

ANESTHETIC BLOCK OF THE INTERTRANSVERSE SEPTUM, A PROSPECTIVE OBSERVATIONAL STUDY

BLOQUEIO ANESTÉSICO DO SEPTO INTERTRANSVERSO, ESTUDO PROSPECTIVO OBSERVACIONAL

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ABSTRACT

Objective: To evaluate the influence of intertransverse septal anesthetic block (BASIT) on postoperative pain in lumbar spine surgery. **Methods:** The study was carried out prospectively and observationally. Were included 105 patients who underwent posterior lumbar spine surgery, divided into two groups: 35 patients in the experimental group, who received BASIT at the end of the procedure, and 70 patients in the control group, without BASIT. Patients were assessed for low back pain (visual pain scale), opioid consumption on the 1st postoperative day, complications related to the procedure, and length of stay after surgery. **Results:** The sample consisted of 46 men and 59 women, with a mean age of 57.7 years (21 to 90 years). Mean postoperative pain in the experimental group was 1.88, and in the control group 2.11 ($p < 0.05$). There was a trend towards less morphine use in the experimental group with $p = 0.053$. There was a statistical difference in morphine consumption between patients who did not previously use opioids and those who already used them ($p 0.04$). There was no difference between the groups regarding length of stay. **Conclusion:** Anesthetic blockade of the intertransverse septum reduced the consumption of opioids and the levels of low back pain after surgery ($p < 0.05$), with no statistical difference in length of hospital stay or complications related to the technique. **Level of Evidence II; Clinical Prospective Study.**

Keywords: Nerve Block; Spine; Pain, Postoperative.

RESUMO

Objetivo: Avaliar a influência do bloqueio anestésico do septo intertransverso (BASIT) sobre a dor pós-operatória em cirurgia de coluna lombar. **Metodologia:** O estudo foi realizado de modo prospectivo e observacional. Foram incluídos no estudo 105 pacientes submetidos à cirurgia da coluna lombar por via posterior e divididos em dois grupos: 35 pacientes no grupo experimental, que recebeu o BASIT ao final do procedimento e 70 pacientes no grupo controle, sem o BASIT. Os pacientes foram avaliados quanto à dor lombar (escala visual de dor), consumo de opioide no 1º dia pós-operatório, complicações referentes ao procedimento e tempo de internamento após a cirurgia. **Resultados:** A amostra consistiu em 46 homens e 59 mulheres, com média de idade de 57,7 anos (21 a 90 anos). A média de dor pós-operatória do grupo experimental foi 1,88 e no grupo controle 2,11 ($p < 0,05$). Houve uma tendência a menor uso de morfina no grupo experimental com $p = 0,053$. Houve diferença estatística no consumo de morfina entre os pacientes que não utilizavam opioides previamente quanto comparados aos que já faziam uso ($p 0,04$). Não houve diferença entre os grupos quanto ao tempo de internamento nem eventos adversos relacionados à técnica. **Conclusão:** O bloqueio anestésico do septo intertransverso reduziu o consumo de opioides e os níveis de dor lombar após cirurgia ($p < 0,05$), não havendo diferença estatística no tempo de internamento, nem intercorrências relacionadas a técnica. **Nível de Evidência II; Estudo Prospectivo Clínico.**

Descritores: Bloqueio Nervoso; Coluna Vertebral; Dor Pós-Operatória.

RESUMEN

Objetivo: Evaluar la influencia del bloqueo anestésico del septo intertransverso (BASIT) sobre el dolor posoperatorio en cirugía de columna lumbar. **Método:** El estudio se realizó de forma prospectiva observacional. Fueron incluidos en el estudio 105 pacientes sometidos a cirugía de columna lumbar posterior y se dividieron en dos grupos: 35 pacientes en el grupo experimental, recibieron BASIT al final del procedimiento, y 70 pacientes en el grupo control, sin BASIT. Los pacientes fueron evaluados por dolor lumbar (escala visual de dolor), consumo de opioides en el primer día postoperatorio, complicaciones relacionadas con el procedimiento y tiempo de estancia hospitalaria después de la cirugía. **Resultado:** La muestra consistió en 46 hombres y 59 mujeres, con una edad media de 57,7 años (21 a 90 años). El dolor postoperatorio medio en el grupo experimental fue de 1,88 y en el grupo control de 2,11 ($p < 0,05$). Hubo una tendencia hacia un menor uso de morfina en el grupo experimental con $p = 0,053$. Hubo una diferencia estadística en el consumo de morfina entre los pacientes que no usaban previamente opioides en comparación con los que ya los usaban ($p 0,04$). No hubo diferencia entre los grupos

Study conducted by the Cajuru University Hospital, Curitiba, PR, Brazil.

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con respecto a la duración de la estancia. **Conclusión:** El bloqueo anestésico del septo intertransverso redujo el consumo de opioides y los niveles de dolor lumbar posoperatorio ($p < 0,05$), sin diferencia estadística en la estancia hospitalaria ni en las complicaciones relacionadas con la técnica. **Nivel de Evidencia II; Estudio Clínico Prospectivo.**

Descriptor: Bloqueo Nervioso; Columna Vertebral; Dolor Postoperatorio.

INTRODUCTION

Pain control after spine surgery remains challenging,¹ and adequate analgesia corresponds to a fundamental step for surgical success – seeking minimum side effects, and early mobilization, thus facilitating recovery and reducing hospitalization time.^{2,3} Inadequate control of postoperative pain is the second most common cause of early hospital readmission in spine surgery.⁴ Considering the current therapeutic options, opioids are the analgesic class most used for the management of postoperative pain⁵ and as a consequence, there are records of the need and prescription of excessive doses for satisfactory control, triggering various side effects: respiratory depression, cardiac involvement, cognitive changes, delayed healing, and sphincter dysfunction.¹ Multimodal analgesic therapies have been a viable alternative,^{1,6} among them the use of anesthetic blocks, which despite presenting good results in recent literature, are still being consolidated in spine surgery.⁷ The objective of this study was to evaluate the effectiveness of a method of postoperative analgesia as to the level of low back pain, opioid consumption, and length of hospital stay after posterior approach lumbar spine surgery.

METHODS

Study Design

This study was planned as a prospective observational study, comparing patients who received BASIT with a control group. Therefore, the patients were unaware of whether or not the anesthetic block was performed. The Ethics Committee, CAAE 57376722.1.0000.0020, approved the project. All participants signed the Informed Consent form.

The data was collected prospectively between May and October 2022.

The patients were divided into two groups, an experimental group ($n = 35$) that received the septal block and a control group ($n = 70$) that did not receive the anesthetic block). The parameters evaluated were opioid use (yes or no) in the first 24 hours after surgery, low back pain intensity (visual analog pain scale), time to hospital discharge, a correlation between prior opioid use and pain rates, and type of surgery (instrumentation or non-instrumentation) and type of surgical approach (midline or posterolateral) and their correlations with pain rates.

Variables evaluated included the degenerative pathology type, the posterior approach (midline or posterolateral), and the presence of pedicle instrumentation.

The differences in the data analysis for the groups (blocking versus non-blocking) were described statistically by the Chi-square and T-student tests, and statistical significance was defined as $p < 0.05$.

Inclusion criteria were adult patients, age range 18-90 years, operated on for degenerative lumbar pathology (symptomatic disc degeneration, degenerative spinal canal stenosis, disc herniation, and spondylolisthesis), and surgical approach of up to three levels, by a posterior approach. Exclusion criteria were: revision surgeries (patients who had previously undergone a surgical procedure on the spine); comorbidities with a high possibility of global clinical impact, such as chronic end-stage renal disease, tumors, advanced heart failure, recent and significant gastrointestinal ulcers or bleeding, uncontrolled neuropsychiatric diseases; documented existence of contraindication to the performance of surgical and/or anesthetic procedure; history of drug addiction, alcoholism and/or smoking (> 40 cigarettes/day); negative regarding voluntary participation. The consent was obtained.

Surgical technique

All patients in the present study underwent a surgical approach performed by three experienced spine surgeons, considering at least 15 years in specialized care activity. Only posterior surgical approaches were performed. The standardized steps of the procedure included: Positioning the patient in spinal support; Infiltration with an anesthetic solution - ropivacaine 5% + epinephrine 40ml + 500 ml of 0.9% saline (applied equally along the incision path - either midline or posterolateral lumbar); Dissection by midline or posterolateral planes; Decompression, with or without pedicle instrumentation;

Blockage of the intertransverse septum

In the experimental group, the “freehand” technique described by Yeşiltaş S. and collaborators,⁸ was performed by identifying the erector spinae muscle and transverse processes and bilaterally applying the anesthetic solution composed of 20ml of levobupivacaine 5% with 20ml of saline 0.9%, distributed equally between the operated levels. (Figures 1 and 2)

The data was collected by an individual interview with the patient every 8 hours after surgery until discharge.

For the visual scale of low back pain, the greatest pain presented by the patient between surgery and hospital discharge was considered.

For opioid consumption, the medical record at the time of the patient's discharge, the anesthetic chart, and the post-surgical recovery chart were reviewed.

RESULTS

Between May and October 2022, 105 patients were included within a cohort of 127 cases, and 22 were excluded following the study criteria. The sample consisted of 46 men and 59 women, with a mean age of 57.7 years (21 to 90 years). The following diseases were addressed: symptomatic disc degeneration, lumbar stenosis, degenerative spondylolisthesis, isthmic spondylolisthesis, and lumbar disc herniation, the last being the most prevalent - 41 cases (39%), followed by lumbar stenosis 31 cases (29%). (Tables 1 and 2)

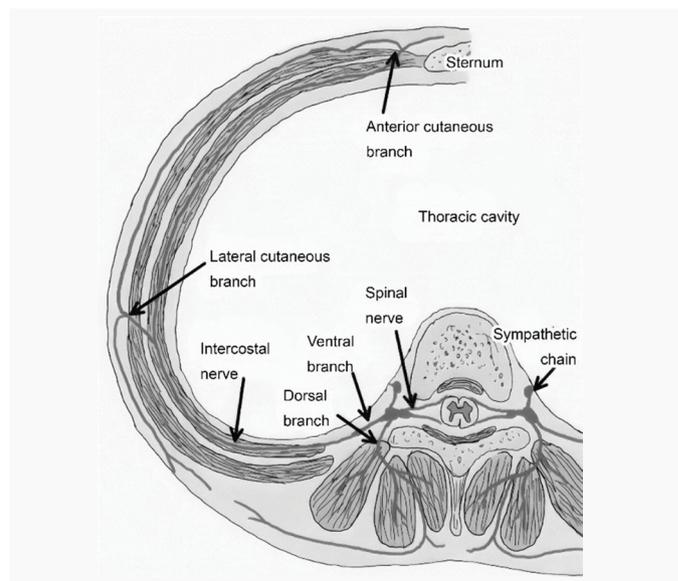


Figure 1. Anatomy of the intertransverse septum.



Figure 2. Performing anesthetic block by direct visualization of the intertransverse septum.

Table 1. Demographics data.

Age		
Average	59.82857143	58.17142857
Median	57	58.5
Standard-Deviation	14.75582779	16.12628732
Gender		
Male	26	20
Female	9	50

Table 2. Diagnostic pathology.

Primary Diagnosis		
DDD	4	8
Stenosis	13	18
Spondylolisthesis Deg	7	10
Isthmic Spondylolisthesis	1	3
HDL	10	31

The average length of hospital stay was two days, with no difference between the groups. Therefore, there were no adverse events related to the use of BASIT.

The most common surgical approach was discectomy/decompression, with the most common access through the midline. (Table 3)

As for postoperative pain, there was a difference between the groups favoring the experiment group, which had a mean postoperative VAS of 1.88, while the control group had a mean VAS of 2.48 ($p < 0.05$).

Evaluating the type of surgery, patients who underwent BASIT had significantly lower pain rates when compared to the control group overall, performing the analysis on an individual basis in the decompression ($p < 0.000001$) and instrumentation ($p < 0.02$) groups. In the experiment group, when only decompression was performed, there were lower rates of pain when compared to instrumentation ($p < 0.008$). In the control group, the comparison between techniques showed no statistical difference ($p = 0.07$). (Table 4)

Comparing the types of surgical access, there was a difference in the experiment group in pain rates between midline and posterolateral, favoring the midline ($p = 0.001$). In the control group, there was no such difference. Comparatively, the experiment group showed lower pain rates in both types of access ($p < 0.05$) in the midline comparison and ($p < 0.01$) for posterolateral. (Table 5)

Evaluating opioid use and its correlation with BASIT, the experimental group showed lower morphine consumption when compared to the control group, 8% x 24%, with no statistical difference between the groups ($p = 0.053$). (Table 6)

Table 3. Surgery description / surgical access.

Surgery description		
Discectomy / decompression	20	44
Arthrodesis WITH screw	6	15
Arthrodesis WITH screw WITH cage	9	11
Instrumentation	15	26
Access		
Medium line	19	47
PL (1)	5	22
PL (2)	11	1

Table 4. Comparison between pain levels and type of surgery.

Surgery Type Comparison	Mean postoperative pain (VAS)
Decompression Experiment Group	1.65
Instrumentation Experiment Group	2.06
Decompression control group	2.38
Instrumentation control group	2.65

Table 5. Comparison of average pain and the type of access.

Access type comparison	Mean postoperative pain (VAS)
Middle row experiment group	1.68
Lateral postero experiment group	2.12
Midline control group	2.39
Postero lateral control group	2.66

Table 6. Relationships previous opioid use.

	Experiment	Control
Previous opioid use (number)	28	58
In-hospital morphine use	3	12
Average pain: previous opioid use x no previous use	2.14 x 1.82	2.58 x 2.46

There was a correlation between prior opioid use and the need for morphine use during hospitalization ($p = 0.04$), demonstrating lower consumption in patients who were not prior opioid users.

DISCUSSION

Good postoperative analgesia is an integral part of the surgical process, and its optimization is in focus in the current literature on its correlation with good postoperative outcomes.⁹ Despite the importance of analgesia and advances in pain management, there is still no consensus on a “gold standard” drug or therapy among different analgesic modalities.¹

The opioid class is the most commonly used to control severe pain. In this scenario, high doses are very frequent, leading to clinically relevant adverse effects such as constipation, nausea, vomiting, physical dependence, and refractoriness, and there may also be catastrophic events such as respiratory depression.^{5,10,11}

To optimize intra- and postoperative care, several analgesia protocols have been created. Among them is multimodal analgesia, which resorts to various analgesic and anesthetic medications with distinct mechanisms of action and use routes.^{1,12} These protocols also include intravenous drugs and local anesthetics, as well as the use of peripheral blocks.¹²

Among these techniques is the intertransverse septal block (Figure 1), which began in thoracic surgery to treat scoliotic rib fractures, post-thoracoscopy pain, and intercostal neuropathic pain.¹³⁻¹⁷ In it, blockade of the erector spinae plane is performed, in which the dorsal and ventral branches of the spinal nerve and sympathetic fibers are approached, leading to local anesthetic and analgesic effects (Figure 2 and Figure 3). The anesthetic effect occurs by distributing the anesthetic through the fenestrations at the level of the costotransverse ligament, bringing the desired effect to the injection level and adjacent levels. After its consolidation in thoracic surgeries,

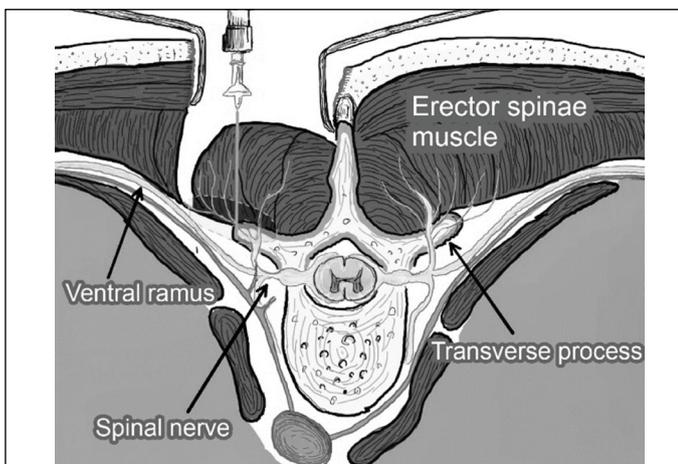


Figure 3. Performing anesthetic block by direct visualization of the intertransverse septum.

it was used in other surgical varieties, such as abdominal surgeries, spine surgeries, and for chronic pain management.^{13,18}

The ultrasound-assisted technique demonstrated by Singh et al.¹⁹ initially described its use in spine surgery, reproducing the benefits achieved in other surgical sites. Yeşiltaş et al. presented the hands-free technique performed by direct visualization, obtaining good results such as greater accuracy of application, effective pain control, and absence of adverse events related to the block technique, such as pneumothorax and motor block by poor positioning of the needles, in addition to the possibility of application at various levels and not requiring additional devices such as ultrasound.^{8,20,21}

In our study, the evaluation of postoperative low back pain showed a clear advantage for the group that received the BASIT concerning efficacy in controlling pain in the postoperative period, as demonstrated by the meta-analysis of Jun Ma and collaborators.²² In this study, 12 studies involving spine surgery were evaluated

regarding postoperative pain, opioid consumption, and other advantages of multimodal analgesia, recommending the standardization of the BASIT in lumbar spine surgeries.

We demonstrated that the type of surgical approach and access (midline or posterolateral) impacted pain. Furthermore, as described by Gerbershagen et al.,²³ our study also showed lower pain rates in isolated decompression surgeries when compared to those involving instrumentation.

The trend toward lower morphine consumption after BASIT shown in this study is in line with current literature.²² In addition, it has been shown that the preoperative use of opioids leads to higher in-hospital consumption.²⁴ Given these correlations, adjuvant techniques such as BASIT are gaining strength in the therapeutic arsenal for postoperative pain control.

Our study had many participants, and the sample was homogeneous in demographic terms. In addition, we relied on the variability of surgeries (approaches and access type) included to reduce internal study biases. However, our study covered a single hospital institution which may impair our external bias, and our pain assessment was restricted to a period of up to 24 h post-op, a period considered short.

The present study demonstrated reduced postoperative pain in patients undergoing lumbar spine surgery using BASIT, with evident short-term benefits. In addition, we demonstrate that consumption of opiate medications before surgery is related to greater morphine use during hospitalization. After the study, this procedure is now used in a standardized way in our institution.

CONCLUSION

Using anesthetic intertransverse septal block after posterior lumbar spine surgery reduced immediate postoperative pain levels and morphine consumption during patients' hospitalization.

All authors declare no potential conflict of interest related to this article.

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