 15-18, 1961.

†Hôtel-Dieu de Quebec, Quebec, P.Q.

‡This paper was published in the French language in the Canadian Journal of Surgery, Vol. 4, p. 448 (July 1961).

15 c.c. the next four days. The patient could perform respiratory exercises, which promoted productive cough. Pulmonary atelectasis disappeared progressively. The epidural catheter was removed seven days later. Analgesics proved unnecessary during the remainder of the treatment.

Case 2

A 46-year-old house-keeper began to feel thoracic pains five hours after a sudden stop which projected her on the dashboard of her car. A dilaudid injection every four hours did not relieve her. Hospitalized on March 26, an X-ray revealed fractures of the fifth, sixth, seventh, eighth, and ninth ribs on the left side, with atelectasis of the left lung.

We inserted a catheter for a continuous epidural, and we injected 35 c.c. Pontocaine. The analgesia extended from thoracic 4 to the legs. Following the initial injection it was necessary to give 20 to 25 c.c. every eight hours to bring relief, and to give the patient the ability to maintain a clear respiratory tract. Three days later, we took out the catheter, because the patient, who had been treated in the past for alcoholic gastritis, developed delirium tremens. Forgetting the fractured ribs, the patient was treated only for this new incident.

Case 3

A man, age 37 years, was admitted to the hospital on August 11, 1960, eight days after a car accident. He was receiving pantopon every two hours, had difficult and noisy respiration at a rate of 24 per minute. He was referred for post-traumatic diaphragmatic hernia. To reduce costal pain, and above all, to allow productive cough, he was immediately put on a continuous epidural. For the next four days, the patient received alternatively, every four hours, 15 c.c. Pontocaine® or 100 mg. Demerol.® The patient was nauseous and vomiting. However, his respiration was improved.

Then the patient underwent a thoracotomy for a 4-inch breach in the diaphragm. The first postoperative day, he received alternatively, every four hours, 100 mg. Demerol and 17 c.c. Pontocaine. The second day, he received three injections of Pontocaine and two injections of Demerol, and had a good night's sleep. For the next four days, he received only three injections of Pontocaine each day. He performed his respiratory exercises and was ambulatory. Ten days post-operative, he was discharged in good health.

Case 4

A 39-year-old man was hospitalized following an accident on September 27. An X-ray revealed a fracture with displacement on the posterior axis of the third, fourth, fifth, sixth, and seventh left ribs, and pulmonary atelectasis on the same side. The patient expectorated blood. Inspiration was painful. Demerol did not bring relief for more than one hour. He refused aerosol therapy and respiratory exercises, because, he said: "this is too painful."

Two days later, we introduced a catheter for a continuous epidural block, and injected 20 c.c. Pontocaine, repeating 10 c.c. every six hours for the first two days, and every eight hours for the next five days. During this period, the patient was ambulatory, performed respiratory exercises, and was free from pain.

Case 5

A 60-year-old hotel-keeper fell on a desk. An X-ray taken on October 15, 1960, revealed a fracture with displacement of the seventh, eighth, ninth left ribs, a pneumothorax on the same side, and an hemorrhagic suffusion of the right lung. He was in severe pain.

On the same day we inserted a catheter, and injected 10 c.c. Pontocaine every two hours. Each time, the injection permitted productive cough and painless respiration. On October 16 and 17, observing that the respiratory rate rose to 30 per minute, while pulse and temperature remained within the normal limit, we considered the possibility of incipient atelectasis. We loosened the chest strapping to allow deeper ventilation and, on the following day, the condition receded. We then gave Pontocaine every six hours for the next three days through the epidural catheter. The patient was discharged and blessed "the tube in his back."

Case 6

A 48-year-old lumber-jack was injured by a falling tree. An X-ray taken on October 20 revealed a fracture of the sixth, seventh, ninth, and tenth left ribs, and a crushed fracture of the eleventh thoracic vertebra. His respiration was superficial, at a rate of 26 per minute.

On October 21, we inserted a catheter for a continuous epidural block and for five days we injected 1 per cent Carbocaine every four to six hours. Pain relief was dramatic. His convalescence went on without analgesics.

DISCUSSION

A continuous epidural block is superior to a paravertebral infiltration or a direct infiltration of the fractured area. These later procedures have to be repeated too frequently to give similar results. For the first injection, 30 c.c. 0.15 per cent Pontocaine is usually needed to provide relief. Afterwards, a volume of 10 to 20 c.c. of Pontocaine is sufficient to relieve pain. This represents a dosage much inferior to that used for repeated simple infiltrations.

To prevent the fall of blood pressure, we give a dose of a vasoconstrictor related to the quantity of Pontocaine injected.

After this experience, we believe, for the following reasons, that the continuous epidural anaesthesia deserves a part in the treatment of broken ribs: to relieve the pain; to promote productive cough and prevent atelectasis; to minimize the doses of narcotics.

Besides the usual contraindications for the epidural anaesthesia, there is danger of masking abdominal pathology.

RÉSUMÉ

Depuis le 11 mars 1960, nous installons une peridurale continue dans les cas de fracture multiple de côtes.

Les buts de ce traitement sont: de soulager le patient; de permettre une toux productive, et ainsi de prévenir l'atélectasie; de minimiser les doses de narcotiques.

Nous croyons que la douleur est causée plus par l'atélectasie qui tire sur le poumon que par les côtes fracturées.

Comme substance analgésique, nous employons surtout la Pontocaine 0.15 per cent pour les raisons suivantes: parce qu'elle donne une analgésie des fibres sensibles pour trois heures ou plus; parce qu'elle ne contient pas de préservatif qui peut être irritant; parce qu'elle cause moins d'obstruction du catheter par sa cristallisation.

Pour la lère dose, 15, 35 c.c. sont nécessaire pour soulager le patient. Par la suite, 10, 20 c.c. aux six ou huit heures pour quatre à huit jours sont suffisants.

Nous injections toujours Wyamine 5, 15 mg. I.M. pour prévenir la chute possible de la tension artérielle due à la paralysie du sympathique.

Six cas sont rapportés avec ou sans déplacement des côtes fracturées. Un cas avec une hernie diaphragmatique accidentelle et un cas avec deux vertèbres dorsales écrasées. Tous ont été traités avec succès et nous croyons que nous devrions employer la périurale continue dans les cas de fracture multiple de côtes.

ACKNOWLEDGMENT

This work has been prepared in the department of Anaesthesia at the Hôtel-Dieu de Quebec, Fernando Hudon, M.D., F.R.C.P.(C.), Director, and registered at: "le département des recherches médicales, Hôtel-Dieu de Québec."

REFERENCES

1. BROMAGE, P. R. Spinal Epidural Analgesia. Edinburgh and London: E. & S. Livingstone (1954).
2. MOORE, DANIEL C. Regional Block Anesthesia. Springfield, Ill.: Thomas (1957).
3. HAMELBERG, W., MENTGES, W. F., & DINDOT, J. V. Crushed Chest and the Anesthesiologists. J.A.M.A. 147.