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Comparative analysis between two intraoperative analgesic techniques in the treatment of surgical pain: TAP Block versus Thoracic epidural Analgesia in postoperative pain following aneurysmectomy

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Abstract

Introduction

Postoperative analgesia in vascular surgery is difficult due to the extensive nature of the surgery and the complex innervation of the abdomen so that the pain is both parietal and visceral.; general anesthesia can be associated with regional anesthesia techniques to control intra- and post-postoperative pain. Thoracic epidural analgesia provides optimal perioperative anesthesia and analgesia after major abdominal surgery and decreases postoperative morbidity and mortality[1]

The transversus abdominis plane (TAP) block the nerves who give sensation to the anterior and lateral abdominal wall and the parietal peritoneum, providing only somatic and not visceral analgesia.[2]

This comparative study aimed to compare the efficacy of the TAP Block and the Epidural anaesthesia in aneurysmectomy

Materials and methods

After authorization from the ethics committee and informed consent of the participants, we analyzed the medical records from 2022 to 2023 of patients undergoing vascular surgery of abdominal aneurysmectomy

The data collected concerns patients n.135, were divided into 2 groups: Group T (TAP) and Group E (Epidural)

Group T: n.70, Group E: n.65, ASA III-IV, Average age: 68 years.

All patients were induced with Fentanest 1.5mcg/kg, propofol 2mg/kg and Rocuronium 0.15mg/kg maintenance with Sevorane on MAC and remifentanil.

Monitoring of intraoperative nociception was based on heart rate variability [HRV], with ANI (Analgesia nociception index, Physiodoloris™; Metrodoloris, France). ANI analyzes the balance of nociception/antinociception through heart rate variability (HRV) on a scale from 0 (maximum of nociception/predominance of the sympathetic nervous system) to 100 (complete analgesia/predominance of the parasympathetic nervous system), making a distinction between appropriate and inappropriate antinociception in anesthetized adult patients., maintaining an intraoperative level between 50 and 70[3].

In the postoperative period, the pain intensity is expressed as Numeric Rating Scale-NRS (0: No pain, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10: worst possible pain).Baseline analgesic consisted of paracetamol every 6 hours.

In the T Group: Ultrasound-Guided The TAP blocks were performed bilaterally at the beginning of the surgery using 1.5 mg * kg−1 bupivacaine diluted with saline to reach a total volume of 40 mL.

All TAP blocks were performed by the same experienced anesthetist at the beginning of surgery and skin closure. The TAP block was performed bilaterally by obtaining an image via real-time US guidance using a 6–13 MHz linear probe (Esaote MyLabFive, Italy). The probe was moved until the abdominal wall muscles were

identified The block was performed using a 22-G 80-mm needle (Pajunk Sonoplex Nanoline Stim Cannula, Germany) while obtaining real-time images via an in-plane technique.

The local anesthetic agent was prepared by diluting 1.5 mg kg−1 of 0.5% bupivacaine with saline to reach a total volume of 40 mL. A total of 20 mL of the solution was injected on each side.

In Group E: : The epidural catheter inserted at thoraco-abdominal level such as to allow covering a sensory level from T6 to T12 is necessary for an extensive abdominal incision; performed with an 17G Thyohy needle ((Pajunk GmbH, Germany)and insertion of the epidural catheter 5-6 cm to the skin. Anesthesia conducted with single shots with levobupivacaine 0.5% with a dosage between 15-20 ml at the beginning of the operation the bolus is not repeated to avoid vasoplegia during clamping and declamping and therefore allow adequate control of organ perfusion

The patients were observed in the ICU for at least 24 h. Patients pain intensity was recorded with NRS scale at 2,6, 12 and 24 h postoperatively before transfer to the ward

Results

Static analysis was performed with SPSS statistical program (version 22.0 IBM®)

We presented data as mean and standard deviation (M ±SD). We used the Mann-Whitney U Test and The significance level for all analyzes was set as < 0.05

Has been calculated :

The average duration of the interventions was 310+/- 43 minutes

Average onset time of surgical analgesia: E: 23 minutes, T: 34 minutes

Mean temple offset surgical analgesia: E 167 minutes, T: 326 minutes

Average ANI value: E 45 +/- 5 SD T 54 +/- 4 SD

Complications: vasoplegia with hypotension requiring vasoactive E: 2 T: 0

Post-operative respiratory complications: E: 0 , T: 3

Postoperative NRS (0-10) as mean value:

- 2h E: 4+/-2 T: 3+/- 1
- 6 h E: 5+/-2 T: 3+/-2
- 12h E: 6+/1 T: 5+/-2
- 24h E: 4+/-1 T 3+/2

At 12 hours in group E it was necessary to treat the pain with a rescue dose via epidural, while in group T administer Ketorolac 30 mg analgesics at 8 hour intervals

The difference between the means of intraoperative ANI values between the two groups was statistically significant with a P < 0.05

The difference between the mean NRS values in the two postoperative groups were not statistically significant at 2, 12 and 24 h p>0.05 while they were statistically significant at 6 h p<0.05

Discussion

Comparing these two techniques of anesthesia and postoperative analgesia, we can see a faster action of the Epidural group compared to the TAP group, a more rapid reduction in offset of the epidural anesthesia compared to the TAP, with good pain control recorded by the ANI.

In the epidural group 2 episodes of intraoperative hypotension due to vasoplegia managed with norepinephrine, increased blood volume and ephedrine, no events related to the TAP- group

Postoperatively Better pain control in the first postoperative hours in the TAP group compared to the Epidural group at 12 h. In both groups, rescue analgesic doses were required.

In the TAP group, 3 cases were associated with postoperative NIV linked to atelectasis at the bases of the lung and rise in the hemidiaphragm.

At 24 the pain in both groups was acceptable with the possibility of transfer to the ward with only basal analgesia with paracetamol.

Conclusions

It is concluded that the two techniques are effective and valid in controlling intra- and post-operative pain despite the lack of perhaps visceral component of the TAP block, epidural vasoplegia is dangerous during this type of surgery as is the need for systemic anticoagulation if the interval times between positioning of the epidural catheter and administration of heparin. At the same time, postoperative control is easier with epidurals.

One could consider using an analgesic and non-anesthetic dosage in the epidural intraoperatively to minimize vasoplegia, but it would not eliminate the risk of hypotension. To eliminate it, you could reserve the use of the same only in the post-operative period.

The TAP block was probably easy to perform and in the 3 cases of respiratory episodes treated with NIV they were related to increased pain localized in the subcostal area compared to the xipho-pubic surgical wound, probably the pain had not allowed adequate lung re-expansion in the post-operative period.

Prospective randomized studies are necessary with a larger sample size which generally increases the power of the analysis to detect significant effects or differences, to compare the two techniques performed at the beginning of the intervention, both execution of the TAP and epidural analgesia at the end of the intervention.

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