

6d EPIDUROSCOPY

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1. Introduction:

Epiduroscopy, a new, minimally invasive diagnostic and therapeutic technique, may be useful for pain relief in such patients. Epiduroscopy is a procedure mainly used for the visualisation of the spinal epidural space with an endoscope, although optional interventions such as mechanical or laser mobilisation of spinal adhesions, or application of steroids to inflamed tissues, may also be performed. It allows visualization of normal anatomical structures, such as the dura mater, blood vessels, connective tissue, nerves and fatty tissue, as well as of pathological structures, such as adhesions, sequestrars, inflammatory processes, fibrosis and stenotic changes⁽¹⁾.

Epiduroscopic technology with flexible optics has been used in clinical application on patients since the early 1990s⁽¹⁾. In 1991, Heavner et al. reported on endoscopic examinations of the epidural and spinal space of rabbits, dogs and human cadavers using a flexible endoscope⁽²⁾. In 1996, Schutze published the first report on epiduroscopically assisted SCS electrode implantation⁽³⁾. Ruetten et al. reported on clinical application of epiduroscopically assisted laser therapy for postnucleotomy syndrome⁽⁴⁾. In 2000, Ovassapian wrote that the role of epiduroscopy for chronic back pain is explored⁽¹⁾. In 2004, Schutze described over 500 epiduroscopies in chronic pain patients. This publication described endoscopically assisted epidural analgesic therapy as well as the treatment of painful epidural fibrosis and adhesions with laser technology⁽⁵⁾.

Among chronic pain disorders, low back pain arising from various structures of the spine constitutes the majority of problems. The lifetime prevalence of

chronic low back pain has been reported as high as 80% with an annual prevalence ranging from 15% to 45%, with a point prevalence of 30%^(6,7). Studies of the prevalence of low back pain⁽⁶⁾ and its impact on general health showed 25% of patients reporting Grade II to IV low back pain with high pain intensity with disability. The human intervertebral disc in the lumbar spine has been known to cause low back and lower extremity pain secondary to disc disruption, disc herniation, and nerve root compression⁽⁸⁾. Nerve root compression may be caused by disc herniation, spinal stenosis, and osteoarthritis. Chemical radiculitis and residual pain after surgical interventions, also known as post surgery syndrome, are also common factors in the causation of low back and lower extremity pain related to the disc⁽⁸⁾.

Epiduroscopy is a new technique for treatment of chronic low back pain⁽⁹⁾. At the present time, only a few prospective studies have been conducted to establish the benefits of epiduroscopy^(10,11) although retrospective studies have described the clinical effectiveness and cost-effectiveness of epiduroscopy in patients with herniated disks or severe low back pain after back surgery⁽⁹⁻¹¹⁾.

2. Indications:

The suitable patient selection is very important for the results of Epiduroscopy. Epiduroscopy offers a technique for diagnosing and treating spinal pain syndromes. The main indications of Epiduroscopy were written below.

- This may involve distinguishing pathological and anatomical structures and circumstances, such as

epidural fibrosis following invasive procedures and radiculopathies.

- Postlaminectomy syndrome, not elsewhere classified
- Lumbar spinal stenosis
- Cervical disc disorder with radiculopathy
- Lumbar pain, radiculopathy
- Postoperative epidural adhesions
- Chronic refractory back pain or failed back surgery

3. Contraindications:

Contraindications are important to avoid the complications of this procedure. The main contraindications of Epiduroscopy were written.

- Systemic and local infections, Bleeding tendency, coagulopathy disorders.
- Large, sequestration, extrusion and non-contained disc herniation.
- Lumbar disc herniated cases with severe neurological symptoms such as cauda equina syndrome.
- Congenital anomalies, presence of or increase in intracranial pressure, pregnancy
- Cerebrovascular disease, renal or liver insufficiency, inflammatory or dystrophic skin lesions in the area of the sacral canal, meningeal cysts, meningoceles, meningomyeloceles, severe respiratory insufficiency
- Patient's refusal to undergo the procedure

4. Treatment Principle of Epiduroscopy

For epiduroscopically assisted interventions, such as biopsy, adhesiolysis, resection of scar tissue, removal of irrigation fluid or lipoma removal, cauterization, extirpation of foreign bodies and abscess drainage, flexible surgical instruments, surgical lasers and catheters are available for use via the working channel of the epiduroscope⁽¹⁾.

Epiduroscopic epidural catheter placement for procedures such as epidural analgesic therapy for chronic pain is frequently indicated when sufficient analgesia cannot be brought about despite the use

of systemic analgesics or if adverse effects occur that are intolerable for the patient.

The use of epiduroscopy allows directed and targeted spinal dorsal and ventral epidural pharmacologic treatment and epidural analgesic therapy (EAT). With the use of our epiduroscopy management, the epidural analgesic therapy can substantially contribute to optimizing the treatment strategy for problems such as failed back surgery syndromes, epidural fibroses and lumbar radiculopathy⁽¹⁾.

The use of laser (LASER = light amplification by stimulated emission of radiation) technology expands the options for epiduroscopic surgery. The bundled light has a number of medical applications, such as coagulation for bleeding, rechanneling stenoses caused by tumors and destroying plaques in vessel walls⁽¹⁾. Ruetten et al. reported on a study in which 47 patients in whom epidural adhesions had been detected by epiduroscopy were treated with a Holmium:YAG laser⁽⁴⁾.

Schütze et al. reported on patients who underwent epiduroscopically assisted SCS electrode implantation for neuromodulation for the first time to treat their failed back surgery syndrome⁽³⁾. Epiduroscopy also allows this extraneous fibrous tissue or scarring near the implanted SCS electrode tip to be removed through microsurgery, in order to restore the efficacy of neuromodulation after long-term use without having to replace the electrode⁽¹⁾.

Radio frequency therapy (RFT) is a further invasive option for relieving chronic back pain. The original method of radio frequency thermolysis heated up the surrounding tissue to high temperatures during the application of electrical current. Epiduroscopically assisted SCS electrode implantation and adhesiolysis of the electrode tip, we have the impression that using endoscopy substantially lowers the risks associated with SCS pain management.

5. Surgical Procedures

5.a. Epiduroscopic Equipments

The sterilization equipment for spinal surgery such as betadine, alcohol solution, drape and sterile towel are prepared. Digital endo-camera system, which consists of the epiduroscope, light guide and camera with a cable, carrying out epiduroscopy and endoscopic

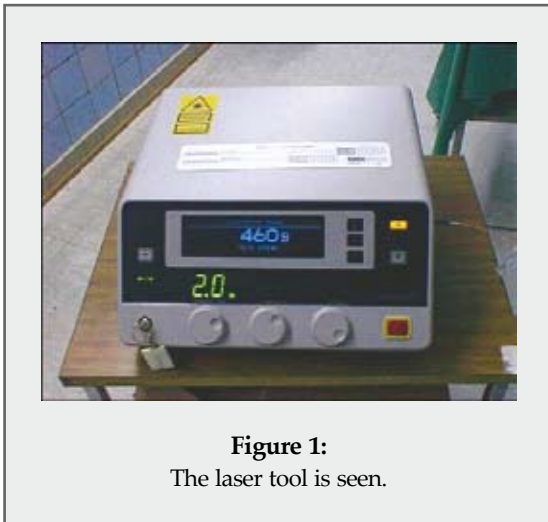


Figure 1:
The laser tool is seen.

surgery requires that the proper sterile instruments are laid out on an instrument tray (Figure 1).

5.b. Operating room set up

Anesthesiological standards for preparing the operating room and carrying out the invasive procedure must be maintained at all times. When performing epiduroscopy, stringent safety standards for hygiene must be maintained. Absolute sterile techniques must be adhered to in the operating room when performing epiduroscopy. Our operating room is equipped with a number of highly developed specialized devices for epiduroscopy. Controlling the various devices and computers can be complicated, and adds to the stress on the part of the surgeon and the operating room technicians. In addition to controlling the high-quality endoscopy equipment, the assistants often have to operate the C-arm, saline irrigation system and laser and ultrasound technology simultaneously.

5.c. Preoperative management

When performing elective invasive EDS procedures, certain standards for preoperative management must be observed. Because clinical pain symptoms and radiological findings are also used to explain spinal pain syndromes, assessing diagnostic examinations can be difficult. The diagnostic method is selected based on the patient's previous course of disease and the current clinical findings. The multidisciplinary findings (e. g. radiological, neurological and psychiatric, orthopedic and neurosurgical findings, as well as the results of internal medicine and

lab tests) and an informed consent discussion with the patient outlining the risks of the procedure are all integral parts of preoperative management for epiduroscopy.

5.d. Patient positioning

Because of the sacral approach to the epidural space, the patient is positioned prone on the operating table. While epiduroscopy can also be performed in the lateral position, it is much easier and safer for both patient and surgeon when epiduroscopy is performed with the patient in the prone position. The operation area is then washed and draped in the usual sterile fashion.

5.e. Surgical Technique

After sterile preparation of the surgical field, an 18-gauge Tuohy needle is introduced into the sacral hiatus, and its tip was confirmed to be in the caudal epidural space by lateral X-ray or by injection of a contrast medium (iotrolan 10 ml, Isovist 240; Schering, Osaka, Japan) through the needle. A 0.8-mm guide wire is then inserted through the needle under fluoroscopic guidance. Using the Seldinger technique, the 4-mm (8.5 F) introducer (4005; Mylotec, Ruswell, GA, USA) with a dilator was advanced over the guide wire into the sacral epidural space. After removal of the dilator and the guide wire, a 0.9-mm endoscope (3000E; Mylotec) covered with a video-guided catheter (2000; Mylotec) is introduced into the epidural space through the introducer.

The endoscope is gently steered and advanced in a cephalad direction under direct vision in the epidural space. And also, fluoroscopy is used to determine the vertebral level of the endoscope tip. The epidural space was irrigated and distended by infusion of saline during the procedure to obtain a good visual field⁽¹²⁾.

6. Postoperative Care:

The patient is rotated to the supine position after closing the wound and taken to the recover room. The patient can be discharged after a few hours resting. A few days bed resting at home are suggested with analgesic, antiinflammatory and antibiotics. It will be better to restrict physical exercise and to avoid hyperkyphosis position for 2 weeks. Physical therapy and rehabilitation is suggested 3 weeks later than the epiduroscopy procedure.

7. Complications and Avoidance:

Complications that may arise during epiduroscopic procedures are generally caused by puncture trauma, accidental dural injury, puncture of an epidural blood vessel or epidural bleeding. The symptoms associated with these complications may include headache, general back complaints, vomiting, meningitis, radicular radiating pain, bladder and rectal disorders and even confusion⁽¹⁾. Although the available contrast agents are water soluble and are completely resorbed, adverse reactions such as headache, neck stiffness, fever, orthostatic dysregulation, spinal functional disorders, psycho-organic syndromes or contrast agent allergy may occur. Mizuno et al. described a case in which encephalopathy and rhabdomyolysis was induced by the administration of the contrast agent iotrolan during epiduroscopy⁽¹³⁾. A dural tear during epiduroscopy allowed the contrast agent to enter the subarachnoid space. A potential complication of EDS is increased pressure in the epidural space due to the epidural infusion. In 2000 the journal *Archives of Ophthalmology* published a report on an acute incident of bilateral blindness associated with preretinal, retinal and subretinal hemorrhages following epiduroscopy. Epidural bleeding and epidural hematoma during or after epiduroscopy constitute extremely rare and extremely dangerous complications⁽¹⁾.

Epidural injuries may be caused by the epiduroscope itself or by microsurgical instruments or a catheter, for instance, when optimal endoscopic vision is not ensured during surgical procedures. In order to achieve the epidural target position, the epiduroscope may not be advanced blindly or with brute force. Permanent optimal endoscopic vision prevents avoidable complications.

8. References:

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