

Methods of labor pain relief – analysis and comparison

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SUMMARY

Childbirth is one of the most painful events that a woman is likely to experience. Although various methods of pain management are available, it is still unknown which attitude is better: pharmacological or nonpharmacological. Labor pain is different from other types of pain. It has different gradation and intensity. In addition, the parturient expects that it will pass soon after giving birth. Currently, the most frequently chosen labor pain relief method is neuraxial blockade. Other pharmacological options are inhaled analgesia and intravenous analgesia. Various nonpharmacological methods, such as water birth and water immersion, transcutaneous electrical nerve stimulation (TENS), acupuncture, massage, breathing techniques and music therapy, should also be taken into consideration. The aim of this work is to analyze and compare currently accessible labor pain relief methods.

Key words: labor pain; pain relief; water birth; epidural analgesia; delivery

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INTRODUCTION

Labor pain is one of the most severe discomforts that a woman experiences during her life. On the one hand, childbirth is a beautiful and unforgettable moment, but on the other, it is a cause of pain, anxiety, stress and a fear of the next pregnancy. Many parturients are anxious about their delivery, which often results from the lack of information concerning labor and labor pain management.

Labor pain is caused by the stretch of the cervix during dilation, uterine muscle ischemia and stretch of the vagina and perineum in the second stage of childbirth. It has huge physiological effects on the progress of labor. Moreover, it increases the level of catecholamines, which lower the intrauterine pressure and reduce blood flow through the uterus. This may result in decreased placental perfusion and fetal hypoxia. In addition, epinephrine is a tocolytic substance and may cause improper contractions [1]. Furthermore, pain during childbirth causes hyperventilation which may result in respiratory alkalosis and a left shift of the maternal oxyhemoglobin dissociation curve, reducing oxygen flow to the fetus [1,2].

Pain is necessary to inform about the progress, speed, and intensity of labor. However, intense pain should be relieved in order to avoid harmful effects on the mother's and newborn's condition.

The aim of this review is to present the latest trends and updates in labor pain management. Nowadays, the neuraxial blockade is the most commonly chosen method. Other pharmacological options include: inhaled analgesia and intravenous analgesia, and they can be used in combination with each other. Among nonpharmacological treatments, there are transcutaneous electrical nerve stimulation (TENS), water immersion and water birth, acupuncture, yoga and exercise during pregnancy, massage and

relaxation techniques and music therapy. The choice of a labor pain relief method is an individual decision, and it should be consulted with a doctor and a midwife. A suitable pain relief method is difficult to choose. Every advantage and disadvantage of each method should be taken into consideration when deciding about pain management.

PHARMACOLOGICAL METHODS

Epidural analgesia

Epidural analgesia is one of the most frequently chosen pain relief methods. It is local anesthesia that belongs to the group of “central blockades”. The drug is injected through a plastic catheter into the epidural space of the spinal cord.

The appearance of epidural anesthesia was a breakthrough in obstetrics; it offers pain elimination but does not interfere with systolic function of the uterus. Owing to this, the parturient can take an active part in childbirth. The medication levels are low to diminish side effects to both the parturient and newborn. Earlier, inhaled analgesia and intravenous analgesia were more common, but drugs administered this way penetrate to the placenta and may be the reason of respiratory and vascular complications in the fetus. Additionally, epidural analgesia less often produces side effects, such as vomiting, dizziness or sleepiness, and reduces pain rapidly. Anim-Somuach et al. concluded that this kind of analgesia is effective in reducing pain during labor, but women using this method are more likely to have instrumental childbirth. There were no effects on the neonatal status among newborns whose mothers used epidural anesthesia [3]. Epidural analgesia may be the cause of slower labor progress, but it does not negatively affect the mother’s or child’s health [4].

Inhaled analgesia

Inhaled analgesia is a mixture containing 50% of oxygen and 50% of nitrous oxide. Nitrous oxide is an analgesic and anesthetic gas, usually administered through a face mask or a mouthpiece. Pain-relieving effects start 15–20 seconds after administration and full analgesia is achieved within 1 minute. This method is dependent on the future mother: she self-administers the amount of inhaled gasses [5]. That is why women should be instructed about proper ways of inhalation earlier in order to gain

as many benefits of gas analgesia as possible. Gases can also be used for additional analgesia, for example, in combination with water immersion.

Nitrous oxide does not eliminate labor pain completely but has relaxing and sedative effects. Likis et al. indicated that nitrous oxide inhalation provided less effective pain relief than epidural analgesia and that Apgar scores of newborns whose mothers used inhaled analgesia were not significantly lower compared to other methods or no analgesia. The need of further research was indicated [6]. The use of inhaled analgesia requires constant observation of the maternal and fetal condition. This method is contraindicated in women with heart and respiratory diseases.

Nitrous oxide may be used by women who need pharmacological pain relief, but in whom epidural analgesia is contraindicated and for women who want to avoid invasive methods [1].

NONPHARMACOLOGICAL METHODS

Water immersion and water birth

The most popular nonpharmacological pain relief methods are water immersion and water birth. In the first one, a pregnant woman stays in the water only during the first stage of labor, and the delivery takes place on a delivery bed. In water birth, both the first and second stages of labor take place in the water [7,8].

This kind of water therapy uses two elements: heat and water properties. The temperature of water should be 34–37°C as heat allows relaxation and analgesia. Hydrostatic pressure, water displacement and its viscosity are the mechanical features of water. Thanks to the first one, the intra-abdominal pressure is increased, making pushing and exhaling easier. Water displacement facilitates changing positions during contractions. Additionally, water reduces muscle tension and ameliorates cervical shortening [9]. Furthermore, water stimulates endorphin secretion, reduces catecholamine release and, through these actions, decreases labor discomfort.

It is important to create a calm and intimate atmosphere in the delivery room. Often, pleasant music and subdued light are provided. Women can be surrounded by family or friends, so they can help the medical staff to calm down the future mother [10]. Water immersion is

considered to be an effective method of non-pharmacological analgesia. The benefits from hydrotherapy are numerous. In 2012, Juda W., et al. showed that water immersion does not prolong the time of the active phase of labor. Additionally, they demonstrated that water birth increases the feeling of security, satisfaction, relief and relaxation [11]. Pawelec et al. concluded that water birth is safe for low-risk patients and their babies, but morbidity after water immersion is not as low as it has been predicted [10]. However, babies born in water immersion are rarely colonized by Group B Streptococcus [12]. Water birth is perceived as therapeutic, but it should be taught well in antenatal classes in order to reduce the need for another analgesia [13]. Patients claim that labor in water is a good experience, however, they wish for the support of the midwife when making the decision about this kind of pain management [14]. Water birth or water immersion are important labor pain relief methods as they ease the anxiety and stress concerning delivery. Hydrotherapy is good for women who seek pain relief and want to remain drug-free, relaxed and have control over the progress of childbirth [15].

TENS

TENS (*Transcutaneous electrical nerve stimulation*) is a nonpharmacological pain relief method that has been used in obstetrics since 1979. The principle of its action is based on a low-voltage electric current wave generated by a stimulator with 2 canals and 4 electrodes. The electrodes are placed on the lower back, in the center line of the body: one pair on the level of Th10-L1 and the other pair on the level of S2-S4, at the distance of 5 cm from the vertebrae [16]. Firstly, this method reduces pain caused by contractions. Secondly, the series of impulses stimulate the organism to produce endorphins. The possibility of changing the intensity and frequency of impulses by the parturient is an indisputable advantage.

TENS is a safe, well-working pain relief method that reduces pain especially during the 1st stage of labor, and when used later, it may minimize or postpone the necessity of pharmacological analgesia [2]. However, Larissa et al. concluded in their systematic review that there is no evidence that TENS reduces the use of additional analgesia [17]. The best effects of TENS have been observed among multigravidas. No negative effects on either the mother or the

newborn have been reported [2,16]. TENS is contraindicated in the pregnant with artificial cardiac pacemakers, epileptics and in combination with hydrotherapy. TENS is widely accessible to parturients, and it should be taken into consideration as an important alternative to pharmacological methods.

Massage

Massage is a technique involving action on the body with pressure by generating tension, motion or vibration, which is achieved manually or sometimes with mechanical aids.

Labor massage is usually performed on the lumbar area. Parturients often need it during contractions, while they relax during breaks. It is important to remember that the room where the massage is performed should be warm. It is also necessary to communicate with the pregnant and ask about her preferences [18]. The pregnant should be in a comfortable position, she may lie, sit on a ball or on a chair. Massage should be performed with two hands and the movements should be regular [19]. This method is usually taught in antenatal classes. Its effectiveness depends on the stage of labor and abilities of the helping partner. Recent studies have shown that massage therapy decreases depression, anxiety as well as leg and back pain. Women who have chosen this method needed less medication and their labor was 3 hours shorter. Furthermore, massaged parturients and their babies presented decreased cortisol levels [20]. Additionally, primiparas find massage and relaxation techniques more helpful than multiparas [21]. Massage enables the body to relax, gives energy and is a method of communication with the pregnant woman [18,21]. A method similar to massage is counter-pressure. It involves applying strong pressures on the lumbar and sacral area at the peak of contractions. These methods are recommended alternatives or additional therapies during pregnancy and labor.

Relaxation and breathing techniques

Relaxation used as a pain relief method is something more than ordinary activities associated with leisure. Deep relaxation enables a woman to reduce muscle tension and remain calm. The most important aspect of relaxation is breathing. Women should be instructed about this technique in antenatal classes. The most crucial thing is to synchronize breathing with labor progress. In order to relieve tension, the

pregnant should concentrate on conscious, long expiration. Proper breathing improves organ perfusion and enables women to relax. [18]. Brown et al. in her work presents that 58.7% (n=27) of parturients who used breathing techniques were satisfied with them [22].

Acupuncture

Acupuncture is a form of alternative medicine. It is commonly used worldwide as a method of pain relief. The mechanism of stimulation is based on skin penetration by thin metal needles (usually made of stainless steel), which are most frequently manipulated manually [23]. In 2007, Hantouhzadeh concluded that acupuncture could reduce pain, duration of labor and oxytocin levels with no negatives effect and with patients' satisfaction [24]. In 2011, Smith et al. assessed that acupuncture may reduce pain and minimize the need for pharmacological pain relief methods [25]. By contrast, Cho et al. did not derive such conclusions [26]. Both works underline the need for further research. In 2015, Asadi et al. showed that acupuncture significantly shortened the duration of labor but did not have an impact on pain relief or cortisol levels compared to the control group [27]. In conclusion, acupuncture may be a good additional pain relief method, but the present evidence concerning its beneficial role in monotherapy is inconclusive.

Music therapy

Music in treatment has been used since antiquity. It can play an important role during pregnancy and childbirth. During pregnancy, it is recommended to listen to music that is compatible with the mother's heart rate.

During delivery, it reduces muscle tension, enables the mother to relax and focus on childbirth. It facilitates breathing and helps assume vertical positions. In addition, it raises the pain threshold and reduces psychophysical tension [28,29]. Listening to music is an acceptable labor pain relief and relaxing strategy for women, especially in the early phase of labor [21]. It is recommended for women to listen to music during delivery as it helps to activate their strength and stimulates them to synchronize breathing with the pace of music [28].

CONCLUSIONS

The range of labor pain relief methods is wide and future mothers may decide which one is the most convenient for them. Availability of different forms of pain relief gives the future mother the feeling of safety. The choice depends on the woman's general condition and diseases, access to different methods and needs of the future mother. Epidural analgesia is still the "gold standard" of labor pain management because of its accessibility and satisfying pain relief. Nonpharmacological methods are becoming more popular and accessible, mostly because they allow childbirth to be as physiological as possible and do not interfere with the progress of labor. The major advantages of nonpharmacological methods include the lack of long-term negative effects on mother and child, the possibility of immediate mother-newborn contact after delivery, no need to engage special machinery and the possibility of cooperation with the parturient. There is still a need for further investigation concerning methods such as acupuncture, massage and music therapy.

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