Technical Note

Epidural Neuroplasty: Indications and Technique

Damián Bendersky1*, Matías Tironi1 and Martín Asem1

*Department of Neurosurgery, Clínica Cruz Blanca, Lanús Oeste, Provincia de Buenos Aires, Argentina

Abstract

This is a technical note which explains the indications, contraindications and the procedural technique of lumbosacral epidural neuroplasty. This procedure is used for several indications in which axial or radicular pain are present, such as: lumbar disc herniation, failed back surgery syndrome, lumbar spinal stenosis, degenerative disc disease and epidural fibrosis for other reasons like infectious, hemorrhagic, traumatic and radiotherapy, among other. Failed back surgery syndrome is the most common indication for epidural neuroplasty in author’s clinical practice. The technique which is described in this article is known as caudal approach, since the catheter is introduced through the sacral hiatus. A radiopaque stainless steel catheter with a flexible tip is used. Mechanical adhesiolysis is performed with the catheter. Furthermore, a mixture of hyaluronidase and normal saline, followed by triamcinolone or methylprednisolone mixed with ropivacaine is injected through the catheter. Then, hypertonic saline may be slowly injected in the recovery room under monitoring in order to reduce radicular edema.

Key Words: Epidural Neuroplasty; Epidural Fibrosis; Pain; Adhesiolysis; Epidural Block; Caudal Approach Technique

Introduction

Epidural neuroplasty (EN), also known as epidural adhesiolysis, is one of the interventional pain management procedures available nowadays and is based on the application of pharmacological agents in the epidural space as well as mechanical maneuvers in order to remove, undermine and cut fibrous tissue and adhesions in the epidural space. Furthermore, a very accurately guided epidural block may be performed during the procedure, not only in the central canal, but also over the spinal nerves and its dorsal root ganglion. It must be borne in mind that injected pharmacological agents would reach easier the desired targets since we performed epidural lysis previously, both mechanical with the catheter and pharmacological with hyaluronidase. Also, edema may be reduced using hypertonic saline. Finally, the local concentration of proinflammatory substances may be diminished through a washing effect. The authors perform the epidural block in just one day, whereas other practitioners leave the catheter in the epidural space for 2 or 3 days and carry out daily blocks.

This is a technical note which explains the uses and the procedural technique of lumbosacral EN. This procedure may also be used in the cervical and thoracic spine, but these uses are out of the scope of this article.

Indications

Since there may be spinal epidural adhesions from different origins, EN is used for several indications in which refractory axial or radiating radicular pain are present, such as: lumbar disc herniation, failed back surgery syndrome (or postlaminectomy syndrome), lumbar spinal stenosis, degenerative disc disease and epidural fibrosis for other reasons like infectious, hemorrhagic, traumatic and radiotherapeutic ones, among others [1-9]. Indeed, it may be thought that any cause of epidural inflammatory reaction could lead to epidural fibrosis. Periradicular fibrosis was also shown in intervertebral disk herniation [4, 10-12]. Failed back surgery syndrome is the most common indication for EN in author’s clinical practice. In fact, this procedure was developed in order to treat this condition [4]. EN may be still used in those patients in whom spinal cord stimulation is not effective for failed back surgery syndrome.

Epidural fibrosis may produce axial and radicular pain because those adhesions generate compression and stretching of the neural structures such as roots and spinal nerves, principally during spinal movements. Also, epidural fibrosis impinges on venous drainage leading to radicular and soft tissue edema. Other issue that is very important for interventional pain treatment is the fact that epidural adhesions preclude pharmacological agents from reaching the desired targets during an epidural block [1, 3, 4, 6, 8, 9, 13, 14, 15].

*Corresponding Author: Damián Bendersky, Department of Neurosurgery, Clínica Cruz Blanca, Lanús Oeste, Provincia de Buenos Aires, Argentina, Tel/Fax: (005411) - 4249-0909; E-mail: damianbendersky@hotmail.com

Sub Date: April 4th, 2018, Acc Date: April 13th, 2018, Pub Date: April 17th, 2018.

Citation: Damián Bendersky, Matías Tironi and Martín Asem (2018) Epidural Neuroplasty: Indications and Technique. BAOJ Med Nursing 4: 052.

Copyright: © 2018 Damián Bendersky. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.
There are some absolute contraindications for EN: sepsis, local infection at the puncture site, coagulopathy, cauda equine syndrome, pregnancy, uncontrolled underlying systemic disease, allergy to the used pharmacological agents or dye and syringomyelia [3, 4, 9]. Also, those patients who need spinal surgery due to compression, instability, deformity or imbalance are not good candidates for this procedure.

**Procedural Technique**

The technique which is described here is known as caudal approach, since the catheter is introduced through the sacral hiatus. The patient is placed in prone position and an abdominal pillow may be utilized in order to diminish lumbar lordosis, but it depends on the preference of each surgeon. Then, the sacral hiatus is identified with fluoroscopic guidance and the entry point is marked in the skin with a surgical dermal marker. The entry point should be 2 cm inferior to the sacral hiatus and 1 to 2 cm contralateral to the affected side, because it will help us to reach the painful nerve root easier (Figure 1). It is followed by sterile preparation and draping in the desired area. Local anesthesia is applied with 2% lidocaine. The entry point is checked again with x-ray. After that, a 15 or 16-gauge epidural needle is introduced through the sacral hiatus under fluoroscopic guidance. The epidural needle should not be advanced beyond S3 level in order to avoid dura penetration with its tip. After negative aspiration (neither blood nor cerebrospinal fluid come from the needle), the correct position of the needle in the epidural space is evaluated with the injection of up to 10 ml of a non-ionic and water-soluble contrast agent through the needle with constant fluoroscopic assistance on anteroposterior view. Then, its position is confirmed with a lateral x-ray image. Although we wait for the normal Christmas tree pattern of the epidurogram, epidural fibrosis or stenosis would preclude this typical fluoroscopic pattern; thus, there would be areas which are left unfilled with the dye. We must pay special attention to these areas because they are most probably the pathological ones. Therefore, sometimes this initial epidurogram may be very useful to guide the procedure. On the other hand, subarachnoid injection will show central and cephalic spread of the contrast agent. In this case, as well as those cases in which cerebrospinal fluid is aspirated through the needle, it is recommended to finish the procedure in this step and repeat it several days later in order to avoid subarachnoid injection and its potentially critical consequences. Subdural injection of the contrast dye produces a fluoroscopic pattern similar than subarachnoid one, but with less spreading in the former than in the last one.

Then, a Racz catheter* (Epimed*) is introduced through the epidural needle. They are radiopaque stainless steel catheters with a flexible tip. The surgeon may decide to bend its tip since it may be helpful to reach the desired target, especially if it is a nerve root. The catheter is then advanced to the target under fluoroscopic guidance and it can be navigated inside the epidural space by moving the catheter in a clockwise or counterclockwise direction. These maneuvers produce adhesiolysis. When the catheter reach the first target, up to 5 ml of contrast agent is injected through the catheter in order to evaluate if the tip is located in the proper position. There should not be vascular spread or subarachnoid filling (Figures 2 to 5). Finally, the content of the pharmacological agents for injection depends on each physician and each patient. If there is only one target planned, we can inject 1500 IU of hyaluronidase dissolved in 5 to 10 ml of normal saline, followed by 80 mg of triamcinolone or methylprednisolone mixed with 1 or 2 ml of 0.2% ropivacaine. If there are several targets, we must divide the total doses between all of them. Some physicians inject epidural ozone, but the authors do not perform it. Furthermore, pulsed radiofrequency may be applied through the metallic catheter, for example in the nerve roots or the dorsal root ganglion. These steps are repeated in all targets if there are more than one planned previously. After that, there are two possible ways: in the first one, both the catheter and the epidural needle are removed. In the second option, the needle is removed, but the catheter is left in place and subsequently fixed to the skin. Only if it is left inside the epidural space, 10 ml of 10% hypertonic saline may be slowly injected over 30 minutes, because at least half an hour must pass between epidural block and hypertonic saline injection. It is performed in the recovery room under monitoring. Epidural hypertonic saline administration may be useful to reduce radicular edema. Some authors leave the catheter in place for 2 or 3 days and carry out further blocks on next days.

![Figure 1](image.png)

Figure 1. The contralateral approach is shown in a case of degenerative scoliosis. The catheter was advanced from left to right side.
Conclusion

As happens with every other procedure, a proper surgical technique and an accurate patient selection is fundamental to achieve good results in our patients. However, it must be borne in mind that there are other potentially effective procedures to treat epidural fibrosis caused by failed back syndrome such as spinal cord stimulation.

Acknowledgments

We acknowledge Romina Marconi for her contributions in manuscript preparation.

References


