

Post-spinal anesthesia headache: an integrative review*Cefalea posraquianestesia: una revisión integradora**Cefaleia pós anestesia raquidiana: uma revisão integrativa***Rafaela Pires Costa¹**

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Abstract

The aim was to analyze and list the risk factors that predispose to headache after spinal anesthesia, as well as the form of prevention, through an integrative review of the literature. The study refers to an integrative review with data taken from the SciELO, Google Scholar and other databases found in the VHL (LILACS and MedLine). The 11 articles studied revealed that there are relationships between the incidence of CPR and the physiological and anatomical aspects of the patient, as well as the type of needle used in the procedure and the number of punctures. In addition, alternative therapeutic forms to the blood patch were discussed, such as the blockade of ganglia and nerves in pain control and relief of associated symptoms, which were presented in a positive way. The analysis of the different predisposing factors to headache and the treatment of this condition is essential for maximizing subarachnoid anesthesia and mitigating this adverse effect.

Descriptors: Anesthesia; Headache; Spinal Anesthesia; Post-Dural Puncture Headache; Adverse Effects.

Resumen

El objetivo fue analizar y enumerar los factores de riesgo que predisponen a la cefalea posterior a la raquianestesia, así como la forma de prevención, a través de una revisión integradora de la literatura. El estudio se refiere a una revisión integradora con datos tomados de SciELO, Google Scholar y otras bases de datos encontradas en la BVS (LILACS y MedLine). Los 11 artículos estudiados revelaron que existen relaciones entre la incidencia de RCP y los aspectos fisiológicos y anatómicos del paciente, así como el tipo de aguja utilizada en el procedimiento y el número de punciones. Además, se discutieron formas terapéuticas alternativas al parche de sangre, como el bloqueo de ganglios y nervios en el control del dolor y alivio de los síntomas asociados, las cuales fueron presentadas de manera positiva. El análisis de los diferentes factores predisponentes a la cefalea y el tratamiento de esta patología es fundamental para maximizar la anestesia subaracnoidea y mitigar este efecto adverso.

Descriptores: Anestesia; Dolor de Cabeza; Anestesia Espinal; Cefalea Post-Punción Dural; Efectos Adversos.

Resumo

Objetivou-se analisar e elencar os fatores de risco que predispõem à cefaleia pós anestesia subaracnoidea, bem como a forma de prevenção, através de uma revisão integrativa da literatura. O estudo refere-se a uma revisão integrativa com dados retirados das bases de dados da SciELO, Google Acadêmico e as demais bases encontradas na BVS (LILACS e MedLine). Os 11 artigos estudados revelaram existir relações entre a incidência de CPR com aspectos fisiológicos e anatómicos do paciente, bem como com o tipo de agulha usada no procedimento e o número de punções. Ademais, foram discutidas formas terapêuticas alternativas ao "blood-patch", como o bloqueio de gânglios e nervos no controle da dor e alívio de sintomas associados, que se apresentaram de forma positiva. A análise dos diversos fatores predisponentes à cefaleia e ao tratamento dessa condição é indispensável para a maximização da anestesia subaracnoide e atenuação desse efeito adverso.

Descritores: Anestesia; Cefaleia; Raquianestesia; Cefaleia Pós-Punção Dural; Efeitos Adversos.



Introduction

Subarachnoid anesthesia, or spinal anesthesia, occurs with the introduction of anesthetic drugs into the subarachnoid space of the spinal region, acting to block nerve conductions, both in the spinal cord and in the peripheral nerves. It is a very common technique in the hospital environment, responsible for producing an adequate surgical condition through the injection of small doses of anesthetic solution such as bupivacaine, lidocaine, procaine, mepivacaine, prilocaine in the subarachnoid space causing a blockage of conduction of nerve structures. In other words, the single injection allows immediate engine blockage. The objective of this type of anesthesia is a pharmacological section of the spinal cord, reaching motor, sensory and sympathetic modalities situated below the chosen level^{1,2}.

Among the side effects and complications of spinal anesthesia are: low blood pressure, feeling of not being able to breathe, drowsiness, postoperative tingling, tremors, itching and skin irritation. The main and most common side effect is post-dural puncture headache (PDPH), characterized by intense pain that manifests itself only if the patient is sitting or standing and is classified as a subtype of headache attributed to low CSF and defined as orthostatic headache, which manifests up to five days after lumbar puncture, caused by CSF fistula by dural puncture. It is usually accompanied by neck pain, tinnitus, hearing disorders, photophobia, and/or nausea and resolves spontaneously within two weeks or after sealing the leak with an autologous epidural patch. Its effects can be reduced with rest, hydration, common analgesics, caffeine and in some cases with sphenopalatine ganglion blockage^{3,4}.

To understand the pathophysiology of PDPH, theories were analyzed in which three main mechanisms were proposed, among them, it is important to mention the reflex dilation of the meningeal vessels that occurs secondary to the reduction in cerebrospinal fluid (CSF) pressure. Another mechanism is related to traction on pain-sensitive intracranial structures, such as the upper cervical nerves that involve the 5th cranial, 9th and 10th cranial nerves, when the person is in an upright position. Finally, there are changes in the compliance of the caudal and cranial parts of the central nervous system (CNS), creating intracranial hypotension, and so any iatrogenic damage to the dura mater can result in post-dural puncture headache⁵.

Thus, the objective of the present review is to analyze, through an integrative literature review, studies on post-spinal anesthesia headache, list the risk factors that may predispose this condition and present the possible treatments used today, in order to minimize this adverse effect, maximizing the positive purpose of spinal anesthesia.

Methodology

Therefore, a qualitative descriptive research was carried out, in which the search and realization of the same took place in April 2022. Thus, this study was based on the

prism methodology, to carry out an integrative literature review, that is, an analysis that allows the search and critical and synthesized evaluation of the available evidence related to headache after spinal anesthesia, with the aim of achieving an orderly and comprehensive observation. Furthermore, the present study was based on six steps: elaboration of the guiding question, search or sampling in the literature, data collection, critical analysis of the included studies, discussion of the results and, finally, presentation of the integrative review⁶.

The 1st step is related to the definition of the theme by structuring the guiding question, with the intention of identifying the keywords. The 2nd stage aims to select the studies, by establishing the inclusion and exclusion criteria⁷. The inclusion criteria used were: studies that answered the guiding question – What are the factors that influence post-spinal anesthesia headache? -, refer to the health area, published in the last 5 years (2017-2022), in Portuguese, English and Spanish and any articles without delimitation of specific typology that are not paid access. The exclusion criteria used were: researches that did not answer the above-mentioned guiding question, did not fit within the determined period, did not meet the area of interest, were not in the pre-determined languages and non-free reading articles.

The 3rd stage is the “data collection”, that is, the categorization of the illustrations, when organizing the information. The 4th stage is the analysis of the critically included studies, which in turn is grouped by thematic axes, according to the main issues addressed. The 5th stage is related to “the discussion of the results”, that is, to execute comparative arguments to find possible flaws in the researches and to make future suggestions. Finally, the 6th stage is the “presentation of the integrative review”, in which the summary of available evidence is presented⁷.

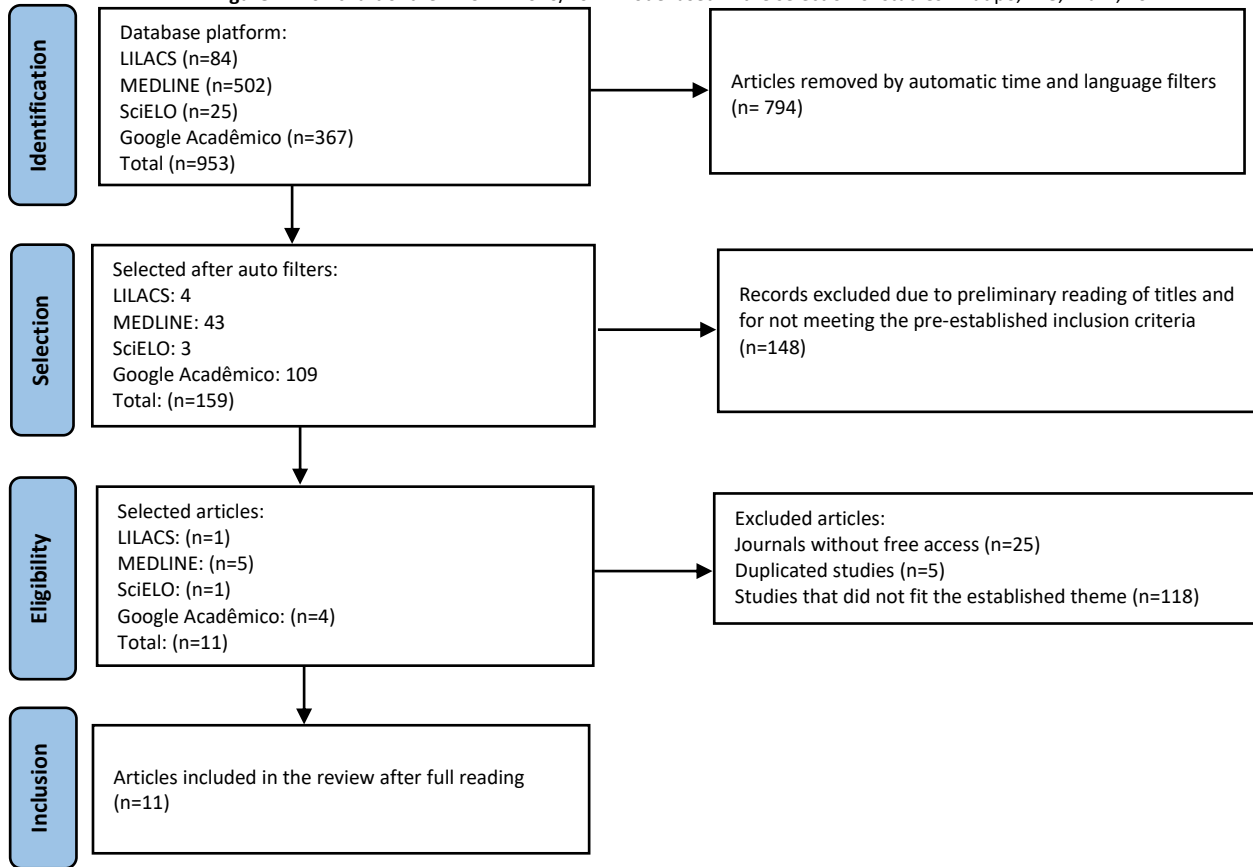
Thus, due to the possibility of finding more substantial data for observation, as well as more confident information collection sites were the Virtual Health Library, where Medline and LILACS indexing bases were selected, in which 728 results were obtained in total, 502 in Medline and 84 in LILACS, however, after filtering studies carried out 5 years ago, 47 studies were selected and, after applying the established inclusion and exclusion criteria, 6 articles were selected (5 from Medline and 1 from LILACS). There was also collection in the Scientific Electronic Library Online (SCIELO), and when performing some combinations of descriptors, 25 results were achieved. However, when including the date criteria, 3 articles were selected and after analyzing the inclusion criteria, only one that responded to these weights was selected. In addition, Google Scholar was also used for collection, using the combination of descriptors, 367 results were obtained, however, when including the order of the period of the last 5 years, 109 articles were found. After that, articles that did not respond to the guiding question, articles that were repeated between the databases and between the combinations of descriptors were excluded, thus, in total, 4 articles were found.



Thus, the sample consisted of scientific productions with the following descriptors: "Headache" AND "anesthesia" AND "post-dural puncture headache" AND "adverse effects" AND "spinal anesthesia". In addition to combinations of the aforementioned descriptors:

"Headache" AND "spinal anesthesia" AND "anesthesia" "Post-dural puncture" AND "spinal anesthesia" "Adverse effects" AND "spinal anesthesia" AND "headache". The AND, which is a Boolean term, is used as a strategy to search for the interconnection of the descriptors.

Figure 1. Flowchart of the PRISMA 2020/2021 model used in the selection of studies. Matipó, MG, Brazil, 2022



Results

After analyzing the databases, applying the previously established exclusion and inclusion criteria, eleven articles were selected for this integrative review

proposal. Furthermore, such studies have different methodologies, since all types of research were included in this review. Next, each of the selected articles will be analyzed.

Chart 1. Characterization of the scientific production analyzed according to study title, year of publication, authors, objectives and results. Matipó, MG, Brazil, 2022

No.	Study title	Author	Year	Objectives	Results
A01	Investigação da incidência de cefaleia pós-puncção dural em um hospital na cidade de três Lagoas/MS	Ana Paula Paschoal, Lara Cristina Rodrigues de Oliveira Costa, Marcello Pansani Vilaça, Kelly Regina Torres da Silva, André Valério Silva	2022	Investigate the prevalence of headache in patients who underwent spinal anesthesia and who were treated with blood tamponade. In addition, the objective was to associate factors that may influence this condition.	The medical records of patients who fit the research requirements were evaluated. Thus, it was concluded that 86% of the patients were female, 63% were between 21 and 40 years of age, and 91% had headache symptoms after undergoing spinal anesthesia. In addition, it was observed that treatment by blood tamponade is frequent.
A02	Cefalea post punción dural en embarazadas sometidas a cesárea con anestesia raquidea ¿problema actual o	Maryana Nuñez, Carlos Alvarez, Maria Illescas, Martin Perez de Palleja, Paola Spinelli, Rodrigo Boibo, Natália	2017	Study the incidence of post-dural puncture headache cases after spinal anesthesia for cesarean section and the relationship of these cases with risk factors. The effectiveness of treatments	The incidence of post-dural puncture headache cases was 2.6%, ie, 24 patients in the population studied. 66.7% had symptoms within 24 hours, while 16.7% had symptoms within two days. More than half (54.2%) of the group improved within 24 hours and no one underwent the blood patch. The incidence of the use of different types of needle, the number of punctures



	pasado?	Larzabal, Evangelina Morales		and the need for blood-patch were evaluated.	performed, urgent and elective cases, the degree of professionalization of the physician who performed the procedure and the history of previous headache were evaluated. At the end of the study, it was not possible to establish an association between post-dural puncture headache and other risk factors.
A03	Cefaleia pós-punção dural em pacientes submetidas a cirurgias em um hospital universitário	Felipe Serrano Farias, Ana Beatriz Retamero Rodrigues, Daniela Costa Anastácio, Pedro Celeste Valadares, Karen Carneiro Sene, Ana Carolina Vaz Emanuel, Arielle Patrícia da Silva, Luciano Alves Matias da Silveira	2021	Estimate the incidence of post-spinal anesthesia headache in patients at a university hospital after surgical interventions.	During this study, 130 female patients were analyzed, but five were observed due to not being able to locate post-surgery. In addition, the surgical procedures were cesarean half and the others were classified as different gynecological surgeries. Regarding anesthesia, patients were submitted to Quincke spinal needle, in gauges 20 (0.77%), 25 (38.4%), 26 (45.4%) and 27 (15.43%). Another point analyzed was the qualification of the physician during the procedure, thus, it was observed that residents in anesthesiology performed 99% of the interventions, with 68% R1, 25% from R2, and 6% from the third R3, and 1% performed by service staff. The result of the study showed a 5.6% incidence of post-dural puncture headache development. Thus, a total of 7 patients.
A04	Impact of spinal needle design and approach to postdural puncture headache and spinal anesthesia failure in obstetrics	Roumiana Batova, Silvi Georgiev	2019	Compare how the different types of needles (Sprotte, Quincke and Atraucan) and the different types of approach (median and paramedian) used in the spinal anesthesia procedure and discuss how these aspects can interfere in the cause of post-dural puncture headache.	This study analyzed 655 medical records of patients who underwent spinal anesthesia. It was concluded that headache is more prevalent when the Quincke needle is used.
A05	Effectiveness of Lateral Decubitus Position for Preventing Post-Dural Puncture Headache: A Meta-Analysis	Andres Zorrilla-Vaca, Jeetinder Kaur Makkar	2017	Hypothesize that the anesthesia or lumbar puncture procedure, performed in the lateral decubitus position, may be a measure to prevent post-dural puncture headache.	This study reviewed several articles that address this issue, concluding that the lateral decubitus position favors a decrease in post-dural puncture headache when compared to the position in which the patient is seated during the procedure.
A06	Sphenopalatine Ganglion versus Greater Occipital Nerve Blocks in Treating Post-Dural Puncture Headache after Spinal Anesthesia for Cesarean Section: A Randomized Clinical Trial	Hamby Abbas Youssef, Hala Saad Abdel-Ghaffar, Mohamed Fathy Mostafa, Yara Hamby Abbas, Ahmed Omar Mahmoud, Ragaa Ahmed Herdan	2021	Research and testing on the effectiveness of less invasive treatments for post-dural puncture headache relief. Evaluated the therapy of greater occipital nerve block (GONB) and sphenopalatine ganglion block (SPGB) in different groups.	In both groups, the results were very satisfactory after 30 minutes of therapeutic application. The scale (NRS) used to quantify patients' pain had values reduced from 10 to values below 4. The GONB group had NRS < 4 before the SPGB group; however, after 3 hours of treatment, the effectiveness of both methods was shown to be effective similar, showing the great therapeutic capacity of both treatments.
A07	Bloqueio do gânglio esfenopalatino via transnasal para tratamento de cefaleia pós raquianestesia: relato de caso	Bruno Leandro Maximiliano Barbosa, Fábio Henrique Motter, Vagner Fagnani Linartevischi	2020	The objective of this report was to demonstrate the effectiveness of the treatment of post-dural puncture headache in exposure of a case that occurred at Hospital São Lucas, where the sphenopalatine ganglion block therapy was performed.	There was an attempt of non-resolving conservative treatment in the first 24 hours of symptoms. After this period, the sphenopalatine ganglion block methodology was applied and the patient showed improvement in pain and associated symptoms in 40 minutes, with no return of complaint.
A08	Trombose venosa cerebral após raquianestesia: relato de caso	Flora Margarida Barra Bisinotto, Roberto Alexandre Dezena, Tania Mara		The report aimed to expose cases of cerebral venous thrombosis (CVT) related to complications caused by	In the case described, the patient presented post-spinal headache with common symptoms, but with rapid evolution. It was misdiagnosed and treated as sinusitis and progressed to limb paresthesia and seizures, which



		Vilela Abud, Laura Bisinotto Martins	2017	spinal anesthesia.	showed, after admission to the ICU and imaging tests, that it was a case of CVT.
A09	Postdural puncture headache: Incidence and predisposing factors in a university hospital	Lütfiye Pirbudak, Halil İbrahim Ozcam,, Pinar Turturk	2019	Evaluate the incidence and predisposition of post-dural puncture headache after spinal anesthesia in a university hospital.	The occurrence of post-dural puncture headache has a higher incidence in patients under 40 years of age, as well as surgical interventions most observed in the development of PDPH are cesarean sections. In addition, it was noted that the physician's experience and physical fatigue are also relevant factors.
A10	Comparison of cutting and pencil-point spinal needle in spinal anesthesia regarding postdural puncture headache: a meta-analysis	Hong Xu, Yang Liu, WenYe Song, ShunLi Kan, FeiFei Liu, Di Zhang, GuangZhi Ning, ShiQing Feng	2017	Check the frequency of PDPH according to the category of needle used during the procedure and analyze the rate of severe PDPH in patients who received spinal anesthesia with different tip design.	The study demonstrated that pencil-point needles have a lower rate of PDPH and severe PDPH (P < 0.00001). It is worth mentioning that the use of EBP was a minority in the same type of pencil point needle (P < 0.0001).
A11	Cefaleia pós-punção dural em cesariana: fatores de risco associados e novas perspectivas sobre condutas medicamentosas	Lucas Romero Baia Feitoza, Andrey Thiago Balieiro de Souza, Daniele Regina da Silva Fernandes	2021	Carry out an integrative review on what measures can be taken to prevent and control post-spinal headache in cesarean sections, taking drug approaches and new postures during the intervention.	The study brought an integrative review of 10 authors on postures that can be adopted for a lower incidence of PDPH and on the influence of medication on symptoms and as a preventive way of PDPH.

A research investigated, in a hospital in the state of Mato Grosso do Sul, the predominance of post-dural puncture headache (PDPH), associated with spinal anesthesia and correlated with the treatment performed through epidural blood tamponade. Thus, the medical records of patients who had undergone surgery with subarachnoid anesthesia, underwent the blood patch procedure and had headache were evaluated. It was observed that 57 patients fit these criteria, calculating a prevalence of 0.25%¹.

In this way, it was possible to verify that the majority of patients who presented PDPH after spinal anesthesia are young adults and women, especially after undergoing gynecological/obstetric procedures, being a risk factor for this pathology. In addition, it was observed that elements such as the bevel and needle gauge also influence this type of headache¹.

According to another study analyzed, in a hospital in Bulgaria, the medical records of 655 patients who underwent cesarean section through spinal anesthesia were investigated. The objective was to analyze the design of the needles used in this procedure, demonstrating how this is a factor that directly influences this type of headache. In this regard, it was found that the incidence of post-dural puncture headache in spinal anesthesia was 0% in the groups that underwent the procedure with the Sprotte needle design, 2.5% with the Atraucan needle and 7.2% with the Quincke needle. . Thus, it can be concluded that the higher rate of headache may be associated with the use of the Quincke needle design⁸.

In addition, another reviewed study proposed, through a literature review, the analysis of the patient's position at the time of spinal anesthesia, raising the

hypothesis that this may be a predisposing factor for post-dural puncture headache. In this perspective, after consulting several databases, it was concluded that the application of spinal anesthesia in the lateral decubitus position significantly reduced the number of PDPH cases when compared to the position in which the patient is seated during anesthetic application⁹.

In addition, in another study, a survey was carried out on the less invasive possibilities of treating post-dural puncture headache. The study addressed the possibility of two therapeutic methods that can be considered before the more invasive option, Epidural Blood Patch (EBP), which consists of removing the patient's peripheral blood and applying it to the site of the lesion caused by the dural puncture. Such methods are: greater occipital nerve block, whose acronym is GONB and sphenopalatine nerve block, whose acronym is SPGB¹⁰.

To determine the effectiveness of treatments, the Numerical Rating Scale - acronym in English, NRS - was used to combine levels of intensity of headache and other associated symptoms. These parameters were measured at defined time intervals, ranging from 30 minutes after therapeutic experimentation to 1 week. This whole mechanism was applied in two different groups: the first, with 47 people, the GONB was tested, and the second, with 46 people, the SPGB was tested, all, however, being patients who underwent spinal anesthesia for cesarean section. elective, at a University Hospital in Egypt¹⁰.

Of the 47 people evaluated in the GONB group, 32 had symptom relief, while in the SPGB group, 27 of the 46 evaluated reported the same result. In both groups the statistical significance was p=0.479. Both in the GONB and in the SPGB, the patients' evaluations showed satisfaction



in the treatments ($p=0.643$). In addition, there were no statistical differences between groups regarding adverse effects ($p>0.05$). In summary, all patients recovered within one week of the study and none had serious or permanent complications associated with the interventions administered¹⁰.

The effectiveness of SPGB was described in a case report built at Hospital São Lucas, in Paraná. A 37-year-old male patient underwent surgery with spinal anesthesia and began to experience symptoms of CPR (post-spinal anesthesia headache) 2 days after the procedure. After the conservative treatments were exhausted after 24 hours, it was decided to use the sphenopalatine ganglion block. This therapy took place as expected, without causing harm to the patient, such as bleeding, and relieved the headache and associated symptoms within 40 minutes¹¹.

In the case of cases like this, a survey was carried out at the Women's Hospital that evaluated 914 pregnant women who received spinal anesthesia for cesarean section, in order to measure the incidence of post-dural puncture headache (PDPH), which was 2.6 % of patients. Within the first 24 hours of analysis, 66.7% of patients reported headache, and another 16.7% complained after two days³.

This study also analyzed the type of needle used in the procedures, as well as the training time of anesthesiologists and deformations in the patients' spine. In the first case, 25-gauge pencil-point needles (86.3% of patients), 25-gauge bevel needles (1.9%) and 27-gauge pencil-point needles (11.2%) were most used. In the second case, 94 patients were anesthetized by professionals with less than 5 years of experience, while another 289 by anesthesiologists with more than 5 years of specialization, in addition to 494 (54%) having been anesthetized by residents. In the third case, 96.3% of the patients had no back problems, while 3.1% had^{3,12}.

In addition, the number of punctures in some patients was variable, with 76.6% of them having only one puncture, 15.2% had 2 punctures and 7% had more than 2 punctures³.

Regarding patients with incidence of headaches (2.6%), the intensity of PDPH was analyzed, whose classification of mild pain covered 50% of those studied, while 4.2% reported severe pain. The duration of the pain crisis was observed to be present for 24 hours in 13 patients (54.2%), for 48 hours in 10 patients and for 72 hours in 1 patient. In addition, 8.3% of patients complained of photophobia and 29.9% had episodes of nausea and vomiting. No patient analyzed needed to perform the EBP method³.

In addition to these symptoms commonly related to post-dural puncture headache, it is possible to observe, in smaller numbers, however, the association of spinal anesthesia with involvement by cerebral venous thrombosis (CVT). According to a case report published in the Brazilian Journal of Anesthesiology, CVT is a rare but serious complication that has a strong relationship with other health conditions, such as pregnancy, puerperium, use of oral contraceptives and malignant diseases¹³.

In the case portrayed, the 30-year-old patient did not have any previously explicit health problems and underwent surgery with spinal anesthesia, which took place as expected. However, 48 hours after the procedure, the patient reported frontal headache, evolving to holocranial headache in 12 hours. The presentation of associated symptoms, such as ear obstruction, was also reported. Upon seeking medical attention, the patient in the case was diagnosed with sinusitis, receiving instructions for the treatment of this disease¹³.

Within two days, the condition progressed to paresthesia of the left arm, followed by grade III hemiparesthesia, followed by generalized tonic-clonic seizures. The treatment continued in the Intensive Care Unit, where CVT was found. After eight days of hospitalization, the patient, whose family history of thrombosis had been exposed after diagnosis, was discharged from the hospital. Over 3 months, behavioral sequelae were detected without presenting motor deficits¹³.

One study expresses that during the study with 125 patients undergoing gynecological and obstetric surgeries, seven women were identified with post-spinal anesthesia headache. In view of this perspective, it was observed that the relevant factors for the development of PDPH are related to the anesthesiologist's experience, in which first-year residents need a greater number of punctures to perform anesthesia. In addition, the gauge of the needle is an important factor as the 25G gauge had a greater predominance in the involvement⁴.

According to a survey carried out with 613 patients at a university hospital exposed to dural puncture, the incidence of PDPH is more significant when using Quincke category needles compared to the pencil point type ($p<0.013$). The study also demonstrates that patients over the age of 40 years had fewer PDPH complications compared to the 18–25 and 26–40 age group ($p<0.008$). Another coefficient found was that the onset of post-spinal headache is greater in cesarean sections than in anorectal surgery and transurethral resection (TURP) ($p<0.001$). Furthermore, the study revealed that fatigued anesthesiologists who perform the procedure have a higher incidence of patients developing PDPH, unlike the block performed by a professional in good physical circumstances ($p<0.023$)¹⁴.

Other research found, accuses the cutting tip spinal needle has a higher incidence of PDPH cases compared to the pencil tip needle ($P < 0.00001$). In addition, the study points out that PDPH is more frequent in women than in men, as well as analyzes carried out with 2457 obstetric patients revealed that cesarean sections with a cutting needle triggered the appearance of PDPH in 7.3% of pregnant women undergoing this procedure category (1159 patients), on the other hand, only 2.3% of women undergoing pencil point needles (1298 patients) suffered this complication. Furthermore, the frequency of EBP is more widely used in the group of individuals exposed to the sharp needle group when compared to the pencil point needle group ($P < 0.0001$)¹⁵.



Furthermore, an integrative review reports on risk factors related to the incidence of post-dural puncture headache such as the position in which spinal anesthesia is applied, the position of the needle during the intervention, the size of the needle as well as the correlation with the count values. (PC) and mean platelet volume (MPV). Furthermore, the study brought a new panorama about drug interventions, raising discussions regarding drugs: aminophylline, tetracosactide, ketamine, ondansetron and intrathecal fentanyl¹⁶.

Discussion

In the present study, the recent literature available on post-spinal anesthesia headache is limited, although searches were performed in various databases.

In this review, the objective was to list the aspects that influence post-spinal anesthesia headache, in this way, the research results revealed different categories to be discussed, they are: influence of gender and age, needle choice, patient's position during procedure and performance of the professional who performs anesthesia. In addition, many studies have discussed the characteristics of pain, symptoms and treatment possibilities.

In the first analysis, regarding the influence of gender and age, it was possible to analyze that the incidence of post-spinal anesthesia headache is higher in young adults, because they have physiological characteristics that favor this condition, such as the presence of greater pressure cerebrospinal fluid and patients over 65 years of age present a lower elasticity of the meninges, which favors a minimal loss of CSF. In addition, it is more frequent in females, this is due to physiological and anatomical factors, in addition to the fact that women are more likely to use spinal anesthesia when undergoing obstetric and gynecological procedures^{1,4,14}.

Regarding the use of the needle, most studies indicate this factor as predominant in the occurrence of post-dural puncture headache^{1,3,8,14-16}. Thus, it can be concluded that the headache is directly associated with the gauge and design of the needle, in addition to the orientation in which the bevel is introduced.

Needle gauge is an important determining factor, since the larger the needle, the longer the tissue injured by anesthesia will take to heal and, consequently, there will be extravasation of cerebrospinal fluid (CSF), leading to headache^{1,16}.

Furthermore, the design of the needle is also a relevant condition, and it is determined by the type of bevel: the Quincke type, according to research, is the one that is most related to the causes of headache. This is because it has a high capacity to cut the meningeal tissue that will take longer to recover and, consequently, there will be greater loss of CSF. There are other types of bevel, such as the so-called "pencil tip", present in the Sprotte needle, considered a better choice for the prevention of post-dural puncture headache, since it is less sharp, will make a less painful incision and, therefore, consequently, less cerebrospinal fluid leakage. Therefore, the Sprotte

needle is statistically related to a lower frequency of this pain condition when compared to the Quincke type^{1,8,15}.

The position in which the patient undergoes spinal anesthesia is a relevant factor for the appearance of PDPH, given that studies have shown a higher incidence when the patient is sitting. In this way, it is observed that the CSF pressure is greater and results in a larger orifice in the dura mater, thus, there is a longer duration of extravasation compared to the same procedure in lateral decubitus^{9,16}.

Regarding professional influence, one study did not effectively demonstrate the relationship between operator experience and CPR cases. Despite this, it is easy to associate that training and professional practice support the understanding of techniques and strategies for better choices for performing spinal anesthesia, thus promoting better results and fewer adverse effects, such as inadvertent dural puncture. Given this perspective, the anesthesiologist's knowledge of the technique directly influences the development or not of PPC, given that the satisfactory application of the technique^{3,4}.

It was possible to observe that post-dural puncture headache is not a singular condition, but encompasses several other characteristic symptoms, such as stiff neck, photophobia, nausea and tinnitus. This may imply a plurality of conservative treatments, such as the use of non-opioid analgesics, adequate hydration, antiemetics and caffeine. However, sometimes these conditions become limiting and require more invasive therapeutic approaches^{10,14}.

Regarding the drug management scenario, studies show that prior administration of aminophylline, ketamine, ondansetron 4 to 8 mg and intrathecal fentanyl can be effective for the reduction of PDPH, but more research is still needed as the findings do not are conclusive. In addition, patients with the presence of PDPH can be given intravenous tetracosactide 1mg, which results in a satisfactory postoperative period¹⁶.

Within these possibilities, the so-called gold standard treatment is blood-patch, which means "blood patch". This therapy consists of withdrawing peripheral blood from the patient and relocating the lesion caused by anesthesia, in order to close the opening provided by the needle entry. Despite being the most effective form of treatment, blood-patch is still an invasive technique, which leaves room for the development of other complications^{10,11}.

Thus, treatments such as greater occipital nerve block or sphenopalatine ganglion block are less invasive and risky alternatives for resolving CPR. As described in one of the studies found, which showed the positive results of using the methods in experimentation groups¹⁰.

Final Considerations

It can be concluded that to carry out this study, difficulties were encountered during the research, due to a scarcity of literature on the subject. It is also clear that this is a subject that has not yet been studied and that it may have a wide range of triggering coefficients. In this way, it is possible to understand some of the conditions discovered



in the research that are favorable for the development of headache, the main ones being: bevel, gauge, design and needle mark, the experience of the responsible professional and the patient's position at the time of anesthetic application, CSF hypotension and factors related to age and gender.

Furthermore, it was possible to conclude that there are methods of treatment for this pain such as greater occipital nerve block (GONB) and sphenopalatine

ganglion block (SPGB). Furthermore, the pain lasts for only a few days, and through therapeutic intervention its intensity can be significantly reduced.

However, even with the limitation of the literature, the objective of the present review was accomplished, since it was possible to answer the guiding question, concluding that there are predisposing conditions to this pain and treatments that are able to attenuate it.

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