

# Superior Hypogastric Nerve Block (SHNB) for pain management in Uterine Artery Embolization (UAE): a literature review

*Bloqueio do Nervo Hipogástrico Superior (BNHS) para o manejo da dor após Embolização de Artérias Uterinas (EAU): revisão de literatura*

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## ABSTRACT

**Introduction:** Uterine Artery Embolization (UAE) is a therapeutic option in the treatment of symptomatic uterine fibroids; however, post-procedure pain imposes as a great challenge in this technique. In this context, the Superior Hypogastric Nerve Block (SHNB), already used in the treatment of chronic pelvic pain associated with malignancy, presents itself as an option for intraprocedural intervention, to improve patients' recovery and to promote UAE in the clinical setting. **Objective:** to perform an integrative literature review about the effectiveness of SHNB in pain management after UAE. **Methods:** databases PubMed, The Cochrane Library, Lilacs and Medline were assessed using the combination of the terms "uterine artery embolization", "pain" and "superior hypogastric block". Clinical studies were included once available in full text, with adult patients submitted to UAE, whose objective was to evaluate the use of SHNB and its impact in post-procedure pain. Review articles, letters to the editor, and publication in conference proceedings were excluded. **Results:** 8 articles were found, most of them retrospective, indicated SHNB's consistency in terms of short-term therapeutic success and pain reduction. The single reported complication evolved satisfactorily. **Conclusions:** SHNB has the potential to improve pain management after UAE, which can positively impact recovery time and quality, with reduced pain and consumption of opioids in the postoperative period. Benefits like these can enhance the embolization procedure as an alternative to be considered for the treatment of symptomatic fibroids for women candidates for uterine preservation.

**Keywords:** leiomyoma; anesthetics, local; pain; gynecology; radiology, interventional.

## RESUMO

**Introdução:** a embolização de artérias uterinas (EAU) é uma opção terapêutica no tratamento de miomas uterinos sintomáticos; todavia, a dor pós-procedimento representa um grande desafio para essa técnica. Nesse contexto, o Bloqueio do Nervo Hipogástrico Superior (BNHS), já utilizado no tratamento de dor pélvica crônica associada à malignidade, apresenta-se como opção de intervenção intraprocedimento para melhorar a recuperação das pacientes e fomentar o uso da EAU na prática clínica. **Objetivo:** realizar uma revisão integrativa da literatura disponível sobre o BNHS no manejo de dor pós EAU. **Métodos:** bases de dados PubMed, The Cochrane Library, Lilacs e Medline foram avaliadas a partir da combinação dos termos "uterine artery embolization", "pain" e "superior hypogastric block". Foram incluídos estudos clínicos, disponíveis em texto completo, com pacientes adultas, submetidas à EAU, cujo objetivo era avaliar o uso do BNHS e seu impacto na dor pós-procedimento. Foram excluídos artigos de revisão, carta ao editor, e publicação em anais de congresso. **Resultados:** 8 artigos, em maior parte retrospectivos, indicaram consistência do BNHS em termos de sucesso terapêutico a curto prazo e redução da dor. Apenas uma complicação foi relatada, e evoluiu de forma satisfatória. **Conclusões:** BNHS tem potencial de aprimorar o manejo da dor após EAU, podendo impactar positivamente no tempo e na qualidade da recuperação, com redução da dor e consumo de opioides no período pós-operatório. Esses benefícios valorizam o procedimento de embolização como uma alternativa a ser considerada no tratamento de leiomiomas sintomáticos para mulheres candidatas à preservação uterina.

**Palavras-chave:** mioma; anestésicos, locais; dor; ginecologia; radiologia intervencionista.

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## INTRODUCTION

Uterine artery embolization (UAE) is a minimally invasive procedure, considered safe and effective for the management of uterine fibroids<sup>1</sup>. It is based on a minimally invasive angiographic technique that interrupts blood supply to segments of the uterus, promoting an ischemic necrosis that, by shrinking fibroids, reduces their impacts<sup>2</sup>. In general, the procedure occurs with the introduction of a small catheter in the femoral artery, posteriorly identifying, reaching, and performing the embolization of the uterine arteries uni or bilaterally, according to the location of the fibroid<sup>3</sup>. It is a great alternative to surgical options, as it requires less procedure and hospitalization time, enabling early return to routine activities<sup>4-7</sup>.

The acceptability of the practice is complicated by the intensity of the post-procedure pain and difficulty in its management<sup>8</sup>, which causes longer hospital stays, higher need for readmission and occurrence of complications associated with pain<sup>9</sup>. The painful condition is explained by the Post-Embolization Syndrome (PES), condition associated with the infarction of part of the organ, or all of it; in this case, the myometrium<sup>10,11</sup>, causing pain and other possible symptoms, such as nausea, vomiting, fever, fatigue and malaise<sup>8</sup>.

Several authors have proposed ways of managing post-procedure pain, usually with medications, which can lead to side effects such as nausea, vomiting, constipation and fatigue<sup>12</sup>, reducing the quality of recovery and patient satisfaction. In this context, the Superior Hypogastric Nerve Block (SHNB) presents itself as an intraprocedural alternative for post-procedure pain management, since it allows the nervous block of the entire pelvis and uterus, preventing the spread of nervous stimulus in the critical period of pain. This technique is already used for the management of pain associated with cancer<sup>13</sup>. It uses fluoroscopy to access the nervous plexus, which divides into right and left, extending inferiorly after the aortic bifurcation, an important anatomical reference for the technique<sup>14</sup>.

In Plancarte's original description of the technique, patients are in a positioned position and spinous processes from L4 to L5 are identified in the topography of the skin. A 22-gauge needle is directed 45° in a caudal direction until bone contact is made. The needle is then guided to an anterolateral surface of L5, advancing an additional 1 cm through the psoas muscle into the retroperitoneal space. At this point the needle tips are presumably at the level from L5 to S1. To perform the blockade, 6 to 8 mL of bupivacaine, 0.25%, is injected. The same amount is used for neurolysis with 10% phenol (supersaturated) in the needle<sup>14</sup>.

The present study aims to perform an integrative literature review, despite the scarcity of randomized controlled studies, to assess the effectiveness of superior hypogastric nerve block in managing pain after uterine artery embolization.

## METHODS

A literature review was carried out, based on publications indexed in the Pubmed database, The Cochrane Library, Lilacs and Medline, in Portuguese, English and Spanish.

The articles were selected in August 2020, based on the combination of the terms "uterine artery embolization", "pain" and "superior hypogastric block". Case-control, cohort, randomized clinical trials and case report studies, published up to the year 2020, were eligible once they were available in full text, with adult patients submitted to UAE, whose objective was to evaluate the use of SHNB and its impact in post-procedure pain. The selection process of included articles is demonstrated in Figure 1. Review articles, letters to the editor, and publication in conference proceedings were excluded. Also, three articles were excluded for being ongoing clinical trials (NCT02270255; ACTRN12614001253695; NCT04126824)<sup>15</sup>.

The seven selected clinical studies had different types of design: 04 retrospective, 02 prospectives and 01 case report, the latter being of a patient already counted in one of the retrospective articles<sup>16</sup>, leading to a total of 434 patients.

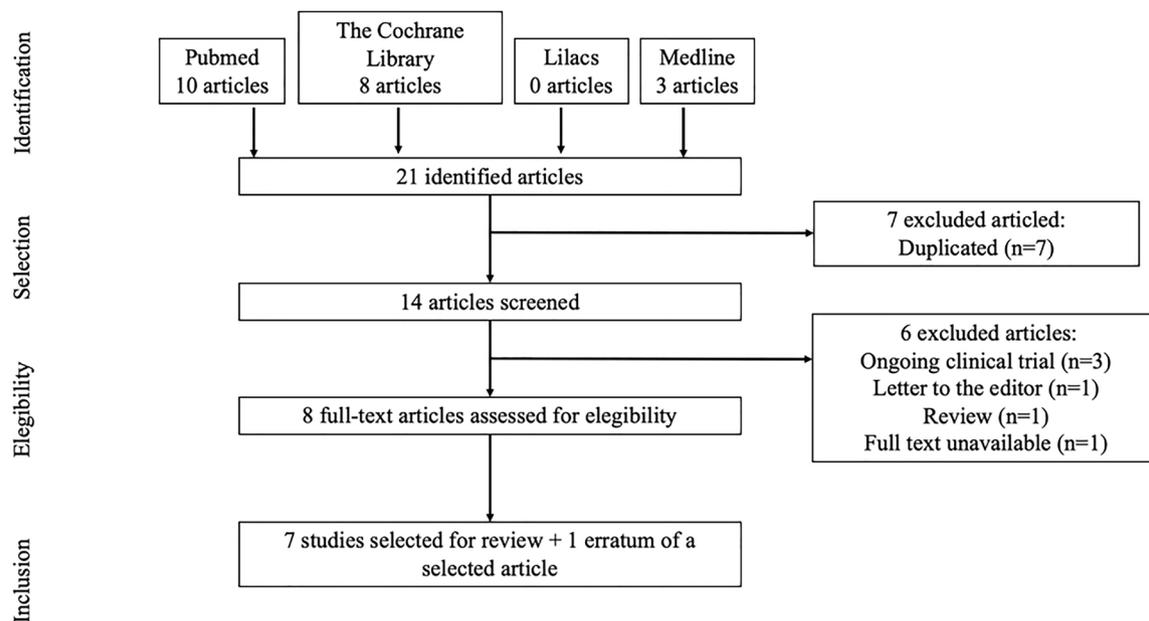
## EFFECT OF SUPERIOR HYPOGASTRIC BLOCK ON UTERINE ARTERY EMBOLIZATION

The assessment from pain scores and/or morphine consumption showed an overall reduction in pain in the BHNS group compared to the sham group (placebo procedure, without anesthetic block)<sup>17</sup>, especially when long-acting morphine is associated with the blockage<sup>18</sup>. It also demonstrated the possibility of applying a second SHNB for immediate relief of pain not responsive to the first application. Regarding the use of pain relief medication, there was less need for morphine in the SHNB groups compared to the control, sham and epidural groups<sup>17,19,20</sup>.

In the study by Binkert et al, 28% of patients who underwent the block did not need analgesia<sup>20</sup>. Also, to optimize pain management, the study by Stewart et al, considering the reduction of analgesia after 8-12 hours of blockade, proposed the adjuvant use of corticosteroids – thus achieving reduced maximum pain levels in mean (5.9/10 ± 2.9, at the apex of pain)<sup>21</sup>.

Complications reported are related to the need to reposition the needle<sup>20</sup>, with the technical success of the block being related to the operator's experience, in the study by Pereira et al<sup>16</sup>. A class B complication according to the Society of Interventional Radiology, which does not involve major consequences and includes admission overnight for observation only, was published as a case report<sup>22</sup>, with a positive outcome.

It is also considerable, as reported in the retrospective study by Park et al<sup>19</sup>, the association of reduced narcotic use with fibroids larger than 5 cm (p = 0.009), intramural (p = 0.04) and in patients aged 45 years or more (p = 0.006).



Flowchart 1. Flowchart of the selection process for the researched articles.

Table 1. Description of included studies.

Author, Year	Study Design	Intervention	Results
Yoon, 2018 <sup>17</sup>	Prospective, randomized, double-blind	SHNB (n=22) vs. Sham* (n=22)	Less severe pain in the SHNB group (1.0±2.1 mg) than in the sham (2.6±2.0 mg); p = 0.01. Lower dose of morphine in the SHNB group (5.1±5.8 mg) than in the sham (11.0±9.0 mg); p = 0.014.
Rasuli, 2004 <sup>18</sup>	Prospective	SHNB + short-acting morphine (n=100) vs. SHNB + long-acting morphine (n=39)	Less severe pain with the use of long-acting morphine (2.7±2.5 mg) than short (5.7±2.2 mg); p <0.01.
Park, 2020 <sup>19</sup>	Retrospective	SHNB (n=44) vs. control (n=44)	Less self-controlled use of morphine in the SHNB group (35.9 ± 26.6 mg) than in the control group (51.7 ± 27.4 mg), p = 0.008. Three patients (7%) in the SHNB group did not need analgesia after the procedure.
Binkert, 2015 <sup>20</sup>	Retrospective	SHNB (n=81) vs. epidural (n=27)	149.21 ± 116.92 mg in morphine equivalent were used in the epidural group and 19.33 ± 22.17 mg in the SHNB, p <0.001. In this group, 23 patients did not need analgesia.
Pereira, 2020 <sup>16</sup>	Retrospective, case-control	SHNB (n=39)	Blockage was effective in 34 patients, of which only 1 (2.7%) required self-controlled analgesia; among the 17 patients who received opioids, an average of 7.5 mg in morphine equivalent was used (IQR, 10)
Stewart, 2020 <sup>21</sup>	Retrospective	SHNB + corticosteroid (n=16)	13 patients reported pain, with a mean score between 0.6/10 ± 1.1 at the beginning and 5.9/10 ± 2.9 at the apex (which occurred 33.8 ± 14.8 hours after the procedure), p <0.001
Pereira 2018 <sup>22</sup>	Case report	SHNB (n=1)	The patient became drowsy and disoriented after the application of the total dose of 60mg of ropivacaine, requiring admission to the ICU, with later recovery of consciousness and favorable evolution, without other complications or sequelae

## DISCUSSION

There is a lack of randomized controlled studies on the topic and the results of retrospective studies, such as the majority of the selection<sup>16,19,20,21</sup>, are conditioned to the accuracy and availability of the information and to the selection bias in the grouping process. Furthermore, the evaluation of predetermined results can be influenced by unmeasured factors, which can be misleading. For example, the lack of data on the use of analgesics in the first postoperative days is an important limitation of Stewart et al<sup>21</sup>, as the consumption can directly impact on the start of pain complaints.

Although all studies have shown positive results, there was a difference in pain assessment: whereas some authors have used scores<sup>18,21</sup>, others evaluated according to the use of opioids, a more objective factor<sup>16,19,20</sup>; and only one performed the assessment of both<sup>17</sup>.

The application of the block in the studies occurred with few changes, generally related to the size of the needle. The procedure was described as successful<sup>18,20</sup>, without major complications that could not be resolved in the intraoperative period<sup>17</sup>. The work by Pereira et al<sup>16</sup> showed a success rate of 87%, the failures being associated with technical or patient factors, such as increased abdominal circumference, wide fibroids, lack of needles of adequate size, two attempts aborted by consecutive blood aspiration, and bradycardia in one patient.

The complication reported by Pereira et al<sup>16</sup> indicates that, although ropivacaine is considered a less toxic local anesthetic agent, the high amount required for the block makes it important to assess systemic toxicity in these patients, identifying and reversing those cases<sup>22</sup>. In this situation, the loss of consciousness after needle removal allowed the assistant team to signal the complication. Thus, it became possible to administer oxygen, continuously monitor vital signs and admit the patient to the intensive care unit. After stabilization, hospital discharge occurred after one night of observation.

The procedure time was in general little increased by the block, with the addition of satisfactory time as an average of 4 minutes and 38 seconds (2m 38s–9m 27s), presented by Binkert et al<sup>20</sup>, and 17.9 minutes  $\pm$  6.5 (6–32), for Yoon et al<sup>17</sup>. Moreover, between the studies which allowed hospital discharge on the same day, the reduced hospital stay, on average 2.2 hours<sup>16</sup> and 5 hours<sup>18</sup>, and the low readmission rates due to pain support the possibility of performing the procedure in an outpatient setting.

Despite not being a main objective of evaluation in the studies, a considerable reduction was observed in the use of antiemetics<sup>17,18,20</sup> and in the complaint of nausea and vomiting in the post-procedure period, which can be related to the reduction of opioid use, since these symptoms are common side effects of this medication.

Despite its advantages, SHNB is still little known among the current medical class, and its complexity requires the participation of a prepared and qualified professional, limiting its routine practice.

The limitations of this review are due to the small sample of 434 patients in studies with less evidence design, compared to randomized controlled clinical

studies, unavailable at the time of this study. The disagreement between the proposed interventions can also make it difficult to observe the benefits of the block, as well as the medication proposals in the post-procedure, which were different between studies. Finally, the study follow-up period was reduced to only the first days after the procedure, not allowing a long-term assessment of the effectiveness of the UAE as a resolutive practice for these patients, especially regarding reproductive capacity. Therefore, further studies are needed to elucidate the long-term benefits of the procedure in terms of effectiveness and demand for readmissions and new procedures.

## CONCLUSION

The application of SHNB can be a good alternative for pain management after UAE, significantly reducing the use of analgesics and antiemetics, reducing patient morbidity, without changing their mortality. The technique proved to be reproducible over the course of clinical trials, in a safe and effective way, and can bring positive impacts for allowing faster recoveries and making it possible to perform on an outpatient basis. Thus, the benefits of this procedure, in terms of analgesic control and reduction of hospital use, can make the UAE an even more attractive option for women with symptomatic fibroids of reproductive age. Further studies on the topic are required. Long-term follow-up and evaluation of readmissions for longer periods require more studies on the subject.

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## AUTHORS' CONTRIBUTION

We describe contributions to the papers using the taxonomy (CRediT):

Conceptualization, Investigation, Methodology, Visualization & Writing - original draft: Mussi MCL. Visualization & Writing – original draft: Bernardes RT. Supervision, Formal Analysis & Writing – review & editing: Cândido EB, Silva-Filho AL.

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