# REVISTA BRASILEIRA DE ANESTESIOLOGIA

## CLINICAL INFORMATION

# Quadratus lumborum block: are we aware of its side effects? A report of 2 cases

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**Abstract**

*Background and objectives:* The quadratus lumborum block was initially described in 2007 and aims at blocking the same nerves as the ones involved on the Transverse Abdominis Plane block, while accomplishing some visceral enervation as well due to closer proximity with the neuroaxis and sympathetic trunk. Given its versatility, we have successfully used it in a wide range of procedures. We report two cases where we believe the dispersion of local anesthetic is likely to have led to a previously undescribed complication.

*Clinical reports:* We report two cases in which we performed a quadratus lumborum type II block and general anesthesia for total gastrectomy and right hemicolectomy. There were no noteworthy events while performing the block and inducing general anesthesia, but within 30–40 min serious hypotension and tachycardia were noted. As other motives for hypotension were ruled out, the event was interpreted as block-induced sympatholysis due to cephalad dispersion of the local anesthetic to the paravertebral and epidural space, and successfully managed with ephedrine and increase of the crystalloid infusion rate.

*Conclusions:* The quadratus Lumborum block is safe to execute and provides effective abdominal wall and visceral analgesia. However, the possibility of eliciting undesired episodes should prompt caution when performing this block and practitioners should thereafter remain vigilant. Questions regarding ideal dosing, volumes, timing of block and pertinence of catheters remain to be answered.

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**PALAVRAS-CHAVE**
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**Bloqueio do quadrado lombar: estamos cientes de seus efeitos colaterais? Relato de dois casos**

**Resumo**

*Justificativa e objetivos:* O bloqueio do quadrado lombar foi primeiramente descrito em 2007 e tem como objetivo o bloqueio dos mesmos nervos envolvidos no bloqueio do plano transverso abdominal, ao atingir algumas inervações viscerais, bem como devido à maior proximidade com o neuroeixo e cadeia simpática. Dada a sua versatilidade, temos usado esse bloqueio com sucesso em uma grande variedade de procedimentos. Relatamos dois casos nos quais acreditamos que a dispersão do anestésico local pode ter levado a uma complicação não descrita previamente.

*Relatos clínicos:* Relatamos dois casos nos quais realizamos o bloqueio do quadrado lombar tipo II e anestesia geral para gastrectomia total e hemicolectomia direita. Não houve eventos notáveis durante o bloqueio e a indução da anestesia geral, mas, dentro de 30 a 40 minutos, observamos grave hipotensão e taquicardia. Como outros motivos para a hipotensão foram descartados, o evento foi interpretado como simpatólise induzida pelo bloqueio devido à dispersão cefálica do anestésico local para os espaços paravertebral e epidural e tratado com sucesso com efedrina e aumento da taxa de infusão de cristaloides.

*Conclusões:* O bloqueio do quadrado lombar oferece segurança na execução e fornece analgesia eficaz à parede abdominal e vísceras. Porém, a possibilidade de provocar episódios indesejáveis requer cautela em sua execução e, por conseguinte, os médicos precisam estar atentos. As questões relacionadas à dosagem ideal, aos volumes, ao tempo de bloqueio e à pertinência dos cateteres permanecem indefinidas.

## Introduction

In 2007 R. Blanco described the ultrasound-guided quadratus lumborum block (QLB), consisting of the ultrasound-guided deposition of local anesthetic (LA) into the anterolateral surface of the QL muscle, reaching the same nerves as the ones involved on the Transverse Abdominis Plane (TAP) block while accomplishing some visceral enervation as well due to closer proximity with the neuroaxis and sympathetic trunk. In 2013 an alternative technique was described using the same landmarks used for the lumbar plexus block (''Shamrock'' method), arguing that there is less of a redundant spread of LA in an anterolateral direction.[1] Finally, Blanco described the type 2 QLB (QLB2), a variation consisting of the deposition of LA posteriorly to the QL which he now favors thanks to more predictable spread of LA to the paravertebral space, better safety profile, and improved ultrasonographic resolution due to the more superficial point of injection.[2] Recently, parasagittal oblique approaches have been developed but no definite data exists yet on their efficacy.[3]

We have used the QLB2 with success in a wide range of procedures including gastrectomies, colectomies, prostatectomies, nephrectomies, cystectomies, cesareans and hysterectomies. We present two cases where its use led to an undescribed complication and discuss its implications, as well as its potential as a versatile analgesic weapon.

## Case 1

An 83 year-old male presented at our hospital for elective total gastrectomy due to gastric signet-cell carcinoma which had been responsible for weight loss (65–52 kg in 3 months), asthenia, and partial GI tract obstruction. Previous history consisted of benign prostatic hyperplasia and complete left branch bundle block. Blood tests only revealed mild hypochromic microcytic anemia. Because the patient refused an epidural for pain management, our group aimed at achieving similar benefits with a bilateral QLB2.

The patient was monitored according to American Society of Anesthesiology standards (BP 124/62 mmHg, HR 73 bpm) and pre-medicated with 1 mg of midazolam and 0.05 mg of fentanyl. A bilateral QLB2 was performed with 20 mL of 0.25% levobupivacaine in each side, using a 21G 100 mm needle (Stimuplex® Ultra 22 gauge, B. Braun, Melsungen, Germany) under ultrasound guidance (Venue 40 Ultrasound, GE Healthcare, with a 5–13 MHz wide-band linear array transducer) with an *in-plane* approach, from lateral to medial. After the block, eventless rapid sequence induction and intubation were performed with 3 mcg.kg$^{-1}$ of fentanyl, 2 mg.kg$^{-1}$ of propofol and 1.2 mg.kg$^{-1}$ of rocuronium. Anesthesia was maintained with sevoflurane and a mixture of $O_2$:Air 50:50.

Roughly 40 min after performing the block, the patient had a sudden drop in BP (70/40 mmHg) and rise in HR (100 bpm) which could not be explained by drugs or an acute surgical event. This event was interpreted as sympatholysis secondary to the QLB2 (with reflex tachycardia) and managed with 10 mg of ephedrine and an increase in the crystalloid infusion rate. Urinary output remained well above 1 mL.kg$^{-1}$.h$^{-1}$ throughout the procedure.

Analgesia consisted solely of 1 g of paracetamol 30 min before the end of the procedure. He also received 4 mg ondansetron for Post-Operative Nausea and Vomit (PONV)

prophylaxis. The procedure was otherwise uneventful, and took 3 h to complete.

Following recovery from anesthesia in the Post-Anesthesia Care Unit (PACU), the patient reported no pain or discomfort. He was given a PCA device with morphine for endovenous rescue analgesia with no basal infusion. The first bolus was requested 6 h after the block. He was discharged from the PACU within 4 h, and during the following 3 days reported no pain with paracetamol 1 g 6 hourly and the PCA (he requested a total of 12 mg of morphine per day). No supplementary analgesia was required nor side effects noted during this period, after which he was discharged from our care.

## Case 2

A 61 year-old, 76 kg male with arterial hypertension, type II diabetes mellitus, stable coronary disease and psoriasis was scheduled for right hemicolectomy due to adenocarcinoma. There was no other relevant history or significant changes in his pre-surgical workup. A midline psoriatic lesion in the thoracolumbar area advised precaution in regards to performing an epidural; we therefore proposed a QLB2 as an alternative. The patient was monitored (BP 142/84 mmHg, HR 66 bpm), pre-medicated with 1 mg of midazolam and 0.05 mg of fentanyl, and a bilateral QLB2 and anesthetic induction were performed exactly as in Case 1.

Also similarly to Case 1 the patient exhibited a sudden drop in BP (80/38 mmHg) and rise in HR (96 bpm) 30 min after the block, for which we had no justifiable cause aside from secondary sympatholysis. The event was managed as previously described, and no other noteworthy events occurred throughout the surgery. Intra-operatory analgesia and PONV prophylaxis consisted of 1 g paracetamol, 100 mg tramadol and 4 mg ondansetron. The procedure took 90 min to complete.

The patient reported no pain during his stay at the PACU; mild pain was mentioned in the ward 8 h after the block. For the following 2 days he was prescribed 30 mg ketorolac every 8 h and 1 g paracetamol every 6 h. Excellent pain control was achieved, no side effects were reported, no rescue analgesia was required and the patient was discharged from our care afterwards.

## Discussion

The anterior TAP block mainly covers somatic afferents of the abdominal wall, meaning it would suffice for managing the incisional – but not visceral pain – in the cases described. It can also be argued that while the TAP block demands a lower degree of anatomical understanding and therefore has a friendlier learning curve, the QLB2 provides a safer option as it is often more superficial, shielded anteriorly by the psoas major and not as technically prone to difficulties related to deep or irregular patient breathing.

A study on the LA spread demonstrated that the QLB2 causes, on the one hand, pooling of LA between the *transversalis fascia*, the QL and the psoas muscle and, on the other hand, non-contiguous paravertebral, epidural and lymphatic contrast enhancement up to Th5.[4] Blanco shared MRI images hinting that the LA travels medially along the middle

fascial layer until the paravertebral space, moving cephalically afterwards.[2] This distribution justifies both the visceral analgesia and the sympatholysis which led to hypotension.

To our knowledge, we are the first group to highlight this complication. Functionally speaking, the QLB2 seems to hold higher resemblance to the paravertebral block or thoracic epidural than to the TAP block. We therefore hypothesize that higher volumes, concentrations or the bilateral use of the QLB2 increase the likelihood of sympatholysis (including bradycardia if the LA reached the cardioaccelerator fibers at Th4). One possible explanation is that we used levobupivacaine concentrations superior to that of those reported by Blanco (0.25 vs. 0.125%, respectively). The doses of LA to be injected are not yet standardized across the literature: high volumes with low concentrations ensure cephalad spread without exceeding toxic doses, but could theoretically represent an added risk for hypotensive episodes. We should also note that the event observed could have represented LA Systemic Toxicity, although we consider this unlikely given its immediate response to treatment, the cardiac rhythm being sinusal tachycardia, lack of further cardiovascular instability, and total dose of LA used.

Carney raised the question of whether the use of muscle relaxants or positive pressure ventilation would interfere with the cephalad dispersion of the LA and thus lower its effectiveness.[4] It would be interesting to compare the dispersion results of a QLB2 performed after vs. before the surgery under general anesthesia, or under spontaneous vs. controlled ventilation modalities.

Concerning the dispersion to the epidural space, we also wonder whether the QLB2 possesses some of the benefits of the thoracic epidural, namely reduced surgical stress response. This could hypothetically translate into lower rates of cardiovascular, respiratory and thromboembolic events, infection or tumor relapse. Some studies suggest an improvement in disease-free survival where regional anesthesia and analgesia has been used, which could constitute yet another advantage of this block.

Finally, Blanco published one RCT evaluating the effectiveness of the QLB2 in cesareans where he argued that perineural catheters were not likely to be of benefit on this block because its duration of action might extend up to 48 h. In spite of the findings we wonder if there is a particular region to which the LA disperses in which the effect ''wears off'' first and as such, whether there is any benefit in performing a continuous QL block for more aggressive and painful surgeries. We also hypothesize that the use of ''continuous QLB2'' might prompt more frequent hypotension episodes. Nonetheless, others authors have had satisfactory results with these techniques.[5]

Overall, the QLB2 appears to be a versatile weapon in our pain-control arsenal. It is safe to execute, provides effective abdominal wall and visceral analgesia in a variety of settings, and could relate to improvement in patient outcome and survival. All these facts notwithstanding, the possibility of eliciting undesired (and delayed) hypotensive episodes should prompt caution when performing this block, and practitioners should thereafter remain vigilant. Further studies regarding dosing, volumes, timing of block and pertinence of catheters are sure to produce engaging discussion in the following years.

## Conflicts of interest

The authors declare no conflicts of interest.

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