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Letter to the Editor

Endoscopic anatomy and features of lumbar discectomy by Destandau technique

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Minimally invasive spine surgery
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1. Introduction

The development of an endoscopic approach to lumbar disc herniation by Destandau in the early 1990s transformed both the treatment and patients' recovery. Its benefits also extended to other degenerative and tumour spinal diseases. The first results published [2–3,10] demonstrated a good outcome. Since then, more than 9000 patients have undergone surgery using this technique in the Endoscopy Center of Spine Surgery in Bordeaux from 1993 to 2013. This technique follows two major principles of minimally invasive surgery with minimal iatrogenic trauma and extreme efficiency. Following these two principles, discectomy by Destandau's method (DDM) considers: a) an appropriate size of incision (scar does not exceed 3 cm so it is less traumatic and more cosmetic and takes a fast and safe pathway); and b) ensuring adequate target accessibility. From this minimization, DDM shortens the recovery of the patient, and there is virtually no restriction to return to professional and sports life.

2. Technical note

The surgery can take place either under spinal or general anesthesia. Knee-chest position is required for this procedure. A preliminary x-ray image is obtained to verify the correct level of disc space once a metallic tool -designed specifically for this purpose- is applied to the skin of the patient's lumbar region. (Figs. 1 & 2).

Shadowless lighting will be set according to the spotted path of the disc space. This trajectory will guide the surgeon to find the correct level of disc (Fig 3).

Skin incision is paramedian just lateral to spinous processes. Paraspinal muscle fascia will be identified. The fascia incision will be made and extended, using curved Mayo scissors. Paraspinal muscles will be detached and pushed laterally by sharp raspars and curved Mayo scissors. Care must be taken to avoid entering into the muscle fibers since it provokes haemorrhage and arouses postoperative back pain. Bipolar cautery will be used if necessary throughout the procedure. The ENDOSPINE (material designed by Destandau and manufactured by STORZ) will then be inserted and placed against the lamina. It is composed of a speculum and an inner portion. This portion serves to support the endoscope (4 mm) and includes three other channels: one for suction, the other for surgical instruments and the last for root nerve retractor (Fig. 4). The first speculum will be placed against the lamina.

Before inserting the inner portion, the fields will be cleaned by a gauze pad 4 × 4 by means of a clamp. A hemilaminectomy of superior vertebra will be realized, using a 45° angled Kerisson Rongeur instrument. In case of doubt, and in order to confirm correct spinal level, a second x-ray can be taken before or during the process of hemilaminectomy. The opening of the lamina provides access to the spinal canal. The first observed component is the ligamentum flavum. This ligament may sometimes open spontaneously during hemilaminectomy or can be removed with bone after completing the hemilaminectomy. Before removal of the ligamentum, the surgeon must estimate if the bone opening is satisfactory. Care must be taken to ensure that there is no adhesion between the ligamentum and the dural sac which is located anteriorly to ligamentum flavum. This adherence is much more likely in elderly patients. For assurance that there is no adherence, the surgeon can use a hook that can be dragged between the ligamentum flavum and dural sac, to minimize the chance of a dural tear. The surgeon should not remove the ligamentum flavum excessively. Removal of the ligamentum flavum is proceeded only when it blocks the surgeon's view, and the dural sac and its lateral portion will be identified. After a satisfactory opening (can be up to 2 to 3 cm in length) of the spinal canal, a cottoned 1 × 3 will be placed into the field against the bone, and shifted rostral into the operative field. This will allow a non-aggressive dissection and a safe retraction of the dural sac. It also permits a better visualization of the emergence of nerve root and the disc space. A nerve root retractor can be placed to retract the nerve, if necessary. The posterior longitudinal ligament will be cut at the level of disc – if necessary – by a 15 blade scalpel or by a Cottle elevator. The discectomy will then be carried out. The disc herniation will be identified by the hook and will be removed with the rongeur (Fig 5). After that, the nerve root will be inspected from its emergence until its entrance to the intervertebral foramen.

Fig. 1. Metallic tool designed to verify space disc level.

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Fig. 2. A: identification of correct level of disc space B & C: L3–L4 median disc herniation axial and sagittal scanner.

Fig. 3. Shadowless lighting will be set according to the spotted path of the disc space.

After coagulation of the epidural space, the ENDOSPINE will be removed.

3. Discussion

Interlaminar lumbar discectomy for herniation by a posterior approach is the workhorse of spine surgical approaches because it offers a convenient access to the herniation with less complications and negligible morbidity. An endoscopic approach to lumbar disc herniation by Destandau's method gives maximum exposure to disc space with the goal of minimizing cutaneous incision. Alternative mini-invasive approaches have been developed for lumbar discectomy. Posterolateral mechanical decompression of the herniation lumbar disc was introduced in the early 1970s [7], but spine surgeons could only develop this method of surgery in the late 1980s and early 1990s after the introduction of endoscopes with short diameters. In the arthroscopic and endoscopic microdiscectomy via posterolateral approach, the thecal sac and nerve roots are not retracted and scars are minimized. However, with this approach, it is very difficult, or even impossible, to carry out a migrated herniation or to remove bony stenosis especially at the level of lateral recess that obstruct the approach [6–8]. In patients who have a high iliac crest, it may also be difficult to have transforaminal or subligamentoues access to the last disc space (L5-S1) [4].

Another alternative mini-invasive approach is lumbar micrendoscopic discectomy. In this technique, sequential and serial soft tissue dilators are inserted and an x-ray must be taken after each passage. As a result, a non-negligible dose of x-ray will be administered in every procedure. Its most significant disadvantage is a limited visual field, and the operative procedure would also be longer which is considered to be another inconvenience. [1,5,9,11].

Contrary to other minimally invasive approaches, the visual field in discectomy by Destandau technique is broad, and depending on the workability of the ENDOSPINE, an adequate access even to two lumbar levels is possible (Fig 6). In addition, the use of x-rays is reduced to only one time at the beginning of the intervention, and optionally one more time pre-operatively to reassure the level.

It is notable that this procedure has no limitations on the location of the hernia; median, herniated, foraminal, extraforaminal, and even recurrent types can sufficiently treated.

Fig. 4. Endospine with three channels, red arrow for: surgical instruments; black arrow for suction; double arrow: for nerve root retractor

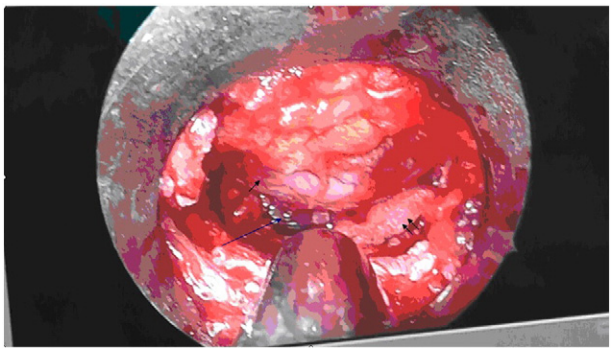

Fig. 5. endoscopic view of lumbar discectomy, black arrow: dural sac, double arrow: cottonoid, blue arrow: discal space.

Fig 6. Endospine follows the movements of the instrument, the end of which is permanently in the field of the endoscope and gives a broad visual field.

Conflict of interest

The authors declare that there are no conflicts of interest.

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