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REVIEW

Use of Complementary and Integrative Methods in the Management of Postoperative Pain: A Narrative Literature Review

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Abstract

Pain is at the top of the common problems experienced by patients in the postoperative period. The use of pharmacological and non-pharmacological methods together is of great importance in the management of postoperative pain. The current multimodal analgesia approach, advances in enhanced recovery after surgery protocols, and the use of safe and low-dose opioids in the management of postoperative pain have made the use of complementary and integrative methods even more important in improving the quality of postoperative pain management. The use of complementary and integrative methods (massage, neuro-linguistic programming, music therapy, laughter therapy, virtual reality distraction, progressive relaxation exercises, hydrotherapy, reiki, reflexology, hot–cold compress, transcutaneous electrical nerve stimulation, acupressure, and aromatherapy) in the management of postoperative pain provides rapid recovery and discharge time, a decrease in the need for analgesics and the frequency and amount of opioid use, and an increase in patient satisfaction, well-being, pain control quality, and quality of life by reducing the patient's pain. It is important for surgical nurses, who have an important role in postoperative pain management, to know the methods of relieving pain and to include non-pharmacological practices that increase the quality of pain management in the treatment and care process of pain. This article presents the most commonly used complementary and integrative methods in postoperative pain management in light of current information.

Keywords: Complementary treatments, integrative treatments, postoperative care, postoperative pain, postoperative pain management

Introduction

The word pain originates from the Latin word "poena," and in Turkish, it is a subjective, complex, and personal experience that means torture and punishment. According to the Taxonomy Committee of The International Association for the Study of Pain, pain is a set of unpleasant emotional experiences that accompany existing or potential tissue damage or that can be defined by damage, originating from a certain part of the body, influenced by the individual's past experiences (Aslan, 2006; Cavdar & Akyuz, 2019; Eti Raj, 2007). Postoperative pain is an unpleasant sensory, emotional, and mental response that begins with acute, surgical trauma and ends with tissue healing, including metabolic-endocrine, autonomic, physiological, and behavioral responses (Cavdar and Akyuz, 2019). Despite successes with advances in modern medicine, the pain remains one of the most common challenges following surgical procedures (Wu & Raja, 2011). Despite new standards, guidelines, and educational implications, inadequate treatment of acute pain has been recognized as a major problem over the past two decades.

Acute pain occurs in three-quarters of patients undergoing surgery. In the early postoperative period, 30%–80% of patients undergoing surgery experience moderate or severe pain (Acar et al., 2016; Apfelbaum et al., 2003; Samuels & Fetzer, 2009; Wu and Raja, 2011). In the management of postoperative pain, high-dose use of analgesics may cause undesirable complications, while low-dose use of them may cause inadequate pain relief and ineffective management of pain. When postoperative pain is not well managed in the early postoperative period, it can turn into chronic pain accompanied by conditions such as high blood pressure, tachycardia, heart rate irregularities, anxiety, depression, and sleep disorders (Apfelbaum et al., 2003; Reisli et al., 2021; Samuels & Fetzer, 2009). Postoperative chronic pain, which is an undesirable and severe complication, may emerge in relation to the level of preoperative pain, opioid use, and most importantly, the level of postoperative pain (Beloeil & Sulpice, 2016).

Although opioids have been used as the main treatment in postoperative pain management, adjuvant modalities are primarily recommended for the treatment of postoperative

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pain, following the developments in the current multimodal approach and enhanced recovery after surgery (ERAS) protocols. Enhanced recovery after surgery protocols are also for the use of adequate minimal doses of opioids (Joshi & Kehlet, 2019; Mitra et al., 2018). The use of complementary and integrative methods in the management of postoperative pain has an important role in reducing the frequency and amount of opioid use, in the effective management of postoperative pain, in increasing the level of well-being, quality of care, and satisfaction of the patient, and in accelerating the discharge time (Argoff, 2014; Cavdar and Akyuz, 2019; Lin et al., 2017; NCCIH, 2016).

Increasing the quality of postoperative pain management is possible with the correct management of nursing care (Aydin, 2002; Nazlikul & Eraltan, 2012). In order to increase the quality of pain management, it is important for nurses to include non-pharmacological complementary and integrative methods in treatment and care, as well as analgesic therapy (Alon & Knessl, 2000; Buyukyilmaz & Asti, 2009; Deng et al., 2004; Gul & Eti Aslan, 2012, Khorsid & Yapucu, 2005; Schulenburg, 2015). The surgical nurse should have knowledge of pharmacological methods and complementary and integrative methods in practicing and evaluating postoperative pain management strategies, should be able to inform the patient, should be able to incorporate appropriate strategies into nursing care, and should be able to monitor the results (http://www.rn.ca.gov/pdfs/regulations; Schulenburg, 2015).

Objective

In this context, the aim of literature review is to present complementary and integrative methods used in postoperative pain management with up-to-date information.

Complementary and Integrative Methods in the Management of Postoperative Pain

In cases where effective analgesics cannot be used or their effects are insufficient, complementary and integrative methods can be used for the management of postoperative pain in order to increase the effect of pharmacological treatment. Complementary and integrative methods in which the individual takes an active role increase the quality of postoperative pain management by changing the individual's perception of pain and reducing the unwanted effects, stress, anxiety, and the need for analgesics secondary to pharmacological treatment. Complementary and integrative methods can be used alone or in combination with pharmacological treatment for the management of postoperative pain. Peripheral and cognitive-behavioral techniques such as progressive relaxation exercises (PRE), music therapy, distraction, reflexology, reiki, meditation, hydrotherapy, massage, transcutaneous electrical nerve stimulation (TENS), neuro-linguistic programming (NLP), virtual reality, hot–cold compress, acupressure, aromatherapy, and laughter therapy are non-pharmacological methods used to reduce postoperative pain (Cavdar & Akyuz, 2017; Dikmen, 2013)

Massage

The relief of pain with rhythmic, mechanical stimuli applied to the tissues is based on the gate control theory, which was put forward by Wall and Melzack in 1965 and is still valid. Touch receptors are stimulated by massage. Large-diameter tactile receptors, which are fibers that transmit pain, transmit impulses to the cortex faster than small-diameter fibers. The cortex receives the impulses of the tactile receptors and sends a message to the substantia gelotinasa. Mechanical stimuli generated by massage activate the gate control mechanism. Gates to the passage of pain stimuli are closed. Tactile information from the massage blocks the transmission of pain stimuli (Ganong, 1996; Nemli et al., 2017; Noble et al., 2007; Tuna, 2011). According to another theory, massage increases the level of beta-endorphins. This raises the pain threshold and reduces or eliminates the sensation of pain. Massage also provides relaxation of the muscles and relaxation of the individual by accelerating the circulation. Blood flow is increased in the area exposed to pressure through vasodilatation in the massaged area. Thus, metabolites accumulated in the area are removed and pain can be reduced (Jiang & Qin, 2008; Kwekkeboom & Gretarsdottir, 2006).

Massage, which is considered one of the oldest healing practices, is a therapeutic practice that provides mechanical and chemical stimulation of the body and relieves pain. Massage, which is a widely used nursing practice, has many types such as sports massage, deep tissue massage, and Swedish massage. Massage can also be used in combination with other complementary and integrative modalities. It can be applied to many areas such as hands, feet, back, abdomen, whole body, extremities, and face (Khorsid & Yapucu, 2005).

It has been reported in the literature that massage alleviates postoperative pain and concomitant discomfort and reduces the dose of analgesic administered (Koras Sözen & Karabulut, 2020; Mitchinson et al., 2007; Nemli et al., 2017). In the randomized controlled studies, in which Koras Sozen and Karabulut applied the hand and foot massage after laparoscopic cholecystectomy and Saatsaz et al. applied hand and foot massage after cesarean delivery, it was reported that the postoperative pain of the application groups was significantly lower than the control groups (Koras Sözen & Karabulut, 2020; Saatsaz et al., 2016). In the randomized controlled study by Dreyer et al., postoperative pain was reported to be significantly lower in the massage group compared to the control group after colorectal surgery (Dreyer et al., 2015).

Aromatherapy

Aromatherapy is a method in which essential oils are used to increase the health and well-being of the individual (Arslan, 2007; Baker, 2005; Senturk et al., 2015). The molecular contents of essential oils have strong pharmacological properties. They can be administered orally, topically, locally, or by ingestion (Buckle, 2001; Hongratanaworakit, 2004; Kwekkebom, 2008; Ozveren, 2011). Essential oils applied by ingestion are prepared by mixing them with alcohol, water

with honey, and vegetable oils. Topically applied essential oil components pass through the epidermis and enter the circulation with lymph and blood vessels. Since essential oils are very pure and concentrated, they should not be applied directly to the skin without dilution. They should be diluted with carrier oils prior to application. Inhalation is the easiest and fastest way that essential oils have an effect on the body. The anatomical proximity and relationship between the nasal cavity and the brain are the reasons for the rapid effect. Essential oil can be given by dripping onto cotton or handkerchief, pouring it into the palm of the hand, dripping oil into the hot water to create mist, by means of an oxygen tent-like head, by dripping the oil into the hot water on the aroma lamp, and by nebulizer/steam machine. (Ozdemir Alkanat, 2015). However, the inhalation method is not recommended for use in individuals with asthma and respiratory allergies (Cristina, 2004; Rawlings, 2003). In aromatherapy, which is a branch of phytotherapy, oils obtained by distillation and squeezing methods of the raw material (flower, plant, tree, etc.) are used (Ozdemir Alkanat, 2015). Lemon, mint, lavender, orange, rose, jojoba, jasmine, sandalwood, eucalyptus, and various incense are the most commonly used aromatic herbs (Baydar, 2016; Mamuk and Dava, 2010). It is recommended to dilute essential oils and use them in accordance with the recommendations of the guidelines (Ross, 2009).

Essential oils show their effect on the systems by participating/acting on the nervous systems or circulation. Essential molecules in the composition of essential oils reach sensitive receptors in the regio olfactoria on the nasal roof. Odor molecules bind to specific receptors in this region. Following the binding of molecules to these receptors, an electrochemical message is transmitted to the limbic system, which is an important constructor of emotional responses and emotional memory, via the bulbus olfactorius and nervus olfactorius. During smelling, the hippocampus and amygdala, which contain the olfactory memory, are activated and support the creation of emotional responses (Denner, 2009; Dobetsberger, 2011; Herz, 2009; Potts, 2009). After the inhaled odor is transmitted to this area, it is perceived as a pleasant or unpleasant odor, according to previous experiences. The effect of belief, expectation, and learned emotional experiences are in the effect mechanism of aromatherapy. Also, culture, experience, gender (women are more sensitive than men), and personality traits influence aromatherapy (Herz, 2009).

In the literature, there are many studies reporting the effectiveness of aromatherapy in reducing postoperative pain (Bagheri et al., 2020; Gorji et al., 2015; Mirhosseini et al., 2021; Seifi et al., 2018; Surya et al., 2020; Zamenjani et al., 2021). In a randomized controlled study by Bagheri et al. (2020), in which they evaluated the effect of aromatherapy with lavender oil inhalation on postoperative pain after inguinal hernia surgery, it was reported that the pain score of the study group that was given 20 minutes of oxygenated essential lavender oil inhalation was significantly lower than that the control group. In a three-armed randomized controlled study by Zamenjani et al., (2021), examining the effects of sweet orange and damask rose essential oils on post-abdominal surgical abdominal pain for 30 minutes, it was reported that aromatherapy was effective in reducing post-abdominal surgical pain, and sweet orange essential oil was more effective than damask rose essential oil. Considering these positive effects, it can be used as an independent nursing intervention.

Acupressure

Acupressure is a simple, painless, safe, and effective pain controlnon-pharmacological application that includes pressure manipulation applications by means of special stimulation bands, palms, fingers, or different objects on certain points of the acupuncture meridians, ensuring the proper functioning of energy channels. The practice, which dates back 5000 years according to traditional Chinese medicine, adopts 12 pairs of prime meridians and 365 points in the body, which carry energy, integrate the energy flow, and provide post-release transmission of neurotransmitters (Cevik & Tasci, 2017; Chen & Wang, 2014; Gonenc, 2012; Mollart et al., 2015; Ovayolu & Ovayolu, 2013; Ovayolu & Zhang et al., 2016; Yildiz, 2013). Each meridian is a bundle of channels that correspond to different organs and provide energy transmission and has an endless flow of energy in the absence of a pathological condition that will cause interruption. These points on the meridians are named according to their location and the diseases they are treated (Chen & Wang, 2014).

According to one hypothesis, neural activity is provided by pressure applied to acupuncture points, and impulses are transmitted through nociceptors. Thus, chemical stimuli are released. According to another hypothesis, in the transmission of the stimulus from the medulla spinalis to the cortex, the activation of the pain-reducing system is provided by stimulating the large fibers and/or stimulating the endogenous opioid release and modulating the hypothalamic-limbic system. Beta-endorphin, serotonin, and norepinephrine levels are elevated in plasma. Thus, analgesic, anti-inflammatory, and immunomodulatory effects occur. Another theory is that pain perception is destabilized due to conflicting stimuli in the pain matrix (Cevik and Tasci, 2017; Dabiri & Shahi, 2014; Hakverdioglu, 2006; Levett et al., 2014; Özdağ et al., 2015; Tournaire and Theau-Yonneau, 2007).

In the randomized placebo-controlled study by Soylu and Kartin, it was reported that acupressure applied for a total of 12 minutes reduced post-laparoscopic cholecystectomy pain (Soylu & Kartin, 2021). A meta-analysis by Zhong et al. (2019) including a total of 1682 participants and 26 studies evaluated the efficacy of auricular acupressure for postoperative pain; however, in order to more accurately interpret the effect, the need for a large-scale, high-quality randomized controlled studies that were more rigorously designed was emphasized. Therefore, it is recommended that nurses should be informed about acupressure applications and this application should be more common.

Transcutaneous Electrical Nerve Stimulation

Transcutaneous electrical nerve stimulation (TENS) is an application that creates an effect on the nervous system and

provides electro-analgesia through controlled low-voltage electrical current given to the nervous system by electrodes placed on the skin. The New York State Nurses Association stated that TENS is a complementary treatment method and should be used in nursing care. The association stated that special practical training and clinical experience are important in such treatment methods, that nurses have assistant and coordinator roles in TENS application, that these roles strengthen the professional autonomy of the nurse, and that the nurse has the responsibility to inform and support the patient about the benefits and risks of the treatment (Manworren RCB, 2015, http://www.tard.org.tr/assets/kilavuz/postooperatifagrikilavuzu.pdf, https://www.nysna.org/).

Although TENS application, which is easy to use, inexpensive, non-invasive and requires special training for the practitioner, is explained by more than one peripheral and central mechanism, its analgesic effect is explained by Melzack's and Wall's Gate Control Theory (Aslan, 2006; Coutaux, 2017; Jones & Johnson, 2009; Kozier, 2008; Ozveren, 2011). As a result of the high-frequency stimulation of the sensory A fibers, an effect is created on the pathway that transmits the stimuli sent to the brain at the spinal cord level, preventing the perception of pain with the closing of the door and the release of natural opioids in the body (Coutaux, 2017; Jones & Johnson, 2009; Kozier, 2008).

There are five types of application models of TENS. In the most commonly used conventional TENS method, electrodes are placed above and below the painful area to achieve the best effect. The effect of the method, which varies from 30 minutes to several hours, starts within 30 minutes and disappears in about 2 hours at the end of the treatment (Gayaud, 2013).

Transcutaneous electrical nerve stimulation application has been used in many operations such as abdominal surgery, thoracotomy, hysterectomy, hernia repair, and total knee replacement surgery (Ahmed, 2010; DeSantana et al., 2008; Fiorelli et al., 2012; Rakel et al., 2014). In the study by Yilmaz et al. (2019), examining the effect of TENS on postoperative pain and patient satisfaction, it was reported that the postoperative pain of the patients in the TENS application group was lower. In a meta-analysis study by Zhou et al. (2020), in which they examined the effectiveness of TENS application in post-pulmonary surgery analgesia, it was reported that patient groups treated with TENS had lower postoperative pain severity scores and that it was an effective complementary analgesic regimen in multimodal analgesia to reduce post-pulmonary surgery pain severity. It has been reported that TENS application in postoperative analgesia reduces the use of postoperative analgesic agents and can be applied as a complementary and integrative method for moderately severe pain after thoracotomy (Bjordal et al., 2003; Freynet & Falcoz, 2010). As a result, the pain level of patients decreased by non-pharmacological treatments and these treatments are also found to increase the comfort of patients and nurse care quality. Consequently, the implementation of TENS on patients has decreased the level of pain and the consumption of analgesics.

Hot–Cold Compress

Hot compress is a pain-relieving method applied as dry heat and wet heat with agents that give warmth to the tissue. Thermoreceptors in the area of the hot compress stimulate pain-inhibiting reflexes (Geziry et al., 2018). The vasodilatation that occurs in the veins with the effect of the compress accelerates the blood circulation and accelerates the conduction in the tissue where the stimuli occur. Elimination of metabolites and release of endorphins increase. In this way, pain-relieving mechanisms are stimulated. However, since hot compress increases the risk of bleeding, it is not recommended to be applied in individuals with high risk of vascular complications and bleeding and in areas close to the operation site.

Cold compress is a method applied as dry cold and wet cold with agents that give cold to the tissue. It is considered that this method, which is more effective in relieving postoperative pain compared to hot compress, provides an effect by raising the pain threshold. By creating a blockage in the peripheral nervous system, pain is reduced by the gate control mechanism. It can be applied within 24–48 hours after surgical trauma (Eti Aslan, 2006; Ozveren, 2011). The gels used in cold compresses are kept in the freezer for 2–3 hours before application and should not be directly contacted with the skin.

When the studies in the literature were examined, in the randomized controlled studies by Demir and Khorshid (2010) in which they evaluated the effect of cold compress on the pain and anxiety experienced while removing the chest tube in patients who had undergone heart surgery, it has been reported that cold packs were applied to the area surrounding the chest tube for 20 minutes in the application group, and after the application, the patients had less pain intensity and the time to need analgesics is prolonged. In the randomized controlled study of Ozkan and Cavdar (2021) in which they applied cold compresses to the incision site after abdominal surgery, it was reported that there was no statistically significant difference in the use of analgesics. Nurses often evaluate the patient's pain and apply non-pharmacologic therapies. Hot–cold therapy application, a practical nursing intervention, can contribute to the healing process by reducing pain.

Reflexology

Reflexology is a holistic and balancing therapy that activates the body's self-healing mechanism with a special massage technique applied only on the hands, feet, and ears in Egyptian, Chinese, and Indian cultures, whose history is estimated to go back to 5000 years (Dogan, 2014; Tabur and Ebz, 2009). Reflexology is applied by massaging the nerve endings at some specific pressure points in the ears, hands, and feet (Dogan, 2014; Thayer, 2014). The positive effect of reflexology on pain is explained by the Melzack's gate control theory and the endorphin theory (Embong et al., 2015; Saatsaz et al., 2016). Reflexology provides relief of muscle spasms and reduction of tension by blocking pain impulses. Reflexology causes the closure of the pain control gate by stimulating the large-diameter nerve fibers

after the stimulation of the release of endorphins. By stimulating the mechanoreceptors, it accelerates the circulation and increases the oxygenation of the tissues (Embong et al., 2015; Saatsaz et al., 2016). It is known that the most effective application area is foot reflexology due to its wide usage area and stimulation points close to the skin surface (Tabur & Ebz, 2009).

In the literature where the effect of reflexology on reducing the severity of pain was examined, it has been determined that foot reflexology applied for an average of 30 minutes reduces the severity of pain in the patients in the early period (Metin & Ozdemir, 2016; Ozturk et al., 2018). In the study by Samuel and Ebenezer (2013), it is reported that reflexology applied to patients experiencing acute pain increases the pain threshold and tolerance. It is reported in the literature that reflexology applied to surgical patients has a positive effect on pain (Metin & Ozdemir, 2016; Ozturk et al., 2018; Sakalli & Oztekin, 2021). It is thought that the effect of reflexology applications in the relief of postoperative pain is effective in reducing pain.

Reiki

Reiki consists of the Japanese words Rei, which means "omnipresent," and Ki, which means "life energy." Reiki is called "Chi" by the Chinese, "Prana" by the Indians, and "Mana" by the Kuhunas (Karahan, 2005). The National Center for Complementary and Alternative Medicine has classified reiki as a subtitle of biofield therapy of energy therapy (Coakley & Barron, 2012; Durmus et al., 2014). Reiki was discovered in Japan in the late 19th century with Tibetan scriptures and spread to America in the 1940s and Europe in the 1980s (Demir & Can, 2013; Sağkal & Eser, 2013).

The basis of Reiki is based on the fact that an illness or imbalance occurs due to a blockage in an energy center and as the solution to this situation. In this natural healing method, energy is transferred by touching the hand. When the hands touch the body in special positions, reiki begins to flow spontaneously. With reiki, the harmony between body, mind, and spirit is restored, and the activity of the parasympathetic system increases, the level of immunoglobulin A increases, the release of stress hormones such as cortisol decreases, and complete relaxation is achieved. Thus, blood pressure and heart rate decrease. Ultimately, reiki dissolves internal blockages and cleanses the toxins in the body (Vitale, 2007; Whelan & Wishnia, 2003).

Krieger began teaching reiki to nurses in the 1970s. Thus, reiki has become a part of nursing care (Amanak et al., 2013). The use of reiki, an easy-to-learn technique in the management of disease symptoms, by nurses and other health professionals has been increasing in recent years (Ozcan Yuce et al., 2017; Sağkal & Eser, 2011).

It is recommended in the literature to use reiki as a non-pharmacological method to relieve pain because it reduces the level of postoperative pain and has no side effects (Midilli & Eser, 2015; Sağkal, 2012; Utli, 2018). In randomized controlled studies, it has been reported that in addition to reducing postoperative pain, in particular, reiki has effects such as increasing the quality of life and comfort, providing relaxation, and complementing nursing care (Erdogan & Cinar, 2011). According to these, it can be said that reiki is applied by trained nurses to reduce pain and improve quality.

Hydrotherapy

Hydrotherapy is one of the manipulative and body-based methods that include in-water exercises, showers, and various physical water applications with normal or thermomineral waters. In modern spa medicine, unique treatments consist of balneological and climatological treatments and their combinations. Balneotherapy (thermomineral water treatment baths) and peloidotherapy (medical mud treatments) are important in a spa cure. Especially in European countries, modern spa cure is a complex treatment option in which some other treatment methods can be applied in addition to balneoclimatological interventions. Massage and exercise are the two most common methods included in these. Phytotherapy and aromatherapy applications are other common methods that can be included in the spa cure. Methods such as health education, diet, and psychological support can also be integrated into the spa cure (Karagulle, 2016).

In Tüz's study, it is reported that the in-water and non-water exercises applied are effective in correcting postoperative pain and functional impairment, and the recovery is accelerated by the effect of hydrotherapy (Tüz, 2002). Studies on postoperative hydrotherapy are in limited number. There is a need for studies examining the effectiveness of hydrotherapy applied to patients with postoperative pain.

Progressive Relaxation Exercises

Progressive relaxation exercises is a non-pharmacological strategy that includes techniques to gradually stretch and relax muscles (Mikolasek et al., 2018; Pak et al., 2015). Stretching of the skeletal muscles at the incision site increases postoperative pain, while relaxation exercises relieve muscle tension and reduce pain (Topcu & Yildiz, 2012; Willens, 2006). The major advantages of PRE are that it can be easily administered by patients independently and does not require invasive intervention (Jacob & Sharma, 2018; Kontrimaviciute et al., 2005).

Studies in the literature show a decrease in sympathetic activity and an increase in parasympathetic activity after relaxation exercises, resulting in a decrease in heart rate, blood pressure, respiratory rate, oxygen demand, muscle tension, pain and pain perception, dilatation in peripheral vessels, and an increase in blood flow in major muscle groups and sleep quality (Demir & Okanli, 2013; İbrahimoğlu & Kanan, 2017; Özlü et al., 2016; Paula et al., 2002; Roykulcharoen & Good, 2004; Topcu & Yildiz, 2012).

Distraction

Distraction is an important cognitive-behavioral method of reducing pain through gate control theory. The individual is

protected from the perception of feeling pain by focusing on a stimulus other than pain. The distraction method does not completely eliminate the pain of the individual, but it increases the pain threshold by increasing the tolerance to the pain (Cakar et al., 2021; Field & Adams, 2001). In the literature, it is seen that the distraction method is used for acute pain (Kozier et al., 2008; Ozveren et al., 2016).

Virtual Reality

According to the Turkish Language Association, the word "virtual" has meanings such as "notion, hypothetical, guesswork that has no place in reality but is designed in the mind." The word "reality," on the other hand, has meanings such as "the real thing, all of the things that exist, truth, senility, reality, being real" (TDK, 2021). Although virtual reality, which enables sick or healthy individuals to be in a virtual world, is a new technology, it is among non-pharmacological methods. Virtual reality was first used in the treatment of fear of heights in 1993. This technology has continued to be used in health care, medical treatments, radiological procedures, rehabilitation, surgical applications, especially laparoscopic abdominal surgery, health, and patient education. This versatile sensory technology, which can be used in different areas, is applied as a distraction method in pain management (Li et al., 2017; Mahrer, 2009; Matheve et al., 2020). It is considered that an effect on the perception of pain is created by blocking the stimulation with the external world where pain stimuli are present in virtual reality applications by distracting (Wismeijer & Vingerhoets, 2005). Watching virtual reality videos, which include postoperative peaceful and relaxing nature scenes, increases patients' and health care personnel's satisfaction by providing relief in the physiological conditions, pain, and comfort of the patients (Okutan, 2021).

In a literature study examining the effect of virtual reality application on the pain level of patients after laparoscopic abdominal surgery, it was reported that there was a decrease in the level of pain after the application (Okutan, 2021).

Laughter Therapy

Laughter is used as one of the distraction techniques in pain management. Laughter therapy was introduced in 1995 by Dr. Kataria as a therapeutic approach. The purpose of laughter therapy is to support the realization of a sincere laugh that does not involve cognitive thinking in individuals by providing laughter without any jokes, comedy, or humor. Laughter therapy is applied in the form of sessions that include warm-up, breathing, and laughter exercises accompanied by applause and songs. (Kataria, 2018; Laughter Yoga University, 2019).

In the literature, it has been reported that laughter therapy used for pain management is effective (Cakar et al., 2021; Henschke et al., 2015; Ko and Hyun, 2013). In a study examining the effects of laughter therapy on post-mastectomy pain and anxiety, it was reported that the pain score of the application group was significantly lower than the control group (You and Choi, 2012). Laughter therapy is used in pain management as one of the distraction techniques

Music Therapy

Music has been used throughout history to maintain and improve physical and mental health. It is considered that music therapy has a positive effect on pain by providing distraction and relaxation in individuals. Music therapy focuses attention on a stimulus other than pain and increases the strength to endure pain. Music therapy also relaxes the individual by increasing the secretion of endorphins. In music therapy, which is an easy-to-use method for pain management, the importance of choosing the music that the patient likes and wants is reported. (Ozveren, 2011; White, 2001; Yavuz, 2014).

It is reported in the literature that music therapy reduces postoperative pain and it is recommended to be applied during the postoperative period (Belknap, 2011; Cigerci & Ozbayir, 2016; Grafton-Clarke et al., 2019; Yarahmadi et al., 2018). In a 2019 study by Grafton-Clarke et al. (2019), it was reported that music therapy (music type: soft and relaxing, duration: 30 minutes, and frequency: once per day) is an effective non-pharmacological method of reducing pain after open-heart surgery. In patients with postoperative pain, music therapy is recommended in addition to pharmacological treatment in postoperative pain management.

Neuro-Linguistic Programming

Neuro-linguistic programming is an application that originates from English and is used in the meaning of brain language programming and neural language programming. Neuro-linguistic programming is a cognitive technique used to advance the process aimed at developing a learning system. People behave according to their view of the world and their thoughts. These behaviors lead to positive or negative consequences. It is aimed to use new behavior patterns that lead to the goal with NLP techniques instead of behaviors that do not reach the goal (Tüz, 2002).

It has been reported in the literature that NLP and guided imagery reduce the pain after open-heart surgery, with the behavior creation technique developed by NLP founder Bandler, and the patient's auditory, visual, and kinesthetic senses related to this perception are directed for 30 minutes in one session to provide change during 30 minutes (Dogan, 2019). However, studies in this area are limited and it is recommended that nurses do NLP research to relieve pain.

Conclusion and Recommendations

Surgical nurses should follow the developments related to pain management and current pharmacological and non-pharmacological approaches, including appropriate complementary and integrative practices in treatment and care, thus increasing the quality of nursing care. The integration of complementary and integrative methods with continued medical treatment can provide positive results in the management of postoperative pain, as well as providing holistic care. Conducting studies examining the effectiveness of complementary and integrative methods in the management of postoperative pain will contribute to the literature by creating an evidence base.

According to the results of the review, the number of studies examining the effectiveness of massage, transcutaneous electrical nerve stimulation, hot–cold compress, distraction, progressive relaxation exercises methods, neuro-linguistic programming, and music therapy in the management of postoperative pain is higher. It can be suggested that studies conducted using the methods of laughter therapy, virtual reality, hydrotherapy, reiki, reflexology, acupressure, aromatherapy are limited, and studies examining the effectiveness of these methods are conducted.

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