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LETTER TO THE EDITOR

The role of quadratus lumborum block in the hemodynamic management during hepatic resection surgery



O papel do bloqueio do quadrado lombar no manuseio hemodinâmico durante ressecção hepática

Dear Editor,

During parenchymal hepatic resection, the main source of bleeding is backflow from the valveless hepatic veins. Many hepatic surgery groups advocate that the distension of the central veins increases bleeding and the difficulty in controlling blood loss during resection.¹

However, the risks of maintaining a low Central Venous Pressure (CVP) (<5 cm H₂O) include cardiovascular instability, air embolism, and renal dysfunction.² Moreover, some patients require a CVP of >5 mm Hg to maintain cardiovascular stability and, in other cases, the basal venous backflow from hepatic veins is increased, namely in patients suffering from pulmonary hypertension or right ventricular diastolic dysfunction.

The complexity of hemodynamic management, particularly involving a perioperative hypovolemic state, that results from reduced perioperative fluid intake, is heightened with the use of intraoperative epidural analgesia using Local Anesthetics (LA).

Some studies have shown the benefits of epidural anesthesia in hepatic resection may not be as straightforward, and may predispose to the risk of transfusion.¹ This increased risk for transfusion may be based on the sympathetic block produced by the epidural analgesia using LA which relaxes vascular smooth muscle and increases venous capacitance.¹

Moreover, if a patient is undergoing low CVP surgery, any hypotensive event caused by epidural sympathetic block may affect directly the need of fluid or vasoconstrictors administration, which can alter the threshold for transfusion. For this reason, most anesthesiologists do not administer epidural LA throughout the intraoperative period in hepatic resection.

On the other hand, an optimized pain control is essential in oncologic surgery. Theoretically, poorly controlled pain in the perioperative period results in the activation of the autonomic and neurohumeral responses, resulting in increased endogenous catecholamines and elevated cortisol levels,

leading to an extracellular milieu that favors angiogenesis as well as immunosuppression.³

A recent meta-analysis has demonstrated that perioperative regional anesthesia use was associated with improved overall survival, although not with reduced cancer recurrence.⁴ This is one of the arguments why we should not rely only in intraoperative IV analgesic or hypnotic drugs in the anesthetic management of the patients undergoing oncologic surgery.

Furthermore, despite data on whether opioids or some types of general anesthesia affect cancer recurrence are still inconclusive, the expression of inflammatory mediators is altered during general anesthesia which may impair the activity of the natural-killer cells and, in addition, μ -opioid receptor overexpression has been documented to occur in breast cancer cells and several non-small cell lung cancer cells, with opioid agonists increasing tumor cell migration, tumor growth, and metastasis.³

In most of my hepatic resection cases, a single-shot right QLB (Quadratus Lumborum Block) type 1 with ropivacaine 0.375% (25–30 mL, according to the patient's height), is given 30 min before induction, as a rule (Fig. 1).

The compliance to this rule is important to reduce the risk to fail the diagnosis of any hypotensive event related to the QLB before induction. Of note, to our knowledge, unilateral QLB blocks have not been associated to hypotension, but there is theoretical possibility, because the spread of LA to the thoracic paravertebral space may occur and prolonged hypotension was described in bilateral QLBs in an isolated case.⁵

In the meantime, after the placement of a low thoracic epidural a lipophilic opioid is administered through the catheter (75 μ g fentanyl).

This approach, combining General Anesthesia (GA) with QLB and intraoperative epidural analgesia with opioid, has several advantages in hepatic resection that have not been emphasized previously.

QLB allows the use of only small amount of intraoperative IV (intravenous) opioids, and most importantly, reduces the dose of IV hypnotics or halogenated drugs after induction. This contributes to better hemodynamic control, which reduces the risk of hypotension, excessive fluid administration or use of vasoconstrictors and the risk of transfusion. Notably this makes a crucial change in anesthetic management in hepatic resection under low CVP.

In opposition to epidural analgesia using LA, which can cause hypotension by its direct sympatholytic effect, if hypotension occurs in a case in which a QLB was used in combination with GA for hepatic resection that will be

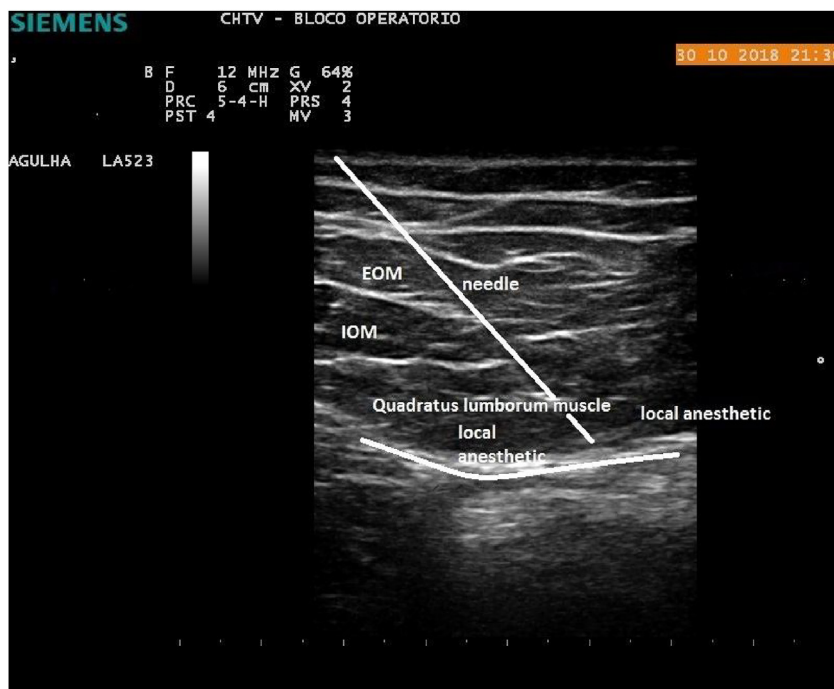


Figure 1 Quadratus lumborum block Type 1. The patient is kept in dorsal decubitus (right side was lifted by a small pillow). The bilateral US-guided QL B1 is performed using a 21G 85 mm needle (Echoplex, Vygon®, Ecoen, France), which is directed in-plane to a high-frequency ultrasound beam (probe: Acuson® P300 ultrasound system, Siemens AG®, Muenchen, Germany) was used. We visualize the LA spread in a medial direction in the anterior surface of Quadratus Lumborum (QL) posteriorly to the anterior layer of TLF. IOM, Internal Oblique Muscle; EOM, External Oblique Muscle (patient granted authorization for the publication of this image).

related mostly to excessive depth of anesthesia, blood loss, pre-operative hypovolemic status, or other intraoperative complication, and less attributable to QL B.

QL B1 blocks, at least, T6 to L1 dermatomes which covers the most of area of the abdominal wall involved in different types of incisions commonly used in open hepatic resection, namely the subcostal J-shaped incision. It was demonstrated that QL B1 may produce blockade up to T4, and until L2-L3, caudally.⁶

In 2011, Carney et al. observed posterior spread of contrast, using a QL B, to the Paravertebral Space (PVS) from the fifth thoracic to the first lumbar vertebral level using magnetic resonance imaging, which can produce visceral analgesia but carries the risk of sympathetic blockade and hypotension, particularly in bilateral blocks.⁶ Nevertheless, the spread of LA to the thoracic PVS is still under debate.

I also administer epidural fentanyl during surgery as an adjuvant to cover the somatic pain from midline and contralateral side (which depends on the type of incision) and visceral pain, and to reduce the total amount of opioid given summing all routes.

The amount of LA anesthetic that reaches the thoracic PVS may depend on the type of QL B (QL B1, QL B2, transmuscular or intramuscular), the volume of the injectate and the ability of the patient to produce muscular contraction which may contribute to the cephalad spread to the thoracic PVS.

The degree of visceral pain is reduced because the pain scores are very low (numeric rate scale pain score 0–2),

and pain is mostly referred to the incision region in the immediate post-operative period (despite only additional paracetamol 1gr IV is given before anesthetic emergence), and the intraoperative needs of IV opioids are residual after the induction.

Epidural infusion for post-operative pain control, in a multimodal analgesia context, is initiated 30 min after the patient is admitted in the PACU (Post-anesthetic Care Unit) (using ropivacaine 1.5 mg/mL plus fentanyl 2 µg/mL, at 5 mL/h), without administration of an initial bolus.

As alternatives to this technique, it could be consider TAP subcostal block (but it will never provide visceral pain relief and the spread of TAP blocks is frequently limited and less reliable), erector of spine plane or retrolaminar blocks or paravertebral block, but, theoretically, in these later cases the risk of hypotension will be comparatively more elevated because the amounts of LA anesthetic that reach the PVS could be higher.

I argue that an epidural analgesia is still a reliable technique in hepatic resection cases for post-operative analgesia, despite it has been discussed that the post-resection impairment of coagulation could increase the risk of epidural hematoma (the evidence about an increased incidence of adverse incidents is lacking).²

In conclusion, we believe that QL B block can indirectly impact intraoperative hemodynamic management during liver resection under low CVP.

To think that anesthetic technique can make a difference in relation to cancer outcomes many years after a single and unimodal intervention is a very promising concept.

Nevertheless, I believe that regional anesthesia has a role that is not limited only to analgesia, opioid sparing effect or to direct and indirect anti-tumor properties, but it may impact patient's outcome and survival in many other ways in the context of "enhanced recovery after surgery", namely contributing to perioperative hemodynamic stability by modifying general anesthesia management, with optimized analgesia without LA epidural administration.

Informed consent from the patient

Patient gave consent for the anesthetic management and interventions. The technique is not a novel intervention. In fact, it is only described an ultrasound image of a patient, as an example. The patient gave written consent for the publication of the image, with anonymized case details.

According to the national law, and to the hospital rules no approval is needed by the hospital ethics committee for the publication of case reports, as long as patient has given authorization for the publication of his anonymized clinical details.

Conflicts of interest

The author declares no conflicts of interest.

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Methylenetetrahydrofolate Reductase deficiency and anesthesia: importance of a detailed preoperative evaluation



Deficiência de metiltetrahidrofolato redutase e anestesia: importância de uma avaliação pré-operatória detalhada

Dear Editor,

Methylenetetrahydrofolate Reductase is an important enzyme responsible for homocysteine and folate metabolism.¹ The deficiency of this enzyme is described as an autosomal recessive disorder that results in increased homocysteine levels in the body well known as Methylenetetrahydrofolate Reductase (MTHFR) deficiency.¹ These patients are basically classified in homozygous, less commonly seen, and heterozygous, the most prevalent variation.¹ MTHFR gene mutation have limited capacity to use the essential nutrient folate which sets off a chain reaction that would culminate in premature atherosclerosis and consequent ischemic insults.¹ The complete mechanism is not completely understood, even though hyperhomocysteinemia presents hypercoagulable properties and has been associated with endothelial dysfunction. The detection

of the mutation is usually observed after an unexplained thrombotic event in a previously "healthy patient". After the diagnosis, family members should be oriented to be genetically screened for this mutation.

If undetected, the patient is at high risk of complications during and after exposure to Nitrous Oxide (N₂O). The utilization of nitrous oxide is frequent in the operating room as a second gas and commonly used by dentists in their clinics. Methionine synthase is the enzyme responsible for the reaction that transforms homocysteine to methionine.² Nitrous oxide inhibits this enzyme resulting in elevated levels of homocysteine.² The accumulation of homocysteine, well known as hyperhomocysteinemia, increases the risk of venous and arterial thrombosis up to six times compared to the general population.² A detailed preoperative evaluation and investigation of past medical history, including family history, is the most valuable tool to diagnose a rare disease such MTHFR deficiency. An unexpected ischemic insult without diagnosis is greatly suspicious and the utilization of nitrous oxide should be avoided, especially because the prevalence of MTHFR deficiency is not known but certainly underestimated. The common use of N₂O should be reviewed due to the risk of undiagnosed population with MTHFR deficiency and possible devastated consequence of its utilization. Patients should be followed up closely in the postoperative period regardless of whether or not N₂O was used due to the susceptibility of the patients for ischemic