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USE OF VIRTUAL REALITY GOGGLES AS A DISTRACTION TECHNIQUE IN PAIN MANAGEMENT FOLLOWING PERCUTANEOUS CORONARY INTERVENTION

PERKÜTAN KORONER GİRİŞİM SONRASI AĞRI YÖNETİMİNDE BİR DİKKAT DAĞITMA TEKNİĞİ OLARAK SANAL GERÇEKLİK GÖZLÜĞÜ KULLANIMI

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Abstract

Percutaneous coronary intervention (PCI) is an invasive but non-surgical revascularization method used in the diagnosis and treatment of coronary artery disease. It involves the use of catheters, typically advanced through the femoral or radial artery, to relieve narrowing or blockages in the coronary arteries through balloon angioplasty and/or stent implantation. It involves the use of catheters, typically advanced through the femoral or radial artery, to treat narrowing or blockages in the coronary arteries using balloon angioplasty and/or stent implantation. Pain is one of the symptoms experienced after percutaneous coronary intervention. If left untreated, pain can lead to respiratory and circulatory disturbances, suppression of the immune system, disruption of patients' sleep patterns, exacerbation of delirium, prolonged hospital stay, increased mortality and morbidity, and increased costs to patients. Although the use of common pharmacological interventions for pain after percutaneous coronary intervention is effective in relieving symptoms in the short term, their long-term use can cause serious side effects and high costs to the healthcare system. Therefore, adjunctive methods to reduce pain after percutaneous coronary intervention are needed. Recently, non-pharmacological interventions have been widely used in symptom management. Studies have shown that virtual reality goggles, one of the non-pharmacological treatments, are effective in controlling pain. It can be said that the effect of using virtual reality goggles, one of the distraction techniques, is related to the gate control theory and that this analgesic effect occurs by slowing down the pain impulses reaching the reticular system in the brain. Virtual reality goggles are a non-invasive intervention for pain management and an effective method that does not cause pain or side effects. However, publications investigating the effect of virtual reality on pain management after percutaneous coronary intervention are limited. Therefore, nurses should be knowledgeable about virtual reality goggles in pain management after percutaneous coronary intervention, inform the patient, and observe the effects of virtual reality goggles on the patient. The aim of this review is to draw attention to the use of virtual reality goggles as a distraction technique in pain management after percutaneous coronary intervention.

Keywords: Pain, pain management, nursing, percutaneous coronary intervention, virtual reality

Özet

Perkütan koroner girişim (PKG), koroner arter hastalığının tanı ve tedavisinde kullanılan, genellikle femoral veya radial arter yoluyla ilerletilen kateterler aracılığıyla, koroner arterlerdeki darlık veya tıkanıklıkların balon anjiyoplasti ve/veya stent implantasyonu ile giderilmesini amaçlayan, invaziv ancak cerrahi olmayan bir revaskülarizasyon yöntemidir. Perkütan koroner girişim sonrası yaşanan semptomlardan biri ağrıdır. Tedavi edilmediği takdirde ağrı, solunum ve dolaşım bozukluklarına, bağışıklık sisteminin baskılanmasına, hastaların uyku düzeninin bozulmasına, deliryumun alevlenmesine, hastanede kalış süresinin uzamasına, mortalite ve morbiditeye ve hastalar için maliyetlerin artmasına neden olabilir. Perkütan koroner girişim sonrası yaşanan ağrıya yönelik yaygın farmakolojik müdahalelerin kullanımı kısa vadede semptomların giderilmesinde etkili olsa da uzun süreli kullanımları ciddi yan etkilere ve sağlık sistemine yüksek maliyetlere neden olabilmektedir. Bu nedenle perkütan koroner girişim sonrası ağrıyı azaltmak için yardımcı yöntemlere ihtiyaç vardır. Son zamanlarda semptom yönetiminde farmakolojik olmayan müdahaleler yaygın olarak kullanılmaktadır. Yapılan çalışmalar, farmakolojik olmayan tedavilerden biri olan sanal gerçeklik gözlüklerinin ağrı kontrolünde etkili olduğunu göstermiştir. Dikkat dağıtma tekniklerinden biri olan sanal gerçeklik gözlüğü kullanımının etkisinin kapı kontrol teorisi ile ilişkili olduğu ve bu analjezik etkinin beyindeki retiküler sisteme ulaşan ağrı uyarılarının yavaşlatılmasıyla ortaya çıktığı söylenebilir. Sanal gerçeklik gözlükleri, ağrı yönetimine yönelik noninvaziv bir müdahale olup, hiçbir acıya ve yan etkiye neden olmayan etkili bir yöntemdir. Ancak perkütan koroner girişim sonrası ağrı tedavisinde sanal gerçekliğin etkisini araştıran yayınlar sınırlıdır. Dolayısıyla hemşirelerin Perkütan koroner girişim sonrası ağrı yönetiminde sanal gerçeklik gözlüğü konusunda bilgi sahibi olması, hastayı bilgilendirmesi ve sanal gerçeklik gözlüğünün hasta üzerindeki etkilerini gözlemlemesi gerekmektedir. Bu derlemenin amacı perkütan koroner girişim sonrası ağrının yönetiminde bir dikkat dağıtma tekniği olan sanal gerçeklik gözlüğü kullanımına dikkat çekmektir.

Anahtar Kelimeler: Ağrı, ağrı yönetimi, hemşirelik, perkütan koroner girişim, sanal gerçeklik

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INTRODUCTION

While infectious diseases have significantly decreased as a result of the improvement of the world's economic conditions, increasing urbanisation, the reduction of daily activities due to work life and changes in lifestyle, the era of degenerative and man-made diseases has begun (1). Cardiovascular diseases (CVDs), which belong to the group of chronic, progressive and non-communicable diseases, cause a decrease in people's quality of life and represent a major burden on the national economy (2). According to World Health Organization (WHO) data, cardiovascular diseases are the leading cause of death worldwide, accounting for approximately 32% of all deaths; the vast majority of deaths are due to ischemic causes such as ischemic heart disease and stroke (3). In the United States, cardiovascular diseases are the leading cause of mortality and morbidity in both men and women, with a total of 915,973 deaths reported in 2023, 349,470 of which were due to coronary heart disease (4). In Europe, the morbidity rate due to CVD is 52% in women and 42% in men, and is responsible for 47% of all deaths (2). According to the Turkish Statistical Institute (TSI) data for 2023, CVD is the leading cause of death in our country with 33.4%. According to the 2023 Death and Cause of Death Statistics of the Turkish Statistical Institute (TÜİK), the leading cause of death in our country is circulatory system diseases, accounting for approximately 33.4% of all deaths. This is followed by benign and malignant tumors (cancers) at approximately 15.0%, and respiratory system diseases at approximately 13.2%. Within circulatory system diseases, the vast majority of deaths are due to ischemic heart disease, which accounts for approximately 42.4% of deaths related to circulatory system diseases (5).

Coronary artery disease is a condition caused by narrowing or blockage of the coronary arteries, usually due to atherosclerosis. The rupture of an atherosclerotic plaque leads to the formation of a thrombus. The presence of a thrombus prevents an adequate supply of oxygen. In this situation, CAD leads to acute coronary syndromes (ACS). These syndromes are unstable angina (USAP), non-ST elevation myocardial infarction (NSTE MI) and ST elevation myocardial infarction (STE MI), and acute ischaemia is associated with an increased risk of cardiac death (1,6-9).

In recent years, coronary angiography has become the gold standard in the diagnosis and management of myocardial infarction (MI). If coronary angiography reveals narrowing and occlusion of the coronary arteries, percutaneous coronary intervention (PCI) is performed using intracoronary stents and/or coronary angioplasty (10). Percutaneous coronary intervention (PCI) is an invasive method aimed at treating narrowing or blockages in the coronary arteries. It can also lead to various complications such as bleeding, hematoma, infection, ecchymosis, pain, pseudoaneurysm, arteriovenous fistula, retroperitoneal hematoma, acute arterial thrombosis, and neuropathy (11-12). One of the most common complications following percutaneous coronary intervention is pain. Patients may experience chest pain due to coronary artery stenosis and pain at the catheter insertion site during the procedure. Additionally, pain may occur in the back and lumbar region due to prolonged immobility following the procedure (13-14).

The development of pain-related anxiety disorders in people with pain has a negative impact on the healing process. The experience of pain can lead to hospital anxiety in patients. Pain also creates significant effects at the physiological level, being associated with both vasoconstriction and increased sympathetic activation, which increases the heart's workload (1). In particular, the effects of pain are realised through the initiation of a neuroendocrine response to pain. This increases cardiac workload and myocardial oxygen consumption. This can lead to serious complications such as angina pectoris, arrhythmias and even myocardial infarction, especially in patients with coronary artery disease (15). Another consequence of the neuroendocrine response is increased secretion of catecholamines and catabolic hormones and decreased synthesis of anabolic hormones. This change leads to

sodium and water retention and increases blood pressure. Stress and sympathetic activation caused by pain disrupts the glucose balance in the endocrine system, leading to negative nitrogen balance, increased muscle tone, increased muscle tone leads to increased oxygen consumption and lactic acid production, and decreased blood flow due to immobility caused by pain leads to venous stasis and thromboembolism (16). To prevent the physiological and psychological harm that pain can cause to patients, it is necessary to relieve the patient's pain. Therefore, the role of nurses in the assessment and management of pain is very important (17). Pain management is effective in preventing complications, reducing pain and speeding recovery.

Nursing interventions for pain management can be divided into pharmacological and non-pharmacological applications. Among pharmacological methods, intravenous (IV) opiates (e.g. morphine) are the most commonly used analgesics in groups of patients undergoing percutaneous coronary intervention. Repeated doses of analgesia are required. They are not the first pharmacological choice for pain management because of the development of side effects such as nausea, vomiting, bradycardia, hypotension, respiratory depression and economic burden (1, 13). Non-pharmacological treatments can be divided into physical methods and cognitive behavioural techniques (CBT). Physical methods include the use of techniques such as transcutaneous electrical nerve stimulation (TENS), hot and cold applications, massage, vibration and acupuncture. CBT includes relaxation exercises, daydreaming, distraction, music therapy and psychotherapy (18-22). Non-pharmacological methods have recently been emphasised in clinical pain management practice because of their ease of use and cost-effectiveness (23).

Another non-pharmacological method widely used in recent years to manage patients' pain is the use of virtual reality goggles (VRG). It has been shown in many studies to be effective in reducing pain levels by distracting attention (24-25). It aims to distract patients from the sensation of pain by placing them in a different environment with interesting images or videos. A study by Spieggel et al investigating the effectiveness of virtual reality goggles for pain management in hospitalised patients found that virtual reality goggles were an effective method of reducing pain levels as a non-standard approach, despite the use of pharmacological methods (25). Another study by Deo et al found that the use of virtual reality goggles was effective in reducing pain levels in women undergoing hysteroscopy (24). The use of virtual reality goggles has been established in the literature as a highly effective and user-friendly method in terms of staff and patient satisfaction (24-25).

Despite technological advances in healthcare, pain management can still be a problem today. It is one of the main symptoms for which patients seek help from healthcare professionals. However, pain management interventions have been found to be inadequate and the majority of patients do not experience pain relief, prolonged hospital stays and increased mortality (25). The negative physical and psychological impact of pain on the patient leads to clinical difficulties in pain management (26).

A review of national and international studies on the use of virtual reality goggles (VRG) found that VRG has been used to reduce pain associated with many interventional procedures such as chest tube removal, arteriovenous fistula cannulation, colonoscopy, hysteroscopy, biopsy, but the number of studies on the effects of VRG in the management of pain after percutaneous coronary intervention is very limited. The aim of this review is to draw attention to the use of virtual reality goggles as a distraction technique in pain management after percutaneous coronary intervention (24-25, 27).

Pain in Percutaneous Coronary Intervention

Pain and Causes of Pain After Percutaneous Coronary Intervention (PCI)

The International Association for the Study of Pain (IASP) defines pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or both (28). The best clinical statement is that "pain is what the patient says it is, and if the patient says it, it exists". Furthermore, pain has been described as the "fifth vital sign" and should be considered as important as the other four vital signs (29).

A series of chaotic electrochemical events that occur between tissue damage in our body and the perception of pain is called nociception. Nociception is defined as the transmission of the stimulus caused by tissue damage to the central nervous system by nociceptors, the interpretation, response and activation of biochemical, physiological and psychological factors, although it is responsible for the relationship between environmental factors and the nervous system in the perception of pain. Nociceptors are neurological receptors in primary afferent nerve endings that are sensitive to stimuli caused by tissue damage. These receptors are activated by chemical, mechanical and thermal stimuli (23, 26, 30). The transmission of the pain stimulus, which begins with the stimulation of nociceptors, to higher centres occurs in four stages;

1. Transduction (sensation of pain): This is the conversion of the stimulus into electrical activity at the sensory endings of nerves (30).

2. Transmission (pain transmission): This is the transmission of impulses perceived by receptors to the central nervous system (30).

3. Modulation (regulation of the pain stimulus): This is the modification of the stimulus by neural pathways at the level of the spinal cord (30).

4. Perception: This is the perception of pain by the transmission of the impulse from the spinal cord to the upper centres. Pain perception varies according to the individual's psychology, age, gender and previous experience of pain (30).

Pain is an unpleasant condition that is usually experienced by individuals throughout their lives and has various causes. Pain, especially after PCI, can be a significant source of discomfort for patients. There are several factors that influence the occurrence of pain after PCI:

Pre-existing musculoskeletal pain: This type of pain can cause increased pain after catheterisation.

Length of PCI procedure: The length of the procedure may increase the stress and physical strain on the patient, which may increase pain.

Sensitivity at the procedure site: Conditions such as tenderness or infection at the procedure site can increase pain during and after catheterisation.

Patient's overall level of comfort and anxiety: The patient's comfort and stress level can affect pain perception. Patients with high levels of anxiety tend to experience more pain.

Patient's previous experience: Negative experiences can lead to greater anxiety and pain perception during subsequent interventional procedures.

Adequacy of patient preparation before PCI: Patient education and preparation can improve relaxation and reduce pain during and after the procedure.

Given these factors, a multidisciplinary approach is required to manage and reduce pain after percutaneous coronary intervention. This process can be facilitated by the use of appropriate medications and patient comfort techniques. Patient education and psychological support also play an important role, as these factors can greatly influence pain perception (31-32).

Pain Management After Percutaneous Coronary Intervention (PCI)

Close assessment of the haemodynamic status of the patient after PCI is very important in pain management. Patients should be closely monitored by cardiac monitoring for 24 hours after admission to bed (33). Continuous cardiac monitoring aims to detect signs of ischaemia and arrhythmias, as well as early detection of a possible new coronary event by monitoring chest pain and arrhythmias (34-35). Vital signs should be monitored after the patient has been placed in an appropriate bed position (36).

After PCI, the patient should be monitored for complications such as bleeding, haematoma, ecchymosis, swelling, pseudoaneurysm, signs of infection, and both extremities should be compared and monitored at regular intervals (33). Particular attention should be paid to the presence of blood, swelling, pain and haematoma in the pressure dressing when monitoring the site for bleeding. As problems such as flank pain, decreased limb pulse fullness, decreased haematocrit and haemoglobin levels may be signs of retroperitoneal bleeding, these indicators should be carefully monitored (36). After PCI, the presence and tenderness of peripheral pulses (dorsalis pedis and tibialis posterior arteries) distal to the treated limb, capillary refill time, and assessment of the sensitivity of the treated limb to heat, temperature, discolouration and paresthesia to detect possible arterial occlusion should be monitored until the patient is stable (33,34,35).

Vital signs of patients after percutaneous coronary intervention (PCI) should be closely monitored, and electrocardiography (ECG) follow-up should be continued. The neurovascular status of the treated extremity should be assessed for the early detection of vascular complications. This assessment should consider the presence of clinical findings such as tachycardia, pain, limited movement, paresthesia, coldness, and pallor (36). Pain arising in the intervention site after PCI or pressure applied to the artery can cause intense parasympathetic stimulation via the vagus nerve, leading to the development of vasovagal reactions. Uncontrolled vasovagal responses can lead to irreversible shock and even death. In this context, effective pain management in the post-procedure period plays a critical role in preventing vasovagal reactions. If a vasovagal reaction develops, the situation can be corrected with rapid and appropriate intervention. Intravenous atropine administration is recommended for this purpose (37).

Today, hemostasis at the intervention site after percutaneous coronary intervention (PCI) can be achieved using manual pressure, mechanical pressure, or vascular closure devices. The literature reports that manual pressure is the most commonly used method (33–35). When manual pressure is applied, it is recommended to apply continuous pressure with the finger approximately 1 cm proximal to the intervention site for 15–20 minutes or until hemostasis is achieved (33–35). After hemostasis is achieved, the intervention site can be covered with a tight bandage or tampon, and vascular closure devices can be applied if necessary. The use of sandbags is not recommended because it prevents effective observation of the intervention site and there is insufficient evidence to support its role in achieving hemostasis (33,35). However, when sandbags are used, it has been reported that a 2–5 kg bag should be removed 4–6 hours after hemostasis is achieved (14,38). When using mechanical hemostasis devices, the manufacturer's recommendations must be followed. Current studies show that the use of vessel occlusion devices in preventing vascular complications after PCI is more effective and better tolerated by patients than traditional sandbags in the treatment of femoral hematoma (39,40).

Kreutz et al (2022) reported that the use of a vessel closure device resulted in less bleeding in patients undergoing PCI compared with manual compression (39). A study investigating the efficacy and safety of the use of vascular closure devices to achieve haemostasis after PCI reported that haemostasis was more successful in the vascular closure device group compared with the manual compression group. It was also concluded that patients with vascular closure

devices had less pain and fewer physical and psychological problems (41). One study concluded that reducing the duration of sandbagging from 6 hours to 3 hours had no effect on the incidence of vascular complications. Shortening the sandbag time was found to reduce back and groin pain, decrease urinary retention and increase patient comfort (40). After PCI, patients should be placed in the supine position and bed rest should be ensured by keeping the limb straight (33,34,35). Patients should avoid hip flexion, limited bed rest should be given for 2-6 hours and all individual needs should be met in bed. It is recommended that the limb position be changed with support at regular intervals, especially in patients with musculoskeletal problems after PCI (33,35). A randomised controlled trial by Türen et al (20-22) investigating the effect of raising the head of the bed on back pain after PCI found that raising the head of the bed by 30° reduced back pain without increasing the risk of vascular complications (42).

Sarabi et al (2021) investigated the effect of post-PCI position changes on pain. Patients in the intervention group were placed in the supine position for two hours after PCI, and the head of the bed was gradually raised to 45° and placed in a semi-seated position for four hours. The control group was placed in the supine position for six hours. At the end of the study, patients in the intervention group had significantly less pain between 2 and 6 hours after PCI than patients in the control group (43). It is recommended that patients remain in bed for a minimum of two hours and a maximum of four hours after PCI and that the operated extremity be kept as immobile as possible (35). It is recommended that patients receiving glycoprotein IIb/IIIa inhibitors avoid mobilisation during the infusion period. There are suggestions that patients receiving bivalirudin may be mobilised two hours after catheter removal if there are no contraindications (33,34). There are studies in the literature suggesting that short-term bed rest reduces complications such as bleeding and haematoma. A network meta-analysis on this topic found that short-term bed rest after PCI was not associated with complications and that the longer the period of bed rest, the more likely patients were to experience back pain. Again, the same study suggested that mobilisation after PCI was safe (44). A study evaluating the effect of early mobilisation after PCI found that early mobilisation reduced back pain and urinary retention and increased patient satisfaction (45).

Application of Virtual Reality Goggles (VRG) and Pain Related Outcomes

Thanks to technological developments and advances, virtual reality goggles (VRG), which have found their place in the literature, are a cognitive behavioral technique recently used by healthcare professionals to reduce pain and comfort patients (24-25). When VRG is used on patients to observe landscapes such as forest, sea, space, listening to birds and water sounds, and listening to relaxing music, it slows down the transmission of pain sensations by distracting attention from the focus of pain, and pain is perceived less. At the same time, VRG use stimulates the release of endorphins, and increased endorphin release leads to an increase in pain tolerance, improved functioning of the respiratory and circulatory systems, and decreased muscle tone (46-47).

Many studies have found that the use of VRG is an effective non-pharmacological method for pain relief (48-49). In a study conducted by Çakır and Evirgen to determine the effect of using VRG to reduce pain during colonoscopy, VRG was found to be an effective method to reduce pain caused by the procedure. It was found that it can be used by nurses to manage pain during colonoscopy as it is an easily accessible, inexpensive and non-invasive method (50). In the study by Austin et al, the use of VRG application for pain relief in cancer patients during palliative care had an effect on reducing pain levels (49). According to the study conducted by Karaman et al. to determine the effectiveness of VRG application in healthy individuals by applying 260 mmHg pressure at 3-4 cm above the antecubital region of the left arm with an adult type aneroid sphygmomanometer, experimentally exposing individuals to pain for two minutes and determining the effectiveness of VRG

application in relieving this pain, VRG application was shown to be an effective method in reducing pain. As a non-pharmaceutical application, it was found to be easy to use by healthcare professionals (51). In the study by Soltani et al on pain relief using active ROM exercises for burn treatment and rehabilitation, the VRG application was found to have a positive effect on pain and patients had a positive experience and there was an increase in patient satisfaction (48). According to the results of the study, VRG, which has taken its place among non-pharmacological applications in recent years, is an approach to reducing the need for pharmacological analgesia and increasing patient comfort (48-51).

PCI, which plays an important role in the treatment of acute coronary syndromes, is an invasive procedure and causes pain to the patient (13-14). Pain activates the sympathetic nervous system. This activation leads to an increase in endogenous catecholamine activity and oxygen consumption, causing an imbalance in the circulatory and respiratory systems. In this context, a multidisciplinary approach is required to manage and reduce postoperative pain (52-53). The use of pharmacological agents in pain management is undesirable due to side effects and economic burden (13). Studies have shown that many non-pharmacological methods that support pharmacological applications, are cost-effective and have low side effects are effective in pain management (54,55-58).

The use of VRG has not been studied in patients who have previously undergone PCI. In the literature, the use of virtual reality goggles for pain relief has been used in various patient groups and found to be effective in reducing pain levels (24,50). In the study conducted by Deo et al (24) on a group of patients undergoing hysteroscopy, the use of VRG application during the procedure was found to be functional for pain relief. In the study by Çakır and Evirgen (50) on pain and anxiety, the use of VRG application during the procedure was found to reduce patients' pain scores in patients undergoing colonoscopy. A review of studies with different sample groups found that VRG application reduced pain severity, similar to the findings of this study (25, 59-60). In their systematic review, Wang et al (20-22) reported that VRG is increasingly being used as a non-pharmacological method to manage pain, reduce anxiety and improve other patient outcomes in patients undergoing surgery (60). Tashjian et al (2017) compared VRG application with computer video in hospitalised patients and reported that it was more effective for pain, suggesting that VRG application is an effective and safe adjunctive treatment for acute pain management (59). Spiegel et al (2019) found that VRG application resulted in greater pain reduction compared to a television group in 120 hospitalised patients, and reported that it is one of the most effective methods for severe pain and a non-drug option for analgesia (25). Jawed et al. used VRG application to reduce pain and prevent delirium in ICU patients and reported that it was effective (61). Vega et al. found that VRG application reduced pain in patients undergoing stem cell transplantation (62). Feyzioğlu et al (2020) reported that VRG application used in the physiotherapy programme for women with breast cancer undergoing unilateral mastectomy with axillary lymph node dissection and receiving adjuvant treatment was effective in reducing pain (63). In all elective unilateral primary total knee arthroplasty patients with preoperative adductor canal catheter insertion, Feyzioğlu et al (2017) compared the group receiving intravenous sedation according to the decision of the regional anaesthetist with the group receiving intravenous sedation and VRG. They reported that pain intensity scores were lower in the VRG group (64). Systematic reviews and studies have reported that the use of VRG has positive effects on pain, anxiety, comfort and patient satisfaction (65-66). In their systematic review, Ioannou et al. evaluated published quantitative studies that examined the effect of VRG use on four different symptoms related to the problems experienced by cancer patients from 2000 to 2020. They found that the VRG intervention was more effective than the control group (i.e. standard care) for anxiety, depression, fatigue and pain, and reported that it has become an interesting alternative in many cases (65). Chow

et al (2021) conducted a systematic review of studies that examined patients undergoing medical procedural interventions and concluded that the VRG application used had an improving effect on pain and anxiety (66).

Virtual Reality Application and Nursing in Pain Management Percutaneous Coronary Intervention

Percutaneous coronary intervention (PCI) is a commonly used revascularization method in the treatment of coronary artery disease. Following PCI, patients may experience back and waist pain due to prolonged bed rest and immobility, chest pain related to coronary artery stenosis, and local pain caused by catheter insertion during the procedure (13-14). Furthermore, it is known that pain after PCI can lead to anxiety and psychological distress (1,17). Therefore, effective pain control is of great importance. Although pharmacological agents are recommended, it has been reported that analgesics do not reduce complications and are costly (1,13). In this context, the use of non-pharmacological methods in post-PCI pain management is prominent, virtual reality glasses (VRG) application is one of these methods.

There are no studies looking at the effect of VRG on pain after PCI, but if we look at the medical procedures where VRG is used to reduce pain and anxiety, the studies are mostly in procedures such as dental procedures, injections, wound care, burn debridement, phantom pain, endoscopic procedures, chronic pain, chemotherapy procedures, suturing under local anaesthesia. In addition, the use of VRG application in rehabilitation services for geriatric patients shows successful results (47, 67). Prabhu et al. found a reduction in pain, anxiety and vital signs (especially pulse and respiratory rate) in patients after surgery using VRG application prepared according to the Attention Attraction Theory (68). Mladenovic and Djordjevic, in their clinical trial of 24 patients undergoing tooth extraction under local anaesthesia, reported that the use of VRG was effective in reducing pain, anxiety and pulse rate in patients (69). In a study conducted by Deo et al. on a group of patients undergoing hysteroscopy, the use of VRG application during the procedure was found to be functional in terms of pain relief (24). In Çakır and Evirgen's study on pain and anxiety, the use of VRG application during the procedure in patients undergoing colonoscopy was found to reduce patients' pain scores (50).

It is now widely accepted that pain is not only a direct output of nociceptive input, but also a sensory and emotional experience, and non-pharmacological treatment strategies are becoming increasingly important (70). VRG application is used as a non-pharmacological treatment option to reduce acute and chronic pain. Specifically, it is hypothesised that VRG application distorts the value of negative emotions associated with previous pain experiences and provides the user with the experience of being in a relaxing and pleasant environment, thus reframing the situation in a positive way. The more attention is focused on the VRG application, the less attention is paid to the pain (59). In the hospital setting, VRG intervention offers unique opportunities to improve pain and reduce opioid exposure in procedural and surgical care, thus interrupting the evolution of opioid overuse with the transition from acute to chronic pain (25).

In the clinical setting, VRG can reduce pain intensity, distress and anxiety by targeting an individual's emotional pain pathways and altering the processing of pain signals in the central nervous system (60). Cognitive behavioural therapy (CBT) plays an important role in preventive health care, is cost-saving, and can be an excellent choice for pain management, especially when there are concerns about drug dependence (47). VRG, a component of CBT, VRG uses distraction techniques such as humour, relaxation, music and imagery to reduce physical and psychological symptoms. By manipulating the environment, it creates an effective emotion-focused coping strategy by shifting the focus of attention away from unpleasant stimuli (60). For many years, nurses have used a variety of strategies to manage physical, social, emotional and psychological symptoms in patients. As virtual reality technology has become more

cost-effective, comprehensive, flexible, portable and proven to be effective for patients, it is becoming more preferred in nursing interventions (71).

The integration of VRG applications following PCI into nursing care may play a potentially significant role in the management of pain and anxiety. Although there are no direct nursing studies on the use of VRG specifically for PCI, the effectiveness of VRG in other invasive and painful procedures, along with nurses' experience in non-pharmacological interventions, suggests that this application can be used safely and effectively in post-PCI care (24,47,50,68,71). Nurses inform the patient before initiating VRG, monitor their comfort and level of attention, regularly assess pain and anxiety scores, and adjust the duration or content of the application as needed. In addition, the condition of the insertion site and vital signs are monitored to observe for possible side effects. VRG should be applied in conjunction with pharmacological and other non-pharmacological pain management strategies. This comprehensive approach enables VRG to be used as an effective non-pharmacological method for managing both physical and psychological symptoms. However, the lack of clinical studies evaluating the effectiveness of VRG applications and nursing interventions after PCI highlights the importance of future research and may provide important information in terms of both patient safety and improving the quality of care.

CONCLUSION AND RECOMMENDATIONS

It is known that VRG application has a positive effect on pain management after percutaneous coronary intervention and contributes to the patient's overall well-being and satisfaction. In order to prevent the widespread use of VRG application, which is one of the non-pharmacological methods, by patients in recent years, to ignore the side effects/allergies of analgesics and to prevent unconscious use, it is important that health professionals who care for and educate patients have knowledge about VRG application in pain management after percutaneous coronary intervention. It is considered that there is a need for studies of high methodological quality to reflect the use of VRGs in the management of pain after percutaneous coronary intervention in nursing practice and to contribute to the literature on this topic. In addition, it is recommended to provide in-service training on the use of VRGs as one of the non-pharmacological methods and to increase awareness by sharing with health professionals the results of studies on the impact of complications of drug treatment on the economy, health and workload in the health care process and the benefits of using VRGs in the management of pain after percutaneous coronary intervention.

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Conflict of Interest Statement

None of the authors have a financial relationship with a commercial entity that has an interest in the subject matter of this manuscript.

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