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TRANSFORAMINAL
ENDOSCOPIC
DISCECTOMY

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Today, minimally invasive surgical approach in spinal surgery is increasingly becoming popular. Microdiscectomy has been gold standard since 1990. However, in certain centers endoscopic discectomy techniques started to be used.^{13,14,21,22}

Today, in East Asia, 30% of the discs are operated endoscopically. And this gives us the signals that the surgical method will change in the future. Transforaminal endoscopic discectomy (TFED) is generally accepted.

While looking at the history of technique, firstly Smith has been started chemopapin application in 1963, than later Hijikata⁵ and Craig⁴ developed the percutaneous nucleotomy. After the 1980's endoscopic discectomy has been started-up. The aim in here has been to make root and the channel visible by endoscope. In first endoscopic discectomies, discectomy has been made only from the bladder but in new concept entering from the foramen is adopted.

The concept related to transforaminal endoscopic technique was defined by Kambin and Gellman for the first time¹¹, and then was developed by Yeung.²² In recent years, a lot of surgeons have demonstrated their techniques^{6-8,16-18}. In the first studies, they reported success rate of 88,2% in foraminal and extra foraminal herniation with arthroscopic discectomy.^{2,3,9,10,14,15,17,19-21}

Nowadays, many of surgeons use different transforaminal techniques. The main differences in TFED systems are due to the operating position (lateral or prone), the diameter of working cannula, foraminotomy method (manually rasping or round using) automatic or manual discectomy, and the use of laser

(using or non-using). Whichever the method using, AP and lateral scopic imaging is used.

Operation Technique

Endoscopic discectomy consist of many stages, including:

- (1) Sedation and Position Phase,
- (2) Marking Phase,
- (3) Discography Phase,
- (4) Foraminoplasty Phase,
- (5) Operation Cannula Placement Stage,
- (6) Phase of Endoscopic Discectomy,
- (7) and Postoperative Phase.

1- Sedation and Position

As a method of anaesthesia, local anaesthesia and sedoanalgesia are administrated. However, one must avoid from deep sedation for not to loose communication with the patient during the intervention. Operations are usually done in lateral or prone position, under biplaner fluoroscopy and on radiolucent operating table.

Each position has its own positive and negative aspects. The prone position is more getting used position, and then can be oriented more easily. However, many of the endoscopic surgeons prefer the lateral position to the other. This is so because this position provides expansion of the foramen by placing the pillow against the cavity.

2- Marking Phase

Skin is covered after field cleaning. Mid-line is marked with iliac pencil. Then for L5-S1 and L4-5



Figure 1: *Skin marking phase*

distance another line is drawn parallel to the midline in the 12-14 cm lateral of midline. (Figure 1) This distance maybe increased, in obese patients or patients with foraminal stenosis or facet hypertrophy. After this process, one should appoint the orientation of the needle by Kirschner wire. This is perhaps the most important stage of TFED; chain of errors begins with the wrong orientation of the needle. For this purpose, under the lumbosacral lateral scopic imaging, the tip of the Kirschner wire is redirected to the foramen of distance to be treated. The tip of the wire of Kirshner in foramen, positioned like will touching to the lower and plateau, and the trace drawnon the skin with pencil with this line is entered by Schiba needle number 22 from the point which the intersection to the line parallel to the midline in lateral. Orientation of the needle must be 55 or 60-degree angle in the lateral view. In the AP plane, it must be 25 degrees in the direction craniocaudal to the inter-crystal line. This marking defined for lateral position and Joimax system.

3- Discography Phase

After the step of marking, needle is entered into the disc space and discography is performed. For discography, 1 cc omnipaque + 2 cc indigo carmin (or Rifocin) is given into the disc pace. (Figure 2) This process allows both the discography and painting the disc. It makes easy to recognise disc fragments. After discography, Kirshner wire is passed through the Schiba needle and is placed in to disc space, and Schiba needle is removed.

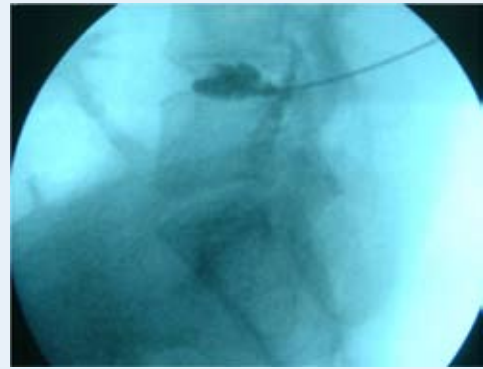


Figure 2: *Discography phase*

4- Foraminoplasty Phase

This stage is not always obligatory. However, if a paramedian disc is aimed, it can be performed. In cases with large foramen, it is not necessary. Because this process is the most painful phase of the stage. Enlargement of the foramen is done with the rasps (reamer) in Joimax system, and done with high-speed drill in other systems.

If foraminoplasty is made with a rasp, Kirschner wire should remain in place until you insert the endoscope. 6-7 mm skin incision is made around the Kirschner wire while beginning the process of dilation. First guide is placed, then foramen is rasped with thin, medium and large rasps and foraminoplasty is made. The location of the tools is confirmed by fluoroscopy at every stage of foraminoplasty process.

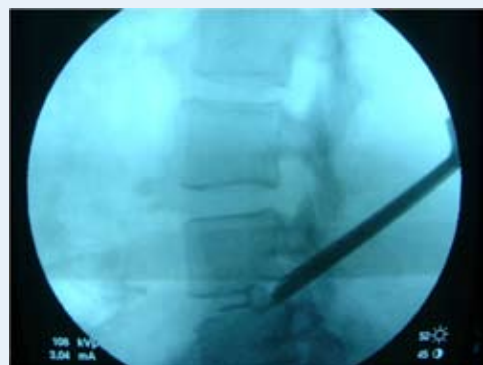


Figure 3: *Insertion of working cannula phase*

5- Operation Cannula Phase

After foraminoplasty, foramen becomes enlarged, and by placing the working cannula, all other tools are removed included Kirschner wire. (Figure 3) AP and lateral fluoroscopic imaging controls the final status of the cannula. Cannula shouldn't be passed to the medial pedicle line in AP position. During this stage, anaesthesia must be neither too deep nor too superficial.

6- Endoscopic Discectomy Phase

In this stage endoscope is passed through the working cannula. Video apparatus and the fluid connection are made. Liquid, which is used, must be isotonic and must be in body temperature. Working cannula and endoscope is kept with the left hand; discectomy should be made by right hand. Procedure must be checked with fluoroscopy at every stage. First of all, extruded disc fragments are looked for, and removed. (Figure 4) Some authors prefer to doing

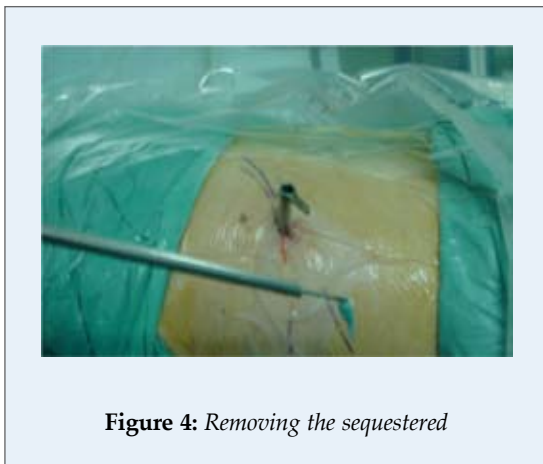


Figure 4: Removing the sequestered

discectomy first, after that doing fragmentectomy. At the end of the process, disc is washed with antibiotic solution, and then endoscope and cannula is removed.

7- Postoperative Phase

Patients are mobilized in 2nd postoperatively hour. Short walks are made inside the house in first 2-3 days. However, is allowed to sit at short intervals. After a week later, patient can start to work. In the 3rd postoperative month MR is taken for control. Figure 5 is a view of a preoperative and postoperative MR of a patient.

Results

There is limited number of studies about transforaminal endoscopic discectomy. Almost, all of these studies are retrospective studies. Indeed in one of the studies, Karnezis reported 83% successful studies after endoscopic discectomy.¹²

Yeung, reported 83,6% good-excellent results and gave 5% reoperation rate after one year follow up in 307 cases.²² 86% good-excellent results are also given by Hoogland.⁷

TFED is not used only for non-operated discs; it is also used in recurrence disc herniations. In patients with recurrence, TFED has got advantages like; no need for general anaesthesia, no meet with scar tissue, no damage the capsular structures, allowing for direct fragmentectomy. Hoogland reported⁸, 12% good excellent results in recurrent disc herniations. Ahn also reported¹, 4% good excellent results in 43 patients with recurrent disc herniations, treated with posterolateral endoscopic discectomy with laser-assisted.

Major complications of TFED are dural tear, root damage and infection. To avoid from the complications, one should start with simple cases and increase the experience.

As a result, TFED is a new horizon in disc surgery. Even though, it is still doesn't substitute of microsurgery. With developing of HD imaging systems, it will be developed more in the future.

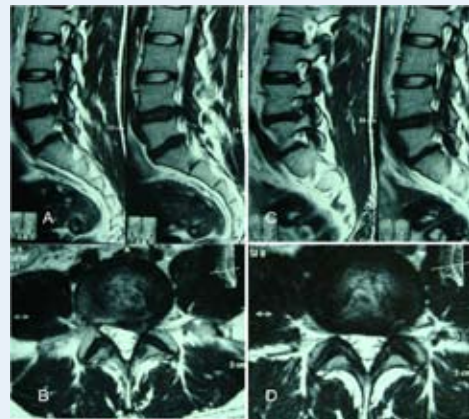


Figure 5: MR images of a case with Left L4-5 disc herniation before (A,B) and after (C,D) endoscopic discectomy

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