

## THE ANATOMICAL APPROACH OF THE ANAESTHETIC NERVE BLOCKS FOR THE ABDOMINAL REGION

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**THE ANATOMICAL APPROACH OF THE ANAESTHETIC NERVE BLOCKS FOR THE ABDOMINAL REGION (Abstract):** The abdominal wall innervation has a great clinical significance in the anesthetic approach of the distribution territories of the subcostal nerve, iliohypogastric nerve and the ilioinguinal nerve; it can ensure comfort after surgery and better recovery of the patients who have undergone surgery. We aimed to identify the origin and the path of the three nerves and describe their anastomotic variants that may have clinical implications in achieving the regional anaesthetic nerve blocks. We dissected a total of two corpses one male and one female and watched the nerves path from emergence to their terminal distribution level. **Key words:** ANATOMICAL DISSECTION, SUBCOSTAL NERVE, ILIOHYPOGASTRIC NERVE, ILIOINGUINAL NERVE, ANAESTHETIC NERVE BLOCKS

### INTRODUCTION

Innervation of the abdominal wall is supplied through the ventral branches of the intercostal nerves (last 5), subcostal nerve, iliohypogastric nerve and ilioinguinal nerve. This innervation is motor and sensitive and is metameric type pointed posterior to anterior with successive passage through the interstice between the external oblique muscle and the internal oblique muscle into the gap between the internal oblique muscle and transversus abdominis muscle. Every nerve in part addresses both muscular territory and cutaneous territory through muscle or skin branches.

Innervation is segmentary kind and continues intercostal nerve plexiform distribution after the following pattern: from the fifth sternochondral rib joint to the inferior border of the 11th rib we find the sixth to eleventh intercostal nerves. Below the twelfth rib we identify the subcostal nerve. The nerves originating in the lumbar plexus with lower distribution toward the subcostal nerve are iliohypogastric nerve, ilioinguinal nerve and genitofemoral nerve. The latter did not participate at the innervation of the abdominal wall.(1,4)

### MATERIAL AND METHOD

We dissected a total of two corpses, one male and the other female, and initially we marked with ink on the skin, the subcostal, iliohypogastric and ilioinguinal possible nerves path. After that, on this trajectory we dissect successively from anterior to posterior the layers: skin, subcutaneous tissue with the two fascias of the fatty tissue, external oblique muscle, internal oblique muscle and transversus abdominis muscle identifying the origin, path and distribution territory of each nerve: subcostal, iliohypogastric, ilioinguinal.(1,4)

**Subcostal nerve** origin identification is at the tip of the last rib, anterior to the quadratus lumborum muscle and posterior to the kidney. The ideal approach is the retroperitoneal approach, also being the easiest place to discover in the dissection.

**Iliohypogastric nerve** emerges from the lumbar plexus, from the anterior branch of the first lumbar nerve. It is found in the lateral edge of the psoas major muscle, passing anterior to the quadratus lumborum muscle and posterior to the kidney, the lower renal pole.

**Ilioinguinal nerve** is found through a lat-

eral approach at the edge of psoas major muscle, hence having a nerve path nearly parallel to the iliohypogastric nerve, passing anterior to the quadratus lumborum muscle on 2-3 cm below the lower renal pole. We then dissected each nerve path to approach every nerve at the abdominal wall, at the same time identifying cutaneous branches.

The nerves path is almost identical at the lateral abdominal wall. At first all nerves pierces the transversus abdominis muscle aponeurosis then reach in the interstice between it and the internal oblique muscle. Then, after a short trajectory, nerves will divide in their cutaneous branches: lateral cutaneous branches and anterior cutaneous branches.(1,4)

## **RESULTS**

We identified the symmetrical distribution of the subcostal nerve, iliohypogastric and ilioinguinal nerves; the branches being symmetrically arranged on the right and to the left side of the abdominal wall, with the same path.

The sections that nerves crosses are identical no matter of the corpse gender and all the three nerves have common path in the depth of the transversus abdominis muscle.

Gender variability distribution of the nerve branches: we found no significant difference between nerve routes described above in the male corpse versus female corpse, the only difference is regarding the nerves volume; the nerves are much better represented in the male corpse in terms of their diameter. (2.5-3 mm at male, 1.7-2 mm at female).

The nerves length is significantly higher in male compared to female, even that the bodies were almost the same weight, with an difference of about 8 cm more in length at the male corpse.

We measured the distance to the cutaneous layer at the thickness of the lateral abdominal wall on the midaxillary line for all the 3 nerves (subcostal, iliohypogastric, ilioinguinal) and we identified the following: because muscle thickness at the antero-lateral abdominal wall in male is more well represented than in women (difference between 1-1.5 cm in depth) these nerves are by 1-1.5 cm deeper situated in the man corpse than in the woman corpse.

## **DISCUSSIONS**

Clinical importance of the anatomical study is represented by the facilitation of the anes-

thetic nerve block for the abdominal field.

We present three of the anesthetic nerve blocks for the abdominal wall as follows: transversus abdominis plain block (TAP), iliohypogastric nerve block and ilioinguinal nerve block.

### **Transversus abdominis plane block**

Because all the three nerves crosses the muscular thickness of the transversus abdominis muscle it is a good area for diffusion of the anesthetic solution for all three nerves together.

Anatomic landmarks: we identify by palpation at the anterolateral abdominal wall the Petit triangle, which is an lumbar area delimited anteriorly by the posterior edge of the external oblique muscle and posteriorly of the lateral edge of the latissimus dorsi muscle. The floor is represented by the internal oblique muscle and transversus abdominis muscle.

Technique: the needle is inserted perpendicular to the skin, 1-2 cm superior to the iliac crest, on midaxillary line, oriented to the way of the triangle apex. We insert the needle until feel "loss of resistance" when passing first through the external oblique muscle aponeurosis, then the internal oblique muscle fascia. We check the needle position by aspiration and inject 20 ml local anesthetic solution between the transversus abdominis muscle and the internal oblique muscle. This block can be performed unilaterally or bilaterally.(2,3)

### **Iliohypogastric nerve block**

Anatomic landmarks: the umbilicus and the ipsilateral anterior superior iliac spine.

Technique: the needle is inserted at 50-70 degrees to the skin at the junction of the distal 1/3 with medium 1/3 on the line that connects the umbilicus and the ipsilateral anterior superior iliac spine. The needle is inserted in an antero-posterior and caudal way and advanced to the "loss of resistance" when passing through the external oblique muscle fascia, where after negative aspiration we inject 5 ml local anesthetic; then we advance deeper passing through internal oblique muscle fascia with "loss of resistance" and another 5 ml local anesthetic is administered after negative aspiration.(2,3)

### **Ilioinguinal nerve block**

Anatomic landmarks: the ipsilateral anterior superior iliac spine, the pubic tubercle.

Technique: the needle is inserted at 50-70 degrees to the skin at the junction of the distal 1/3 with medium third on the line that connects the ipsilateral anterior superior iliac spine with

the pubic tubercle and advanced in an antero-posterior and caudal direction with “loss of resistance” when passing through the external oblique muscle fascia. After negative aspiration we inject 5 ml local anesthetic, after that the needle is advanced deeper towards the “loss of resistance” when passing through the internal oblique muscle fascia and another 5 ml local anesthetic is administered after negative aspiration.(2,3)

## CONCLUSIONS

Identifying and precisely following the anatomical landmarks and descriptive studies to reveal the nerves path we conclude that anesthetic nerve blocks are feasible and reliable in the postoperative pain management. Widening

of the anesthetic field block can be accomplished depending on the size and type of the surgical incision and approach. Choosing the type of the regional anesthetic block is pursuing the same goal, to increase comfort after the surgery. Decreasing the intensity of acute post-operative pain it promotes more rapid healing of the surgical wound and enhances patients recovery after the surgery.(5,6)

The anatomical study helps us to establish with accuracy the location and trajectory of the nerves involved in the anesthetic technique blocks to their best quality. Classical anatomical landmarks used in performing the anesthetic nerve blocks are accurate, clear and repeatable regardless of the individual variability (weight, gender, height).

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