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ULTRASOUND-GUIDANCE LUMBAR SYMPATHETIC GANGLION BLOCK. CASE REPORT

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РУКОВОДСТВО ДЛЯ ПОЯСНИЧНОГО СИМПАТИЧЕСКОГО БЛОКА ПОД УЛЬТРАЗВУКОВЫМ КОНТРОЛЕМ. КЛИНИЧЕСКИЙ СЛУЧАЙ

Блок поясничного симпатического ганглия (LSGB) относится к одному из инвазивных методов, который используется в лечении хронической боли, а также в других ситуациях. Этот тип блока выполняется с помощью флороскопии.

В последнее десятилетие широкое распространение ультрасонографии приводит к внедрению этого метода в региональную анестезию с ослаблением других методов выявления нервов и нервных сплетений. Ультразвуковое изображение также может быть реализовано в симпатических блоках. В этой статье приводится описание трех случаев, в которых ультразвуковая навигация использовалась во время LSGB. Описание включает в себя метод блочной процедуры в деталях с учетом соноанатомии LSGB и методов введения иглы. Во всех этих случаях идентификация места введения анестезирующего средства была возможна с ультразвуковой навигацией. Авторы утверждают, что LSGB под ультразвуковой навигацией может использоваться у пациентов вместо флюороскопии при условии хорошей визуализации анатомических структур.

Ключевые слова: поясничный симпатический ганглиозный блок, метод трилистника, симпатический блок, ультразвуковое руководство.

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ULTRASOUND-GUIDANCE LUMBAR SYMPATHETIC GANGLION BLOCK. CASE REPORT

Lumbar sympathetic ganglion block (LSGB) belongs to one of the invasive methods which is used in the chronic pain treatment as well as in other situations. This type of block is done with the help of floroscopy. In the last decade, the widely spread of ultrasonography leads to the implementation of this method in regional anesthesia with subside of other methods of nerves and nerve plexuses identification. Ultrasound (US) imaging can also be implemented in sympathetic blocks. In this article, there is a description of three cases in which US guidance has been used during LSGB. The description includes the method of block procedure in details with taking into account the sonoanatomy of LSPB and techniques of administration of needle. In all of those cases, identification of administration site of anesthetic drug was possible with US. Authors claim, that LSGB under US guidance can be used in patients instead of the use of fluoroscopy under the condition of good visiualaization of anatomical structures.

Key words: lumbar sympathetic ganglion block, shamrock-method, sympathetic block, ultrasound-guidance.

Introduction

Lumbar sympathetic ganglion block (LSGB) is performed in vascular surgery to improve blood circulation, by frostbite, in the treatment of chronic pain in the lower extremities [1; 2; 7]. Traditionally so-called C-arm fluoroscopy or computed tomography is used for LSGB [7; 10]. The above imaging methods have some disadvantages to which belongs the availability of the apparatus and the exposure of the patient to radiation [11]. The broad implementation of ultrasonography refers not only regional anesthesia but also pain medicine [8]. Based on the lumbar plexus block technique with the so-called Shamrock Block [6] method, it is possible to visualize the anterolateral surface of the lumbar vertebrae where the sympathetic lumbar ganglion is located [4]. Moreover, the visualization of the needle insertion is possible with Shamrock method [4]. The aim of this case of LSGB is to assess the feasibility of using ultrasound guidance for LSGB.

Methods

Case № 1. Patient l.24 was qualified for LSGB due to generalized hyperhydrosis with particularly excessive sweating of both feet preventing the patient from normal function-

ing in society, decreasing the quality of life, worsening the patient's mental state. The patient was treated pharmacologically for many years (ointments, oral medications). LSGB was performed with 0.15% — 6.0 ml ropivacaine on the right side. The next day, two-sided bilateral LSGB was performed with 0.1% — 6.0 ml of ropivacaine for each side. After 4 weeks, two-sided LSGB was performed with a mixture of 97% — 4.0 ml of ethanol with 1% — 2.0 ml of ropivacaine per side. The procedures went without complications. After each procedure after 24 hours, redness, increased heat, dryness of both feet were recorded. After 48 hours, persistent dryness of both feet and a slight degree of redness were observed.

Case № 2. The patient aged 46 was in the Intensive Care Unit with out-of-hospital cardiac arrest in the course of acute coronary syndrome with concurrent symptoms of frostbite. During the stay, stabilization of vital functions with full return of consciousness was observed. On the 5th day of stay there were signs of ischemia of both limbs in the absence of clinical and additional symptoms of the distributive shock. The cyanosis of both lower limbs was observed in the distal part of the lower leg and cold feet. Ultrasound with Doppler revealed present flow in the anterior arteries and dorsal foot on both sides. Angio-CT of the lower limbs arteries did not reveal stenosis in the proximal and distal arteries of the lower limbs. The vascular surgeon suggested to perform a bilateral LSGB. Two-sided LSGB was performed on the left and right side. After 30 minutes, redness and increased warmth of both feet occured and persisted over the next days. During further stay, perfusion disorders in the lower extremities have not been documented.

Case № 3. Patient l.32, a type II complex regional pain syndrome (CRPS) was diagnosed. The pharmacological and non-pharmacological methods of treatment used so far have not been effective. There has been persistent burning pain, allodynia, and hyperalgesia in the lower limbs, especially on the left side, which has persisted for several months. Twice left LSGB was performed 48 hours apart with 0.1% 6.0 ml ropivacaine. After 24 hours from the implementation of the second LSGB, pain relief was reduced from 8 to 2 points on the NRS scale, hyperalgesia subsided. The patient was offered a repeat series of LSGB with ropivacaine after 4 weeks. In addition, the possibility of neurolysis of the sympathetic lumbar plexus has been reported. She consented to the continuation of further interventional treatment but did not report to the hospital within the prescribed period.

Results

In all three cases, the block was performed as follows. All patients gave informed consent for LSGB. Patients also expressed their written consent to the publication of data on the implementation of the blockade. During the procedure, intravenous access, standard monitoring and access to the LAST (Local Anesthetic Systemic Toxicity) treatment set were provided. In a sterile condition on the healthy side, an E-Saote or BK-Medical Flex Focus 400 scan was performed using a convex probe 3MHz in the transverse axis. The probe was applied immediately above the iliac crest in the axillary medial line. In this position, three layers of the anterior abdominal wall muscle and the transverse fascia were shown as an extension of the abdominal transverse muscle.

Next, the ultrasound probe was moved backwards to reveal the quadratus lumborum muscle located medially to the transverse fascia. The aim of the ultrasound pre-assesssment was to visualize the anatomical structures of the L3–L4 vertebral body with the transverse processes, quadratus lumborum muscle, psoas muscle, erector spine muscle, which form a view of the shape of clover as described by A. Sauter [4; 6]. The lumbar plexus was located inside the psoas muscle as confirmed by a neurostimulator. The lower

pole of the kidney and the liver on the right side are shown by the slight tilting of the probe upwards [6]. The abdominal aorta and the inferior cava vein were visible anteriorly to the vertebral body of L3 and L4. Special attention was paid to the visualization of the boundary between psoas muscle and the retroperitoneal space located in the immediate vicinity of the anterolateral surface of L3 and L4 vertebral body. Insertion point of the echogenic needle (Stimuplex Ultra 360, BBraun Melsungen AB, 10 or 15 cm) was 8 cm laterally from the midline at L3/L4 (Fig. 1). Then, the needle was directed medially. Additionally, the needle was connected to the Stimuplex HNS12 neurostimulator, I — 1.5–0.6 mA, f-2Hz, 0.1 msec to identify the lumbar plexus with quadricepse femoral muscle twiching. After identification of the lumbar plexus, the needle was redirected in the anteromedial direction. The end-point of the needle was localized on the anterolateral surface of the L3 vertebral body (Fig. 2). After the aspiration test, 0.1% — 6.0 ropivacaine solution or ethanol solution with ropivacaine was administered.

The blood supply of the foots, body temperature of the blocked limb, the degree of dryness of the foot was assessed after performing of LSGB. The temperature of the blocked limb was assessed by measuring on 1 toe of the foot with the Draeger Infinity Delta XL temperaturκ skin probe 1.5M reusable. The measurement was made before the block, after 30 minutes and after 2 hours after the lock was made. The difference in the 1 foot temperature before and after the block was 2.1, 2.2 and 2.2 degree Celsius after 30 minutes; after 2 hours: 2.2, 2.3, 3.4 degree Celsius. The assessment of the perivertebral structure visualization, needle visualization and local anesthetic spreading during block was carried out using a 4-point Likert scale [9], where 0 point — not visible structure, 1point — hardly visible, 2 points — well visible, 3 points — very well visible. The results are presented in Table 1.

Discussion

Sympathetic nerve blocks for many decades remain the interventional methods of choice in the treatment of chronic pain and minimall invasive treatment of other diseases [3; 11]. In the present moment it becomes possible to perform this kind of blocks using

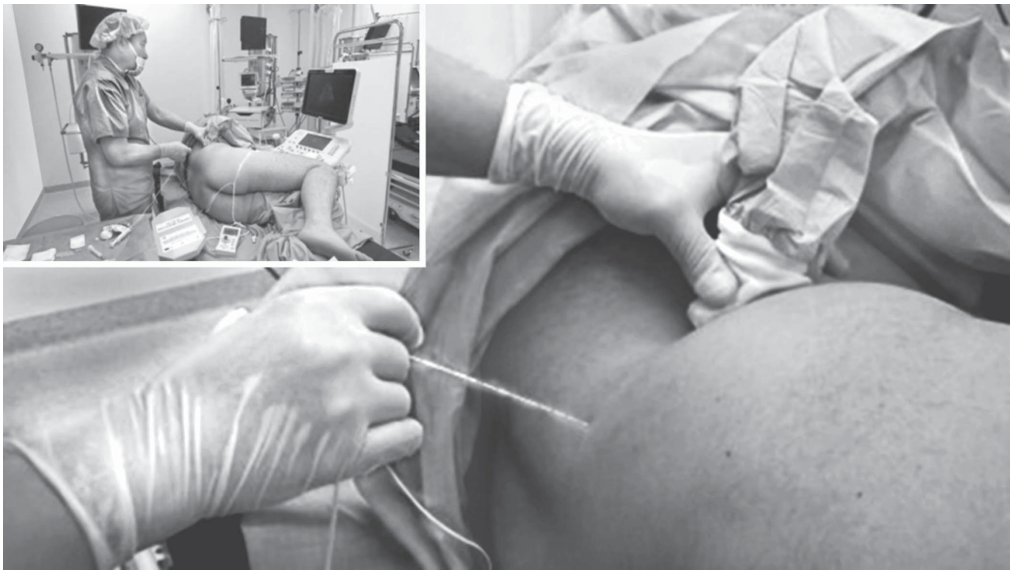

Fig. 1. Performing of the LSGB

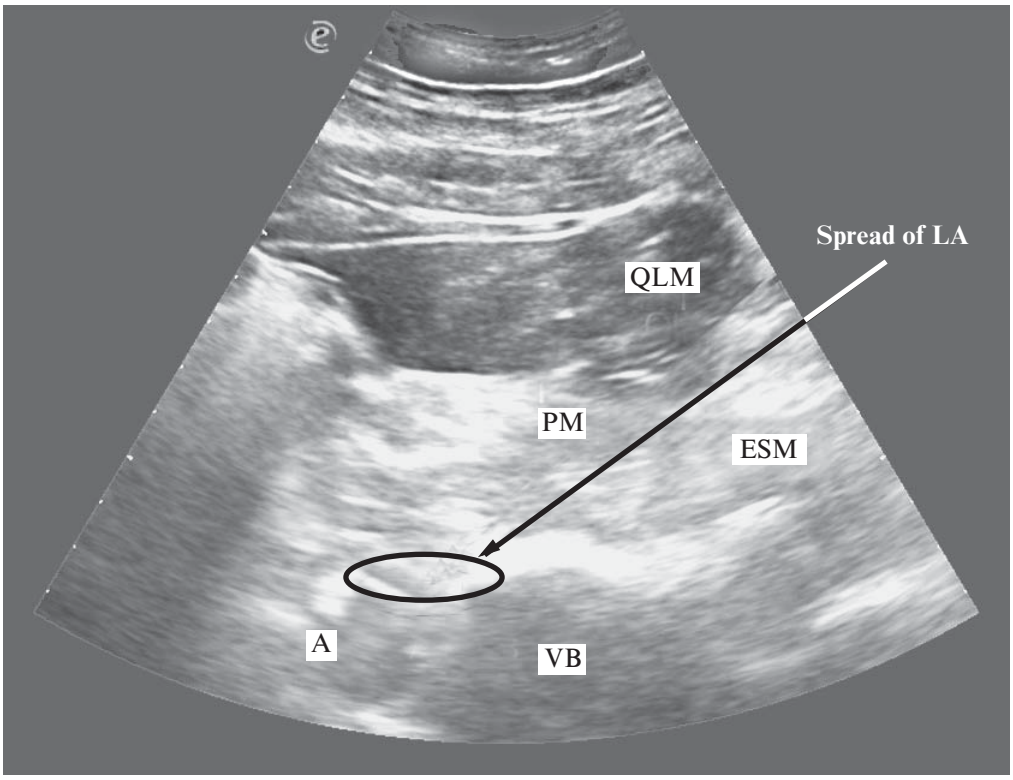

Fig. 2. US-imaging during LSGB. Transverse process is not visible. Note, that slight tilting of the US probe removes transverse process from the needle trajectory. Arrow-path of the needle: A — aorta; QLM — quadratus lumborum muscle; ESM — erector spinae muscle; PM — psoas muscle; VB — vertebral body; LA — local anesthetic

ultrasound-guidance [2]. The sympathetic ganglion in the lumbar region and the lumbar plexus nerve [9] are in close proximity to each other. In the last decade, the posterior ultrasound-guide approach of the lumbar plexus nerve has been described in detail [6; 9]. By the lumbar plexus nerve block, the tip of the needle should be located in the medial posterior part of the psoas muscle close to the antero-lateral surface of the L3–L4 vertebral body [1; 8; 11; 12]. This method is used in traumatic-orthopedic surgery to block nerves coming out of the lumbar plexus: femoral nerve, obturator nerve, lateral cutaneous femoral nerve [6].

The Shamrock — method becomes the basis for the implementation of LSGB [6].

Table 1

Ultrasound Visibility of Different Structures During LSGB (Likert scale)

	Case		
	N1	N2	N3
Erector spinae muscle	2	3	3
Qudratus lumborum muscle	2	3	3
Psoas muscle	2	3	3
Transversus process L3	2	3	3
Vertebral body L3	2	3	3
Abdominal aorta	2	2	3
Vena cava inferior	2	2	3
Tip of the needle	2	2	2
Spreading of LA	2	2	2

Various LSGB approaches with the use of ultrasonography have been described in the literature: sagital paramedical access [8], translateral access [9].

Prevention of intravascular administration and local anesthetic systemic toxicity reaction plays an important role in LGSB, because sympathetic trunk in the lumbar region lies very close to big vesselss: on the right side there is a inferior vena cava and the abdominal aorta on the left side [5]. In addition, there are lumbar arteries within the psoas muscle. Ji H. Hong and the authors [13] showed a high (12.5%) percentage of intravascular administration of contrast agent during LSGB. The aspiration test and fluorography are methods that prevent intravascular injection. The authors conclude that the aspiration test and direct fluoroscopy have a low sensitivity of 40.7% and 70.4% respectevely. In our study, Color Doppler was used to perform LGSB, because it helps to identify the abdominal aorta, the inferior vena cava and sometimes to visualize smaller vessels. Real-time visualization of the end of the needle, spread of the local anesthetic during administration, lack of exposure to radiation are undoubted advantages of ultrasonography in comparison with the application of radiological control by LGSB. C. E. Alexander and the authors believe [3], that the most specific sign of an effective sympathetic blockade is an increase in temperature by 2–3 degrees Celsius after blocking. In our study, the change in the leg temperature was above 2 degrees. It should be emphasized that the visualization of perivertebral structures, shaft of the needle and the spreading of local anesthetic during performing of the block were satisfactory and amounted 2–3 points in the Likert scale [9]. One of the limitations of our report is a small numer of procedures to reveal.

Ultrasound guidance LGSB can be used as an alternative to radiological control or computed tomography, avoiding exposure to the radiation, gives the possibility of real-time visualization of muscle structures, including anterior fascia of psoas muscle, vertebral body, large vessels, tip of the needle and local anesthetic spreading [12]. Further prospective randomized trials are needed to determine the suitability, efficacy and safety of Ultrasound guidance LGSB.

Ключові слова: поперековий симпатичний гангліозний блок, метод трилистника, симпатичний блок, ультразвукове керування.

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