Fishchenko Iakiv, Piontkovskyi Valentyn, Zlativ Volodimir. Complications of epidural adhesiolysis. Journal of Education, Health and Sport. 2016;6(2):183-189. eISSN 2391-8306. DOI http://dx.doi.org/10.5281/zenodo.46408
http://ojs.ukw.edu.pl/index.php/johs/article/view/3384
https://pbn.nauka.gov.pl/works/716072

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part B item 755 (23.12.2015).
755 Journal of Education, Health and Sport eISSN 2391-8306 7

The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 05.01.2016. Revised 12.02.2016. Accepted: 21.02.2016.

Complications of epidural adhesiolysis

Iakiv Fishchenko

SI "Institute of traumatology and orthopedics NAMS of Ukraine"

Valentyn Piontkovskyi

Rivne rigional hospital Ukraine

Volodimir Zlativ

Rivne rigional hospital, Ukraine

Complications of epidural adhesiolysis

Epidural adhesiolysis is a minimally invasive procedure used to treat neuro-compression pain of the lumbosacral part of spine with degenerative diseases. Thanks to being minimally invasive and to its high efficiency, the rate of this procedure in recent years has increased significantly. On a material of 760 patients we analyzed the mistakes and complications related to epidural adhesiolysis. The complications of varying severity were observed in our 297 (30.0%) patients. Of these, the complications which did not require any modifications of treatment strategies, or its minor correction occurred in 277 (36.4%) patients; complications requiring reinstallation of the catheter were observed in 15 (1.9%) patients; complications of moderate severity, as epidural hematoma, epiduritis we noted in 5 (0.6%) patients; threatening complication of spontaneous rupture of the dura mater followed by the catheter hypertonic solution of sodium chloride, we observed in one (0.1%) case.

Key words: epidural adhesiolysis, neuro-compression pain, complications.

Introduction

Epidural adhesiolysis (EA) - a minimally invasive method of treatment of neuro-Compression pain in the lumbar-sacral spine and lower extremities in various degenerative-dystrophic diseases. The procedure is carried out by introducing into the epidural space using an epidural catheter and a variety of drugs, such as local anesthetics, hormones, pyridoxine, lytic enzymes, hypertonic solution of sodium chloride, and homeopathic medicines.

During any epidural manipulation, as well as during EA various complications associated with wound-channel structures and side effects of drugs administered are possible.

The most frequent complications of any epidural manipulation include epidural hemorrhage, infections, and damage to the nervous structures. Additional risks associated with entry into the epidural space with the needle and catheter include injured dural membrane followed by leakage of CSF, neurological complications associated with hematoma and compression of neural structures by introducing a large amount of fluid (1).

In his monograph L. Manchikanti et al (2007) (2) analyzed 75 papers devoted to EA, identified and systematized the potential complications of the procedure.

The results of their analysis are reported in Table 1.

Along with becoming more common, EA is gaining relevance of analysis of complications associated with the technique of the procedure, the possible injuries of the spinal canal structures, as well as reactions to medications administered.

Table 1 Potential complications of epidural adhesiolysis (L. Marchikanti et al (2007))

Pain	• Pain at the site of the needle insertion • Exacerbation of existing pain • Pain in the low back
Infection	• Soft tissue abscess • Epidural abscess • Meningitis • Encephalitis
Bleeding	• Soft tissue hematoma • Epidural hematoma • Spinal cord hematoma • Neve root sheath hematoma

Trauma	• Soft tissue • Nerve root • Spinal cord
Inadvertent	• Dural puncture injection • Subdural injection • Intrathecal injection • Intravascular injection
Miscellaneous	• Spinal cord compression • Cauda equina syndrome • Arachnoiditis • Paraplegia • Increased intrathecal pressure • Increased intraocular pressure • Retinal hemorrhage • Torn catheter • Retained catheter
Local anesthetic effects	
Steroid side effects	

Goal

To analyze these complications during the epidural adhesiolysis.

Material and Methods

We analyzed 760 EA, made from 2011 to 2015. All patients were examined clinically and radiologically, neurologically and by MRI. According to the MRI, we determined the pathological focus (protrusion or herniation of intervertebral disc, lumbar spinal stenosis, spondylarthritis), to which it is necessary to attach the epidural catheter. Before the procedure, we carried out tests to iodine, a local anesthetic and an antibiotic. During the procedure we monitored the heart rate and blood pressure. Control over the correct position of the needle into the epidural space was carried out by introducing a contrast agent (Omnipak 240). After radiographic inspection we made the introduction of the epidural catheter and wrapped it to the site of compression. The catheter was fixed to the skin using ligatures. We performed an epidural adhesiolysis by a three-day scheme. On

the 3rd day after the last administration of the catheter was removed. In order to prevent infectious complications, patients received 1 g of ceftriaxone 1 time a day for 3 days.

Research results

Our analyzed patients have been observed with following complications: puncture of the dura mater (in 19 (2.5%) patients), injury of epidural vessels (in 12 (1.5%) patients), epidural hematoma (in 1 (0.1%) patient), intravascular test dose (in 29 (3.8%) patients), subdural administration of test dose (in 15 (1.9%) patients), the pressure drop when installing the catheter (21 (2.7%) patient), the response to epidurography (in 1 (0.1%) patients), painful administration of drugs (in 98 (12.8%) patients) epiduritis (in 3 (0.3%) patients), transient sensor neuroradiculopathy (in 57 (7.5%) patients), inversion of the catheter (in 29 (3.8%) patients) hypersensitivity reaction to lydazum (in 12 (3.0%) patients).

Puncture of dura was observed in 19 (2.5%) patients and was shown as a spill of neurolymph from puncture needle. In this case, we reinstalled the catheter at a different level in the same day. In all 19 patients, in whom we observed this complication initially, we installed the catheter at L2-L3 levels. The subsequent and final installation of the catheter was performed the next day at L3-L4 level.

Injury of epidural vessels is a fairly common complication of EA. In our practice, we have noted the epidural bleeding in 12 (1.5%) patients. Epidural bleeding is manifested through output of blood from the puncture needle. This complication did not change tactics of catheter insertion and did not require any specific treatment.

Epidural hematoma is a severe complication of EAs, which can lead to meningitis and epidural abscess formation. In our case, organized in fibrosis epidural hematoma was detected 3 months after EA under control of MRI examination on a background of recurrence of neural compression pain in 1 (0.1%) patients. In this case, the decompression surgery was performed on the patient followed by regression of neurological symptoms.

Intravascular administration of a test dose of 10 mL of 1% lidocaine contact was observed in 29 (3.8%) patients, which manifests itself in the form of a slight drop in blood pressure, dizziness. This complication did not require any additional measures, and the patients begin to receive the main course of treatment the next day.

Subdural catheter position, followed by the test dose was shown the formation of spinal anesthesia (lack of sensitivity and movement below the level of anesthesia) below the injection of anesthetic for 3-4 hours. When the manifestation of this complication, epidural catheter was removed and re-installed the next day. This complication was observed in 15 (1.9%) patients.

In 21 (2.7%) patients we noted a drop in blood pressure during the procedure for installing the epidural catheter. In 7 cases, we carried out an intravenous drip REFORTAN® N GEK 6% with 8 mg of dexamethasone.

In 1 (0.1%) patient in the background epidural administration of 5 milliliters of Omnipak 240, pronounced pain syndrome and painful convulsive spasm of the muscles of the lower limbs were marked, which required intravenous administration of 2 ml of 0.005% solution of seduxen.

In 98 (12.8%) patients, we noted a pronounced pain syndrome (72 local, 26 patients with referred pain in the lower limbs) with the introduction of the standard volume products. This problem was

resolved in 23 patients by offsetting the catheter by 1 cm, 75 of them were required supplementation analgesics and gabapentin.

Compression of the catheter, caused by the catheter volvulus or instability of the lumbar spine, or mechanical compression of fixing skin ligature was observed in 27 (3.5%) patients. The situation was corrected by changing the position of the patient during the administration of drugs through the epidural catheter, with catheter displacement of 1 cm. Reinstalling the catheter was required in 3 cases.

Epiduritis was noticed in 3 (0.3%) patients. Verification of the diagnosis was carried out with changes in clinical and neurological status and laboratory parameters. Treatment was performed using broad spectrum of antibiotics and nonsteroidal anti-inflammatory drugs.

Transient sensory neuropathy of lower limb were observed in 57 (7.5%) patients. They were associated mainly with the administration of lidocaine and hypertonic sodium of chloride solution. Specific treatment of this complication was not required.

Hypersensitivity reactions when administered hyaluronidase solution of 3000 IU was observed in 12 (3.0%) patients. Status was cropped by introduction of allergen medicines, decreasing or excluding the dose of lydazum from the medical scheme.

The most serious complication we observed was a clinical case, which occurred with the patient S., 68 years old. The patient had a disc protrusion of segments L3-S1, deforming spondylosis, spondylarthritis, relative degenerative lumbar stenosis. The procedure of epidural catheter and the following 2 days after the administration of medicines went without any complications. On the third day during the next administration spontaneous rupture of the dura mater occurred followed by injection of a hypertonic sodium chloride solution through the catheter in a volume of 8 ml. The patient was noted to have hyperosmolar hit of the spinal cord and spinal nerve roots, leading to demyelination at L3- L4 (setting of the level of epidural catheter) and the subsequent development of sluggish lower paraparesis, dysfunction of the pelvic organs manifested by uroclepsia and encopresis. The patient fully received neurological rehabilitation treatment, which led to partial regression of neurological symptoms. However, 3 months later the patient died due to complications related to the cardiovascular system.

Discussion

EA complications are widely covered in numerous studies (3, 4). The most common complication is the dural puncture, which in itself can lead to spinal headache, and possibly to the formation of blood clots. Veihelmann et al (5) noted two cases of dural puncture (based on 47 patients), which, in their view, required a transfer procedure for 4 weeks.

Talu GK, Erdine S. (2003) (6) in a retrospective review of 250 patients who underwent epidural adhesiolysis, noted the following complications: injury of dural membranes (4.8%), catheter inversion (1.2%), loose of the catheter (0.4%), subdural placement of the catheter (4.4%), and epidural abscess (1.2%)

In another large study L. Manchikanti et al (2012) (7) evaluated the results of the 10,000 epidural manipulations, among which were 839 EA. The authors noted intravascular administration of drugs (11.6%), transient nerve root irritation (1.9%), dural puncture (1.8%). These complications occurred far more frequently than with conventional epidural blockages. The difference, according

to them, are related to the volume of injectable solutions, the size of the needle, the manipulation of the catheter in the epidural space.

Small studies and case reports, which we have found, described single errors and complications. In one case, the German authors describe a case of severe meningitis after the EA. (8) Another case described the separation of the catheter (9), which subsequently was accidentally identified using MRI for recurrent radiculopathy syndrome. In a small prospective study, 15 of 47 patients had transient sensory radiculopathy in the lower limbs (5). Large amounts of injectable solutions in a closed space (with lumbar spinal stenosis), theoretically increase the risk of cauda equina syndrome or other neurological disorders caused by compression of neural structures. Such a case of transient monoplegia with spontaneous resolution after 5 days was described by Ho K.Y (2008) (10).

L. Manchikanti et al (2009) (11) in their study noted dural puncture in 4 of 170 patients. No additional treatment in such cases were performed.

One of the most serious complications we found in the literature was subdural administration of hypertonic saline, which was manifested by persistent neurological disorders (12). The authors note the development of the patient lethargic paraplegia and complete loss of sensation below the level of the navel. Subsequently, the patient had a slight regression of motor and sensory disorders. The patient died 16 months after the procedure. Autopsy marked loss of peripheral myelinated fibers at a lower level of T12, dense collagen spike arachnoid and the pia mater at the level of T9-T11.

To prevent such disorders we use test dose administration of 10 ml of 1% lidocaine. If the patient experienced symptoms of subdural administration of drugs, we removed the catheter and performed his repeated conduct the next day in another interspinous gap.

Temporary neurological disorders described by A. Veihelmann et al (2006) (5) included 15 cases (out of 47 patients) with transient loss of sensitivity. From the point of view of the authors, high frequency of sensory disorders was due to location of the catheter in the ventral epidural space.

Epidural adhesiolysis is a minimally invasive procedure used to treat neurocompressive pain of the lumbosacral spine in degenerative diseases. Thanks to minimally invasive and high efficiency rate of this procedure in recent years has increased significantly. On a material of 760 patients we analyzed the complications associated with epidural adhesiolysis. The complications of varying severity were observed in 297 (30.0%) of our patients. Of these, the complications did not require any modification treatment strategies, or otherwise minor corrections occurred in 277 (36.4%) patients; complications requiring reinstallation of the catheter were observed in 15 (1.9%) patients; complications of moderate severity, as epidural hematoma, epidurita we noted in 5 (0.6%) patients; threatening complication of spontaneous rupture of the dura mater followed by the catheter hypertonic solution of sodium chloride, we observed in one (0.1%) case.

Conclusions

1. Epidural adhesiolysis is a safe minimally invasive procedure, which is in 463 (60.9%) cases passed without any complications.

2. The rate of minor complications that did not require any change of tactics of treatment, or its minor correction (puncture of the dura mater, epidural vascular injury; intravascular test dose; subdural administration of the test dose, the pressure drop at the catheter insertion; painful

administration of drugs; transient neuro-sensory radiculopathy; catheter inversion; hypersensitivity reactions to hyaluronidase) were observed in 277 (36.4%) patients.

3. The frequency of complications in the form of moderate epidural hematoma, hypersensitivity reactions to epidurography and epiduritis we observed in 5 (0.6%) patients.

4. In one (0.1%) patient we observed serious complication of spontaneous rupture of the dura mater followed by the catheter hypertonic solution of sodium chloride. As a result, the patient noted persistent neurological damage in the form of sluggish lower paraparesis with dysfunction of the pelvic organs

Bibliography:

1. Frank L, Jamison D, Hurley R, Cohen S. Epidural lysis of adhesions. *Korean Journal Pain* 2014; 1: 3–15.
2. Manchikanti L, Singh V. Interventional Techniques in Chronic Spinal Pain ASIPP Publishing, 2007; 696.
3. Chopra P, Smith HS, Deer TR, Bowman RC. Role of adhesiolysis in the management of chronic spinal pain: A systematic review of effectiveness and complications. *Pain Physician* 2005; 8: 87-100.
4. Trescot AM, Chopra P, Abdi S, Datta S, Schultz DM. Systematic review of effectiveness and complications of adhesiolysis in the management of chronic spinal pain: An update. *Pain Physician* 2007; 10:129-146.
5. Veihelmann A, Devens C, Trouillier H, Birkenmaier C, Gerdesmeyer L, Refior HJ. Epidural neuroplasty versus physiotherapy to relieve pain in patients with sciatica: A prospective randomized blinded clinical trial. *OrthopSci* 2006. 11:365-369.
6. Talu GK, Erdine S. Complications of epidural neuroplasty: a retrospective evaluation. *Neuromodulation* 2003; 6: 237–247.
7. Manchikanti L, Malla Y, Wargo BW, Cash KA, Pampati V, Fellows B. A prospective evaluation of complications of 10,000 fluoroscopically directed epidural injections. *Pain Physician* 2012; 15:131–140.
8. Wagner KJ, Sprenger T, Pecho C, Kochs EF, Tölle TR, Berthele A, Gerdesmeyer L. Risks and complications of epidural neurolysis - a review with case report. *Anasthesiol Intensivmed Notfallmed Schmerzther* 2006; 41(4):213-22.
9. Perkins WJ, Davis DH, Huntoon MA, Horlocker TT. A retained Racz catheter fragment after epidural neurolysis: implications during magnetic resonance imaging. *Anesth Analg* 2003; 96:1717–1719.
10. Ho KY., Manghnani P. Acute monoplegia after lysis of epidural adhesions: a casereport. *Pain Pract* 2008; 8: 404 – 407.
11. Manchikanti L, Singh V, Cash KA, Pampati V, Datta S. A comparative effectiveness evaluation of percutaneous adhesiolysis and epidural steroid injections in managing lumbar post-surgery syndrome: A randomized, equivalence controlled trial. *Pain Physician* 2009; 12:355-368.
12. Kim RC, Porter RW, Choi BH, Kim SW. Myelopathy after the intrathecal administration of hypertonic saline. *Neurosurgery* 1988; 22:942-945.