Available online at www.sciencedirect.com

ScienceDirect

journal homepage: http://www.elsevier.com/locate/poamed

Review Article

Paravertebral blockade – Underrated method of regional anesthesia

Grzegorz Kulesza [a,*], Bułat Tuyakov [b], Małgorzata Braczkowska [b,c], Dariusz Onichimowski [b,c], Ewa Mayzner-Zawadzka [b,c]

[a] Clinical Department of Thoracic Surgery, Municipal Hospital in Olsztyn, Poland
[b] Clinical Department of Anesthesiology and Intensive Care, Provincial Specialist Hospital in Olsztyn, Poland
[c] Clinic of Anesthesiology and Intensive Care, Faculty of Medical Sciences, University of Warmia and Mazury in Olsztyn, Poland

ARTICLE INFO

Article history:
Received 15 December 2013
Received in revised form
17 January 2014
Accepted 18 March 2014
Available online 5 May 2014

Keywords:
Paravertebral blockade
Paravertebral space
Anesthesia
Post-operative pain
Identification

ABSTRACT

Introduction: Paravertebral blockade (PVB) is an old, frequently forgotten and underrated method of regional anesthesia, with relatively few possible complications and an easy technique to perform.

Aim: The aim is to describe anatomy of paravertebral space (PVS), present history of PVB, its mechanism of action, indications and contraindications, techniques, with particular emphasis on identifying the PVS with the use of ultrasound and advantages of its use in various clinical situations.

Material and methods: This work was based on the available literature and the experience of the authors.

Results and discussion: Mechanism of action of PVB that includes somatic and sympathetic nerve blocks at a specific level, and requirements for its effectiveness and safety that rely on identification of anatomical landmarks, pressure differences, use of nerve stimulator, performed during thoracic surgery procedures, under visual control and ultrasound-guided, as a safe and accurate method with relatively the lowest number of complications, determines the use of this technique in the treatment of postoperative pain in certain clinical situations, as well as in breast surgery and hernia repair. Complications and adverse effects, including very rare, such as Harlequin syndrome, compared with complications of epidural anesthesia, confirm usefulness of this method of regional anesthesia.

Conclusions: (1) PVB is a technically simple and relatively easy to learn technique of regional anesthesia, with low incidence of complications and contraindications. (2) It may be successfully used in breast surgery, hernia repair, as well as in surgical debridement and revision of small, superficial thoracic wounds, in case of herpes zoster, rib fractures, bruised liver and several other clinical situations. (3) Its principal use is management of postoperative pain in thoracic surgery, where it should be used more often as an alternative to epidural anesthesia which entails multiple complications and is considered the gold standard in

* *Correspondence to*: Clinical Department of Thoracic Surgery, Municipal Hospital in Olsztyn, Niepodległości 44, 10-045 Olsztyn, Poland. Tel.: +48 89 532 33 57.
E-mail address: kulesza100@wp.pl (G. Kulesza).

http://dx.doi.org/10.1016/j.poamed.2014.03.002
1230-8013/© 2014 Warmińsko-Mazurska Izba Lekarska w Olsztynie. Published by Elsevier Urban & Partner Sp. z o.o. All rights reserved.

certain abdominal or breast surgeries. (4) The best quality of PVB is provided with placement of the catheter under direct vision during thoracotomy.

© 2014 Warmińsko-Mazurska Izba Lekarska w Olsztynie. Published by Elsevier Urban & Partner Sp. z o.o. All rights reserved.

1. Introduction

Paravertebral blockade (PVB) was first performed by Hugo Sellheim of Leipzig (1871–1936) in 1905, who aimed at finding an alternative of intrathecal spinal anesthesia, devoid of possible cardiovascular and respiratory complications. Also in Leipzig, surgical resident Arthur Läwen (1876–1958) injected small quantities of procaine paravertebrally and mapped out the segmental innervation of the intra-abdominal organs, investigating not only pain relief, but also muscle relaxation within certain dermatomes. PVB was first described in 1919 by Kappis.[1] In the 1920s and 1930s it became popular and was a relatively easy method of anesthesia, alternative for imperfect at that time technique of general anesthesia, particularly in abdominal surgery and obstetrics, as well as in differential diagnosis and treatment of various clinical conditions, such as renal colic, biliary colic, angina, asthma, cancer pain, femoral neck fractures or muscular dystrophies.[1] Development and continuous improvement of techniques of general and perineural anesthesia contributed to the marginalization of PVB in the mid-twentieth century, so that this method soon become ''more of interest to historians than practicing anesthesiologists.''[2] Another major blow to the enthusiasts of PVB were reported in 1940s cases of permanent nerve damage after subarachnoid administration of cinchocaine contaminated with phenol used for sterilization of glass ampoules, in which the medication was stored.[3] The concept of PVB has returned since 1979, when Eason and Wyatt prepared a modern description of paravertebral space (PVS), its contents and methods of percutaneous identification and demonstrated that PVB is an alternative to intrathecal anesthesia, safe, free of cardiovascular and respiratory complications, used in abdominal surgery and thoracic surgery both in adults and in children.[4] Despite that, its popularity is not large and frequency of use in the 1990s was approximately 3% in Poland.[5]

2. Aim

The aim of this work was to describe anatomy of PVS, present history of PVB, its mechanism of action, indications and contraindications, techniques, with particular emphasis on ultrasound-guided identification of PVS and advantages of the use of this technique in various clinical situations, as well as possible complications in comparison to epidural anesthesia.

3. Material and methods

This work was based on the available literature and the experience of the authors.

4. Results and discussion

Effectiveness of anesthesia is determined by correct identification of PVS, where local anesthetics are administered.

4.1. *PVS anatomy*

PVS is a wedge-shaped area positioned at the thoracic level, which has no definition in the textbooks of anatomy. It lies on both sides of the spine, is filled with loose connective tissue, anteriorly is limited by the parietal pleura, medially by vertebral body, vertebral disc and vertebral foramen, and posteriorly by superior costotransverse ligament and posterior intercostal ligament. Lack of superior and inferior limitation provides communication between upper and lower spaces. Laterally it is bound by intercostal spaces. Endothoracic fascia divides the PVS into two compartments: anterior – extrapleural and posterior – subendothoracic, importance of which has not been established.[6] Extrapleural compartment contains the sympathetic ganglion and subendothoracic compartment contains spinal nerve. Identification of endothoracic fascia that separates sympathetic trunk from posterior root ganglion with compartments might help to understand spread of the blockade and its frequent diversity.[7]

At the thoracic level PVS contains (Fig. 1): spinal nerve (intercostal, in the paravertebral segment devoid of myelin sheath), dorsal branches of the intercostal nerve, white and gray communicating branches and sympathetic trunk (anteriorly).[8,9]

4.2. *Mechanism of action of PVB*

Administration of a local anesthetic into PVS has a direct effect on the above mentioned neural structures located within this space. The result is a combination of somatic, motor and sensory blockade and unilateral sympathetic blockade of several adjacent dermatomes. Its number (extent of anesthesia) is dependent on the volume and concentration of the anesthetic used.[10] Eason and Wyatt claimed that 15 mL of 0.4% bupivacaine should block at least four adjacent dermatomes. Currently, it is assumed that a volume of 15 mL of 0.5% bupivacaine injected into the PVS results in somatic block of more than five dermatomes (1–9), accompanied by sympathetic block of more than eight dermatomes (6–10).[11] There are reported cases of unintentional block of both symmetrical sides of the body.[8] It results from the use of large volumes of anesthetic (>25 mL), high speed of administration or unintentional injection of anesthetic into the epidural space.[12] Rarely, bilateral planned PVB is used, particularly prior to abdominal surgeries.[13] Such PVB has also been described in a child after bilateral thoracotomy.[14]

Download English Version:

https://daneshyari.com/en/article/2675892

Download Persian Version:

https://daneshyari.com/article/2675892

Daneshyari.com