



**ORIGINAL RESEARCH PAPER**

**Anesthesiology**

**LABOR ANALGESIA IN TIMES OF COVID-19**

**KEY WORDS:** analgesia, COVID-19, labor pain, pregnancy

**Ivis Patricia Sarango Jimbo\***

Médica Egresada del Postgrado de Anestesiología de la Facultad de Ciencias Médicas, Universidad Central de Ecuador. \*Corresponding Author

**Mónica del Pilar Álvarez Chichande**

Médico Tratante en Anestesiología, Hospital Maternidad Isidro Ayora, Quito-Ecuador

**ABSTRACT**

The SARS-CoV-2 pandemic has represented changes in obstetric care and in anesthesiology practice, trying to avoid general anesthesia and promoting the early use of epidural catheters for the management of labor pain. The care of pregnant women represents a risk of contagion for health personnel and all recommendations have been made in order to provide safe environments for the patient and workers. **Objective:** To describe the current scientific knowledge on the analgesic management of the pregnant patient during the period of labor in times of COVID-19, through a bibliographic review of indexed research. **Materials and methods:** Theoretical-descriptive review, with analysis of scientific articles published in journals indexed between 2019-2022, consulting databases: PubMed, MedLine, Scielo, and Google Scholar. The PRISMA diagram was implemented as a tool. **Results:** The pain associated with labor can cause both maternal and fetal alterations and interfere with the normal development of the process. Neuraxial analgesia is recommended when COVID-19 is suspected or confirmed, reducing the need for general anesthesia in the emergency room. There is no evidence of contraindications in these cases and the possible emission of aerosols does not represent a greater risk of contagion. **Conclusion:** Neuraxial analgesia during labor is essential in obstetric care, even in the face of COVID-19 infection. It is currently known that aerosol-generating procedures do not represent a risk of transmission of coronavirus infection under biosafety conditions.

**INTRODUCTION**

The pain of childbirth has been considered as an important and significant process for a woman, its main characteristics describe it as acute, with great individual variability and it is cataloged as one of the most intense that a woman can suffer throughout her life ( 1). The experience of pain associated with labor is complex. The literature indicates psychosocial and environmental determinants of labor pain, yet methods to support women generally focus on physiological attributes through pharmacological interventions.

The degree of pain suffered during childbirth depends on factors such as the level of tolerance, fetal position, the strength of uterine contractions and the dilation of the cervix (2).

Neuraxial blockade is considered one of the most effective techniques for pain control during childbirth. Among the drugs used to carry it out, opioids are included in local anesthetic solutions, the mixture of bupivacaine or ropivacaine with fentanyl or sufentanil being common (3). Another option is the pudendal block as an effective and safe peripheral method, the most used drugs are 1% lidocaine or 2% chlorprocaine (1).

The SARS-CoV-2 virus pandemic, with its rapid spread and the severity of its clinical symptoms, complicated medical management in all cases. In pregnant patients, neuraxial analgesia techniques are recommended when there is suspicion or confirmation of COVID-19, because the need for general anesthesia in emergencies is reduced.

There is no evidence that epidural or spinal analgesia is contraindicated due to the presence of coronavirus. If this infection is suspected or confirmed, isolation measures will have to be adopted, following the same recommendations as in non-pregnant infected patients (4).

When COVID-19 infection affects pregnant women, it warrants routine obstetric care. In these cases, neuraxial techniques are safe. However, it is important that the blocks are performed by expert anesthesiologists. administration of general anesthesia, because the protection and safety of

professionals is essential (5). General anesthesia is a high-risk procedure and therefore should be avoided in caesarean section, and if it is performed, general recommendations should be followed in terms of airway manipulation in these cases referred to in current protocols and with adequate protection of the operating room staff (4), (7).

Neuraxial analgesia, whether epidural or combining spinal + epidural, is the most recommended when there is minimal risk of cesarean section; on the contrary, the use of inhalation analgesia techniques is not recommended due to the risk of possible airborne spread of the virus, In turn, intravenous analgesic techniques with remifentanyl warrant close monitoring by the anesthesiologist, which increases the professional's exposure (6).

Epidural analgesia is an effective and frequent method to relieve pain during labor, although there are other pharmacological (neuraxial and non-neuraxial) and non-pharmacological alternatives to treat it that provide relief. The administration of local anesthetics in analgesic concentrations in the epidural space blocks the sensory nerve endings at their exit from the spinal cord, causing loss of sensation in the pelvic and perineal area, therefore, the main indicator of its effect is relief of pain (10).

In the same way, the data available at the beginning of the pandemic regarding the published series of pregnant women with COVID-19 infection are scarce, however, there is no evidence that there is a higher incidence of severe disease in pregnant patients compared to the non-pregnant population. In the case of professionals who care for them, they have a higher risk of contracting the virus through direct contact with droplets from the airway during tracheal intubation and extubation. The data published to date are not abundant, but there are more and more cases and published series recommending neuraxial analgesia for women with suspected or confirmed COVID-19 infection (5), (8), (9).

According to the statistics regarding SARS-CoV-2 infection in pregnant patients, it is known that pregnant women are not more susceptible to being infected by coronavirus, so peri-

anesthetic management should be focused on preventing equipment contagion of health and the rest of the patients. The use of nitrous oxide for labor analgesia should be avoided, given the risk of aerosolization of the virus that can be caused by the gas mixture administration system (6). However, recent studies question the danger of the so-called aerosol-generating procedures, since during ventilation with a face mask, it does not seem to be greater than that produced by coughing or deep breathing (11).

In this sense, because it is a recent and new pandemic, the information is changing, it is progressively and constantly updated, an aspect that contributes to justify the present investigation, because anesthesiologists must keep themselves updated about the most appropriate drugs and techniques. and effective for the management of analgesia in patients during childbirth. In addition, this research will respond to the information gaps that exist from the theoretical point of view, applying the results for the well-being of patients in the process of childbirth and the personnel who attend them.

In this context, for all of the above, the objective of this study is to describe the current scientific knowledge on the analgesic management of pregnant patients during the period of labor in times of COVID-19, through a bibliographic review of indexed research.

**MATERIAL AND METHODS**

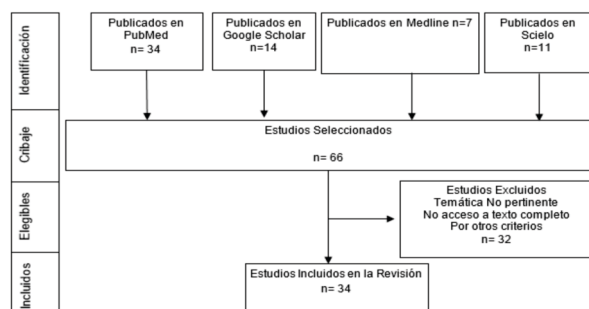
A descriptive theoretical review was carried out, selecting and analyzing the scientific articles (primary sources), consulting the databases: (secondary sources) PubMed, Medline, Scielo, and Google Scholar. In the selection, the PRISMA diagram (Figure 1) was implemented as a tool, taking as inclusion criteria those articles in Spanish and English published from 2019 to 2022, related to analgesia during pregnancy in times of the COVID-19 pandemic. .

The search was based on keywords selected according to MeSH terms: in English, analgesia, COVID-19, pain, pregnancy, childbirth and in Spanish: analgesia, COVID-19, pain, pregnancy, childbirth.

**The exclusion criteria were:**

After the analysis of the scientific articles, an analysis was carried out through a critical reading that allowed them to selectively identify and describe their content in order to document the different references in results. Consecutively the discussion and the conclusion were carried out.

**Diagrama PRISMA**



**Figura 1**

**RESULTS**

66 scientific articles were captured, 34 of them met the inclusion criteria, 32 were excluded because they were papers, clinical cases, studies that did not record conclusive data, topics not relevant to the topic and lack of access to the full text.

**Pain during childbirth**

The pain associated with labor affects all women and can

cause both maternal and fetal alterations, and even interfere with the normal development of the process. Labor pain is described as very acute, with 20% of women in labor referring to it as unbearable, 30% as severe, 35% as moderate, and only 15% as minimum (1). Comprehensive care and pain management in obstetric patients should be valued since the lack of analgesia during labor has been related to a higher risk of postpartum depression and post-traumatic stress (12).

Obstetric analgesia seeks to reduce pain and provide better care during labor as part of comprehensive care, in addition, analgesic management should be an important part of its approach, since the lack of it during this process is considered suffering. unnecessary and has been associated, according to scientific evidence, with an increased risk of adverse outcomes. In contrast, analgesia provides a less traumatic experience, especially in nulliparous women. In developed countries, its use is greater than in developing countries, however, in the latter, most of these procedures correspond to prepaid medicine and private care (13).

**Pain treatment**

Epidural analgesia is a safe, effective technique and the usual indications apply to patients in the active phase of labor with maternal-fetal monitoring in the free-demand category. It has no contraindications in advanced labor or with a history of previous caesarean section, being effective in dystocic or eutocic delivery. Consultation with the anesthesiologist is an effective procedure to anticipate some difficulties that may arise during delivery care and opt for appropriate measures. most suitable for each case (14).

Analgesia in labor aims to relieve pain during this period. One of the most widely used techniques today is epidural analgesia, achieving a sensory block with the administration of drugs by injection into the epidural space. It is now known that this type of pain is caused by uterine contractions and cervical dilation, through transmission through the spinal cord (T10-L1); this process induces an adaptive hormonal response to the increase in cortisol and catecholamines. Epidural analgesia has no effect on the increase in the frequency of caesarean sections, nor on the neonatal APGAR. However, it is associated with a greater use of instrumental delivery when it is performed during the active expulsive phase, so it must be performed much earlier (late phase and active phase) (12).

Combined analgesia or double blockade can also be used, which is based on the administration of a dose of anesthetic in the subarachnoid space through a single puncture, in addition to epidural; It is useful in cases of severe pain, although it can present more adverse reactions. Peripheral blocks such as bilateral paracervical and pudendal blocks can also be performed, which have the advantage of producing rapid analgesia (2-5 min), but require more training since they present a risk in the event of placental insufficiency or prematurity (12).

The less frequent alternatives are inhalants, however, they are widely used in some European countries such as the United Kingdom, with a frequency between 50% and 75%, their use is also common in countries such as Finland, Australia and New Zealand. Still used to treat labor pain, inhaled nitrous oxide (N2O), which has re-emerged as a popular option for labor analgesia, either early, as a bridge before neuraxial analgesia, or for pain relief in the second stage (15).

N2O has a rapid effect and elimination without producing neonatal depression, but its analgesic effectiveness is controversial, however, it has FDA (USA) approval for the administration of a mixture of 50% N2O and 50% O2. Interest has increased mainly in cases where patients refuse neuraxial analgesia and parenteral opioids. On the other hand, there are

the halogenated ones (sevoflurane), their use is infrequent since they require monitoring, training and induce uterine relaxation, neurological and respiratory depression (15).

As for intravenous analgesia, opiates are among the best known, their effectiveness is moderate, their disadvantage lies in the fact that they require permanent monitoring by an anesthesiologist for their use, and caution should be taken with high doses, as they are associated with emesis, nausea, pruritus, maternal sedation and fetal respiratory depression (12).

### Complications

Scientific evidence indicates that epidural analgesia is better managed, effective and with a good safety margin, however, neurological complications can occur during peripartum such as: lateralized analgesia (16.4%), hematic puncture (8, 7%), paresthesias (8.2%), technical difficulty (5.2%), ineffective analgesia (2.7%) and arterial hypotension (2.5%) and during the postpartum period: low back pain (18.5%), urinary retention (3.4%), postdural puncture headache (1.4%) and peripheral neuropathies (0.9%) (12).

### Analgesia in pregnant women with COVID-19 infection

In pregnant women with confirmed COVID-19 infection without severity criteria with spontaneous onset of labor, or with an indication of termination of pregnancy due to obstetric causes (RPM, prolonged gestation, prophylaxis of loss of fetal well-being), the delivery route will depend on the obstetric conditions and general status, otherwise, where there is a serious or critical maternal clinical situation, the only option would be cesarean section. In both situations there is no evidence that regional analgesia is contraindicated and it should preferably be administered early to minimize the risk of general anesthesia in case of urgent termination (17).

Early epidural analgesia may be indicated to reduce respiratory exhaustion in mild to severely symptomatic women. Given the relatively high rate of fetal compromise, continuous electronic fetal monitoring should be recommended during placement of neuraxial analgesia of labor (18). In all cases of analgesia/anesthesia in pregnant women, biosafety and comprehensive protection recommendations must be followed (7).

### Recommendations

The coronavirus disease 2019 (COVID-19) pandemic has caused innumerable alterations in the practice of anesthesiology. The recommendations are precise and protocols have been designed to administer analgesia to patients with suspected or confirmed SARS CoV2 infection, including the need to intubate, who require ventilatory support or emergency surgeries. In these areas, the full use of personal protective equipment (PPE) is one of the most important recommendations (19).

The basic demands of obstetric anesthesiologists working in the Labor and Delivery Unit have not changed; in particular emphasizing how to actively avoid general anesthesia and the benefits of neuraxial analgesia of labor in women infected with COVID-19, and the need to avoid emergency cesarean delivery whenever possible (3).

A consultation and physical examination by an anesthesiologist wearing appropriate PPE and the patient wearing at least one surgical face mask should occur immediately upon admission. For patients admitted for routine induction or labor, the anesthesiologist may delay interaction with the patient until COVID-19 status is known, or the timing of placement of neuraxial analgesia for labor, which happens first (7).

However, it is important to determine if an earlier intervention

would be useful, with an accurate evaluation by the anesthesiologists, to differentiate between patients who need an immediate versus late consultation through this review, direct communication and, if considered necessary, a request consultation of the obstetrician would be an interaction of great value (20).

### Neuraxial analgesia of labor

SARS-CoV-2 infection is not a contraindication for neuraxial analgesia, which has allowed its promotion for early placement as a fundamental initial strategy to avoid general anesthesia, if an urgent intrapartum cesarean section is indicated. This statement has been endorsed by the Society for Maternal-Fetal Medicine (SMFM) and the Society for Obstetric Anesthesia and Perinatology (SOAP) in a joint practice recommendation (21).

The reports currently available show significant statistical data that consistently indicate that asymptomatic patients prevail in the obstetric population. SARS-CoV-2 positivity rates in asymptomatic delivery room admissions range from 0.45% to 19.9%. Cohort studies looking at PCR-positive obstetric patients found that at least 45% were asymptomatic, with most studies reporting an asymptomatic rate of 66% or more (22).

Parturients infected with COVID-19 who are asymptomatic or mildly symptomatic do not require additional laboratory testing prior to placement of neuraxial analgesia and should be treated according to general recommendations prior to placement of labor analgesia. For patients with moderate to severe symptoms of COVID-19 infection, pre-placement laboratory testing should be considered, as one-third of patients with COVID-19 infection have been reported to have thrombocytopenia compared with 7- 12% of patients only during pregnancy (29).

Bauer et al. (28), suggested that thrombocytopenia and COVID-19 are correlated, in addition, the intensity of platelet reduction is directly related to the severity of COVID-19 infection in patients. Our recommendation is that when dealing with COVID-19 positive patients, always look for platelet count first before opting for the neuraxis approach.

The evaluation of whether a parturient with COVID-19 is suitable for neuraxial procedures should focus on the risks of general anesthesia compared to neuraxial anesthesia. In general, the risk of causing meningitis or encephalitis is extremely low with neuraxial procedures, even in infected patients. Regular evaluation of the patient to discover problems in their early stages is always preferred in the case of opting for an epidural. It is also necessary to have the option of initial relocation of the catheter, since there are possibilities that, during surgical events, epidural analgesia is insufficient to pass to anesthesia (23).

Neuraxial analgesia placement is not considered an aerosolization procedure, therefore all caregivers on the ward should follow direct contact droplet precautions, not airborne precautions. As with all interactions, a COVID-19 infected parturient should keep a mask over her mouth and nose during placement of neuraxial analgesia.

For all patients positive for COVID-19, a constant concern of the anesthesiologist should be to maintain standards of care and patient safety while minimizing caregiver exposure (21).

Among the analgesic recommendations in obstetric patients with suspected or diagnosed COVID-19, isolation measures should be adopted, following the same recommendations in non-pregnant infected patients. Surgical procedures in obstetric patients should be planned and coordinated in a multidisciplinary team, as far in advance as possible. In the peripartum period, the parturient should carry out her period



of dilation and/or delivery and postpartum recovery in the same isolation conditions (24).

Intravenous analgesic techniques with remifentanyl require close and direct monitoring by the anesthesiologist and may increase the risk of transmission to staff, in addition to increasing the risk of hypoxia in a patient with pneumonia.

There are insufficient data on the use of remifentanyl for analgesia in patients with obesity and COVID-19. However, it should be used with caution in labor due to the possibility of developing respiratory depression, specifically for women showing respiratory problems. It should be avoided in those patients whose oxygen saturation is less than 95% since it can cause major complications (27). When neuraxial analgesia is contraindicated, patient-controlled analgesia based on short-acting opioids (remifentanyl or fentanyl) should be offered by infusion pump (8).

Women should not be sent to a general post-anesthetic recovery room to avoid transmission of the virus to other patients and/or healthcare professionals. There is no current evidence regarding neonatal safety, although several cases of neonatal transmission of the disease have been described. There are reports where epidural analgesia is associated with intrapartum fever. If the patient is also COVID 19 positive, she should be closely monitored and the possible negative effects on the fetus should be addressed (7).

The Society for Obstetric Anesthesia and Perinatology (SOAP) and the American Society of Anesthesiologists (ASA) have issued recommendations and guidelines for obstetric analgesia in COVID-19. Regarding labor and analgesia: There are limited published resources to support practical recommendations on the use of labor analgesia.

Available data is generally based on transmission risks associated with SARS-CoV-2 and related viruses (25).

According to Landau, Bernstein, & Ring, (30), the start of the pandemic caused anesthesiologists to change workflows and reconsider the care of the obstetric patient, avoiding general anesthesia as much as possible, taking into account the benefit of early neuraxial analgesia for labor and prevention of emergency caesarean delivery when possible.

More than two years after the start of the COVID-19 pandemic, workflows have been normalized, although obstetric analgesia protocols for labor and delivery have not changed significantly, the evolution of circumstances is summarized in the following aspects:

The exposure to the virus of a large number of doctors during the care of obstetric patients infected with SARS-CoV-2, was determined due to the practice of testing all patients who entered the delivery room, showing that many They were asymptomatic positive.

- The institutions decide to take into account that inexperienced personnel to care for patients in high-risk situations in the emergency room, without previous experience in the administration of obstetric analgesia, could be the most likely to become infected.
- No groundbreaking data has emerged in the last three years regarding the management of labor analgesia.
- The recommendations related to neuraxial analgesia of labor remain based on the guidelines of mid-March 2020, which indicate that it should be provided in the early stage of labor, without waiting for the results of diagnostic tests for COVID-19. 19 and ensure that the epidural catheter is well placed.
- The use of appropriate PPE is maintained and for all logistics related to the protection of the anesthesia team (epidural carts, supplies, pumps, medications).
- Reduce unnecessary encounters and ensure that

analgesia is administered by an experienced anesthesiologist.

- Maximize the efficacy of neuraxial analgesia using timed intermittent epidural bolus (PIEB) combined spinal-epidural (CSE) pumps, and considering the addition of adjuvants such as clonidine.
- Ensure proper function of the epidural catheter throughout labor to reduce the likelihood that general anesthesia will be used for cesarean deliveries.

Rule out that the fever is associated with a complication of SARS-CoV-2 infection and is not assumed to be the normal course of epidural analgesia.

## DISCUSSION

The pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has exposed vulnerable populations including pregnant women, knowledge gained from previous outbreaks suggests that pregnant women and their fetuses are particularly susceptible to poor outcomes.

Vertical transmission cannot be ruled out and careful monitoring of pregnancies with COVID.19 and measures to prevent neonatal infection are warranted (28).

It is important to note that in a study conducted at the Zhongnan Hospital of the University of Wuhan, China, in 49 patients with radiologically confirmed COVID-19 for caesarean section or lower limb surgery, spinal analgesia was safely administered, obtaining a well-tolerated response, maintaining stable heart rate, blood pressure, and oxygen saturation after surgery. Level 3 PPE appears to reduce the risk of transmission to anesthesiologists who are exposed to mildly symptomatic surgical patients (31).

In the study by the authors Zaigham et al. (32) related to spinal analgesia and COVID 19, it is highlighted that women present in the third trimester: fever (68%) and cough (34%). Lymphocytopenia (59%) with elevated C-reactive protein (70%) was observed and 91% of women had cesarean delivery, although most were discharged without major complications, severe maternal morbidity as a result of COVID. 19 and perinatal deaths.

Similarly, in a survey study of labor epidural analgesia, 92% of participants reported no restriction on access to labor epidural analgesia during the COVID-19 crisis. 3% reported restricted access to epidural analgesia during labor; three stated that it was due to the availability of the anesthesiologist; two stated that it was due to the availability of PPE; one said it was due to the management of the delivery unit; and one attributed it to equipment/drug availability problems. 5% of the participants did not know or did not have an epidural analgesia service for labor in their hospital. In addition to the well-established analgesic benefits of labor epidurals, they also play an essential role in the safety of maternity units; allowing rapid anesthesia for intrapartum caesarean section and thus reducing the need for general anesthesia (33).

In accordance with the above, in a study carried out in Chile by researchers Acuña, et al. (13), regarding the request for analgesia in vaginal deliveries between 2014 and 2016, an increase of 51.5% to 63.5% was evidenced, with an effectiveness between 97.01% and 98.61%.

Regarding neuraxial analgesia, there are no data on the fact that they should not be used in patients with COVID-19. Epidural analgesia is preferred for women with confirmed and suspected COVID-19 who are in labor.

On the positive side, epidural analgesia in labor provides an added benefit in that it serves to avoid conversion to general anesthesia and provides the advantage of switching epidural analgesia to surgical anesthesia (21).

In a US multicenter cohort study of women with and without peripartum SARS-CoV-2 infection, differences in obstetric and neonatal outcomes appear to be primarily driven by symptomatic patients. SARS-CoV-2 patients (asymptomatic and symptomatic) were less likely to receive neuraxial labor analgesia and more likely to receive general anesthesia for cesarean delivery for maternal respiratory failure. The lower use of neuraxial analgesia in laboring patients with asymptomatic or symptomatic infection compared to patients without infection requires further investigation (25).

Patients with moderate to severe COVID-19 symptoms will likely require a modified approach to maintenance of neuraxial analgesia during labor, this may include continuous pulse oximetry and placement of an arterial catheter for frequent blood gas analysis. blood (26).

The authors of this literature review consider that the issue of pain during labor should be considered by the anesthesiologist as part of a process whose perception of intensity and the need for analgesia vary from one patient to another; In addition to the above, we know that contact with these patients during labor can be so close that exposure to emissions of viral contaminating fluids such as saliva are very likely. In times of the COVID-19 pandemic, it becomes a particularly important issue, since childbirth constitutes emergency care and the possibility of caring for an infected but asymptomatic patient represents a high risk for the personnel who care for her. This review has made it possible to analyze the management that these patients can receive without detriment to care, but maintaining the safety of medical personnel.

Three years after the start of the pandemic, the latest studies maintain the same recommendations regarding the analgesic management of childbirth and the need to use PPE for the professionals who administer it, which were pronounced at the beginning of the pandemic, with the exception that the anesthesiologist appears to have no increased risk of infection from aerosols during procedures relative to those emitted during deep breathing or coughing from the infected patient.

As a limitation to this research, it can be mentioned that, although a good number of publications were found on the analgesic management of childbirth in times of the COVID-19 pandemic, the information tends to be repeated with great similarity in the articles and only few contributions were evidenced. new. Among the methodological strengths, the availability of specific scientific literature in accordance with the established search criteria stands out. The results of this research can contribute to maintaining the necessary and pertinent update on the management of analgesia during childbirth in patients with suspected or confirmed SARS CoV-2 infection, an aspect that guarantees the protection of health personnel, especially while it persists. the pandemic.

**CONCLUSION**

Neuraxial labor analgesia remains essential in obstetric care, even with concurrent COVID-19 infection. Indeed, early epidural placement is desirable to avoid exacerbation of respiratory symptoms with labor pain and to reduce the likelihood of general anesthesia, particularly if cesarean delivery is needed during labor. The benefits of neuraxial analgesia in the context of COVID-19 are demonstrated for the patient, since it will help avoid any exacerbation of the respiratory state with intubation and mechanical ventilation, and for the professionals who offer medical care, since it reduces a possible risk associated with COVID-19 infection during intubation and extubation, although this issue is under discussion since it has been proven that these aerosols emitted are not greater than those caused during the patient's cough, therefore, they do not seem to generate higher risk of contagion.

**Authors contribution**

The compilation of the information, the evaluation, critical analysis, the development of the discussion and conclusions and, finally, the writing and final revision, were carried out by both authors. The corresponding author represents the group of authors.

**Availability of data and materials**

The data supporting this manuscript are available upon request from the corresponding author.

**Consent to publication**

No specific consent was obtained for its publication, due to the fact that it is a review of the literature.

**Ethical approval and consent**

The protocol was approved in a timely manner.

**Financing**

Resources were provided by the author.

**Interest conflict**

The author reports no conflict of interest.

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