Erector spinae plane block on pain management after thoracic surgical approaches due to COVID-19 complications. Case reports

Bloqueio do plano dos músculos eretores da espinha no manejo de dor pós-abordagens cirúrgicas torácicas por complicações da COVID-19. Relato de casos

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ABSTRACT

BACKGROUND AND OBJECTIVES: Erector spinae plane block is an interfascial plane block used as a tool for management of pain resulting from thoracic and abdominal surgical procedures described in the literature since 2016 and widely used in clinical practice. In the context of the pandemic caused by Sars-CoV-2, multiple pulmonary complications arising from severe viral pneumonia and respiratory failure that required surgical approaches for their investigation and/or treatment were observed. The present study's objective was to present a series of three cases of patients affected by COVID-19 who had pulmonary complications due to infection or exacerbation of previous pulmonary diseases caused by the new coronavirus, in which the continuous fascial plane block was successfully used for postoperative pain management.

CASE REPORTS: Three cases of patients with COVID-19 viral pneumonia requiring diagnostic or therapeutic thoracic surgery who underwent erector spinae plane block for perioperative pain management were presented.

CONCLUSION: The use of a catheter with continuous infusion of local anesthetic was useful for reducing analgesic rescue and maintaining good postoperative analgesia with no evidence of adverse effects in the presented patients, also allowing acceleration of postoperative recovery and a better outcome for the patients.

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RESUMO

JUSTIFICATIVA E OBJETIVOS: O bloqueio do plano dos músculos eretores da espinha é um bloqueio do plano interfascial usado como ferramenta para manejo de dor consequente a procedimentos cirúrgicos torácicos e abdominais descrito na literatura desde 2016 e amplamente utilizado na prática clínica. No contexto da pandemia causada pelo Sars-CoV-2, foram observadas múltiplas complicações pulmonares decorrentes de pneumonia viral grave e insuficiência respiratória que demandaram abordagens cirúrgicas para sua investigação e/ou tratamento. O objetivo deste estudo foi apresentar uma série de três casos de pacientes acometidos pela COVID-19 que tiveram complicações pulmonares pela infecção ou exacerbação de doença pulmonar prévia causada pelo novo coronavírus, nos quais o recurso do bloqueio do plano fascial contínuo foi utilizado para manejo de dor pós-operatória com sucesso.

RELATO DOS CASOS: Foram apresentados três casos de pacientes acometidos pelo COVID-19 em sua forma de pneumonia viral, para os quais houve necessidade de cirurgia torácica diagnóstica ou terapêutica, e que foram submetidos ao bloqueio do plano dos músculos eretores da espinha para manejo da dor perioperatória.

CONCLUSÃO: O uso de cateter com infusão contínua de anestésico local foi útil para a diminuição dos resgates analgésicos e manutenção de boa analgesia pós-operatória sem evidência de efeitos adversos nos pacientes apresentados, possibilitando ainda a aceleração da recuperação pós-operatória e um melhor desfecho para os pacientes.

Descritores: Anestesia por condução, Cirurgia torácica vídeoassistida, Dor aguda, Infecções por coronavírus, Relato de caso.

INTRODUCTION

Analgesia for patients undergoing thoracic surgery is often the subject of discussion given the high incidence of pain in this population. Currently, the main analgesia guidelines for the postoperative period of thoracic surgery involve the use of multimodal analgesia and regional or neuroaxis blocks[1].

Erector spinae muscles plane block (ESPb) is cited as a regional analgesia option for postoperative pain control in different thoracic surgery techniques[2-4]. Described in 2016, it is an infiltration of local anesthetic into the spinal erector musculature in paravertebral topography with the objective of blocking the innervation of the thoracic and upper abdominal area, with possible somatic and autonomic components[5].

In the context of the pandemic caused by Sars-CoV-2, many patients developed pulmonary complications from viral pneumonia, requiring surgical intervention in the thoracic region for diagnostic or therapeutic procedures. In some cases, such patients underwent surgeries with high potential of pain, adding to the physiological complications related to COVID-19.

The study's objective was to present a case series of three patients who developed COVID-19 in its viral pneumonia form, for whom there was a need for diagnostic or therapeutic thoracic surgery and who underwent ESPb for perioperative pain management.

CASE REPORTS

The CAse REport (CARE) Checklist was used for preparation of this manuscript in order to increase accuracy, transparency, and usefulness of case reports[6,7].

Case 1

A 73-year-old male patient, previously hypertensive, firstly presented flu-like symptoms and later developed dyspnea and was admitted to a tertiary hospital due to acute respiratory failure requiring orotracheal intubation.

During hospitalization, the patient presented a bilateral pulmonary embolism complication due to deep venous thrombosis of the right popliteal vein, associated with extensive pulmonary infarction to the right. Next, the patient developed a bronchopleural fistula and pneumothorax to the right, with placement of a pigtail drain in the anterior wall, which only resolved satisfactorily after continuous aspiration, without the need for lung expansion.

He was submitted to emptying of the pleural space by right video-assisted thoracic surgery (VATS) and anterior pleural drainage with 28 French (Fr) drain and posterior pleural drainage with 38 Fr drain. The Pain Control Team was asked to evaluate the case. On the first day after surgery, the patient presented intense pain in the right hemithorax, was ventilatory-dependent, burning with irradiation throughout the hemithorax from the axillary region, worsening when deep breathing and coughing.

The prescription included intravenous (IV) morphine 4mg if necessary, oral methadone 10mg once a day, oral paracetamol 2 g a day, and oral dipyrone 8 g a day. Oral pregabalin 75mg per day was introduced and the right ESPb was performed with passage of a local catheter. A patient-controlled analgesia (PCA) pump was started with 0.2% ropivacaine, with a continuous infusion of 7mL per hour (h), bolus of 5 mL, at minimum interval of 30 minutes, and a limit of 17 mL in 4 hours.

The patient condition developed with a report of significant pain improvement, with pain of zero/10 on the numerical rating scale (NRS) at rest, and pain 2/10 when immobilized in bed (sitting and walking), with no other complaints. In the following days, there was a reduction in opioid consumption, and the catheter was discontinued on the 5th day after its implementation. The patient had no more pain complaints until hospital discharge, 20 days after surgery.

Case 2

A 70-year-old male patient, hypertensive, diagnosed with diabetes mellitus and type 2 chronic kidney disease, former smoker, admitted to a tertiary hospital with a confirmed diagnosis of COVID-19 on the 30th day of symptoms.

The patient presented dyspnea during moderate/severe exertion associated with cough and developed tachydyspnea, abolished vesicular murmurs to the right, and use of a 3L/min nasal catheter.

A relief thoracentesis was performed, with an output of 2 liters of serous hematic fluid, improving the symptoms. A pigtail drain was passed without effective drainage and decortication, pleural debridement and VATS thoracentesis were indicated.

In the immediate postoperative period, the patient presented 10/10 pain on the NRS, and the right side ESPb was indicated with passage of a local catheter and infusion of 0.2% ropivacaine solution in PCA with an infusion of 4mL/h; bolus of 5 mL, at 30-minute intervals, with a 4-hour limit of 60mL. The patient was also prescribed gabapentin 900mg/day, dipyrone 4g/day intravenously, and tramadol 100 mg 6/6 hours intravenously if necessary. The condition developed with mild pain (NR: 2/10) in the right hemithorax during deep breathing, with no pain when immobilized and no need for opioids.

Cyclobenzaprine 5mg once a day was later introduced due to complaint of myofascial pain, by decubitus. On the 8th postoperative day, the catheter was discontinued (the catheter broke when the bacteriostatic filter was attached) and weaning of gabapentin was initiated, with no pain complaints. The patient was discharged from the hospital three weeks after surgery, with only occasional use of dipyrone.

Case 3

A 53-year-old male patient, hypertensive, obese, with a diagnosis of COVID-19, requiring orotracheal intubation on the 12th day of symptoms in addition to the use of neuromuscular block in continuous infusion, prone positioning, and nitric oxide (NO). The patient remained on mechanical ventilation for a prolonged period and underwent tracheotomy.

Necrotizing pneumonia developed, and thoracic surgery was needed. Right apical segmentectomy by VATS and thoracotomy were indicated. Afterwards, a closed drainage was performed with a 38 Fr chest drain. During the intraoperative period, a catheter was placed in the right spinal erector muscles plane.

The patient was brought to the intensive care unit with continuous infusion of 0.2% ropivacaine solution at a rate of 6 mL/h, with prescription for manual bolus by the medical team of 6mL, if needed. On the first day after surgery, the nursing team reported that the catheter had been lost. During a new visit by the pain team, after a test dose of 10mL of lidocaine 1% and 50% pain relief, the catheter viability, and its effective fixation at 13cm on the skin mark were confirmed.

After weaning from mechanical ventilation, the patient was conscious and focused, with no complaints of pain during rest

or immobilization and cooperative to respiratory rehabilitation. There was no need for the use of schedule or rescue opioids, maintaining only the use of intravenous dipyrone 8g/day and infusion of local anesthetic through the catheter. On the 5th postoperative day, the interfascial catheter presented a breakage. The catheter and chest drain were then removed on the same day, with no complaints of pain.

After physical therapy treatment for motor and respiratory recovery, the scenario developed with a successful tracheostomy occlusion and decannulation, and the patient was discharged from the hospital with an outpatient follow-up 51 days after the surgical procedure with no complaints of pain.

DISCUSSION

Initially described by Forero et al.[2] for the treatment of neuropathic pattern chest pain, ESPb is a fascial plane block. The erector spinae muscles comprise a series of muscles that extend along the cervical, thoracic, and lumbar region. These muscles are in the lateral sulcus of the spine and include the iliocostalis, spinal, and dorsalis longus.

In the version of this block used in the described patients, the patients are positioned in lateral dorsal decubitus or sitting position leaning forward, and the posterior chest wall is exposed. The procedure is performed under aseptic technique. A high-frequency linear ultrasound transducer is placed in longitudinal orientation over the midline of the spine at T4-T6, with the objective of identifying the spinous process of the vertebra. Once identified, the transducer is laterally slid toward the side to be blocked until the transverse process of the vertebra is identified, the anatomical reference of the block. The blocking needle is inserted in the skin in plane with the ultrasound transducer beams toward the transverse spinal process in the cephalocaudal orientation, until contact with it is established. The needle is then retracted by a few fractions of a millimeter, only so it loses its contact with the bone surface, and the local anesthetic of choice is infused in the fascial plane. The formation of an interfascial pocket is observed between the vertebral transverse process and the erector spinae muscles.

Studies indicate that its probable site of action occurs in the dorsal and ventral branches of the spinal nerves, besides covering the sympathetic chain in thoracic topography[2,5]. There is evidence that, during ESPb, the injected volume is distributed over several adjacent dermatomes in the anterior, lateral and posterior chest wall[6]. The hypothesis is that alterations in intrathoracic pressure in a live model would allow dispersion into the paravertebral space, an event not likely to be observed in cadavers[5]. Another potential mechanism described is the epidural dissemination of the local anesthetic[7].

Currently, the application of ESPb has been extended beyond thoracic surgery and several approaches have been described. There are reports that show its efficacy for analgesia in procedures such as breast reconstruction, hip surgery, coronary artery bypass graft surgery, and others[3,4,8,9].

Regional anesthesia is strongly recommended to reduce the use of opioids and the related adverse effects, including hypoventilation[10], sedation, nausea, and vomiting[11]. ESPb is technically simple to perform, with low chances of complications, such as traumatic nerve injury, pneumothorax, or formation of hematoma. Anticoagulation may be a relative contraindication for ESPb, although there are no specific guidelines. The reported patients were on prophylactic anticoagulation, and this was not stopped for the procedure.

The most recent 2018 American Society of Regional Anesthesia (ASRA) consensus does not specifically address paraspinal blocks and anticoagulation[12]. In addition, there are fewer contraindications for fascial plane block compared to neuroaxial techniques, making ESPb a potential alternative to neuroaxial blocks[13]. Therefore, the ESPb technique can be an important locoregional analgesia tool for pain management in this context.

The three patients presented in this report maintained satisfactory pain scores in the days following the surgical intervention, with good tolerance to the early introduction of routine respiratory physical therapy, even when using a chest drain, sometimes in more than one location. These patients' condition developed with low opioid consumption in the follow-up, showing the benefit of analgesia with continuous ESPb associated with adjuvants such as gabapentinoids and common analgesics. In this specific group of patients, which are those affected by COVID-19 with multiple comorbidities, the benefit of regional analgesia is even more important when considering their borderline status of respiratory, neurological, and hemodynamic functions.

However, there are still obstacles to using and maintaining the viability of the interfascial peripheral catheter during postoperative care. The refinement of catheter fixation techniques is necessary, as well as the training of the teams involved in patient care and manipulation. Continuous interfascial infusion is a relatively recent option of analgesia, and it is necessary to familiarize the entire multidisciplinary team with this tool to avoid catheter losses or infusions through unusual routes. The little experience of the assistance teams outside the operating room with the catheter care and the comprehension of the importance of maintaining its viability are still obstacles to be overcome.

The continuous ESPb (interfascial catheter passage) becomes, therefore, an important ally in the management of surgical pain, especially in patients with significant respiratory issues undergoing thoracic surgical procedures, resulting in better outcome and early recovery. Dissemination of the technique should be encouraged, as well as stimulation of its reproduction and learning by anesthesiologists in training or already in practice in order to expand the range of action and good practices in intraoperative and postoperative management of patients. Future studies can help to prove the benefits and optimization of outcomes found in these reports, expanding the practice of continuous ESPb to other types of procedures, as well as showing its applicability in other locations, such as thoracolumbar or lumbar region transition.

CONCLUSION

ESPb is a technique that substantially impacts pain management in patients undergoing thoracic surgery, including in the presented scenario of patients undergoing such surgical procedures for complications arising from COVID-19. The use of a catheter with continuous infusion of local anesthetic was useful in reducing

analgesic rescue and maintaining good postoperative analgesia without evidence of adverse effects in the presented patients. The little experience of the assistance teams outside the operating room with the catheter care and the comprehension of the importance of maintaining its viability are still obstacles to be overcome.

AUTHORS' CONTRIBUTIONS

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