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Effect on music therapy on quality of recovery and postoperative pain after gynecological laparoscopy

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Abstract

Background: Music therapy is safe, inexpensive, simple, and has relaxing properties for mental and physical capacities, as well as few side effects. Moreover, it improves patient satisfaction and reduces postoperative pain. Thus, we intended to evaluate the effect of music intervention on the quality of comprehensive recovery using quality of recovery 40 (QoR-40) survey in patients undergoing gynecological laparoscopic surgery.

Methods: Patients were randomly assigned to music intervention group or control group: 41 patients each. After anesthetic induction, headphones were placed on the patients, and then classical music selected by an investigator was started in the music group with individual comfortable volume during surgery, while the player was not started in the control group. On postoperatively 1 day, the QoR-40 (5 categories: emotions, pain, physical comfort, support, and independence) survey was evaluated, while postoperative pain, nausea, and vomiting were assessed at 30 minutes and 3, 24, and 36 hours postoperatively.

Results: Total QoR-40 score was statistically better in the music group, and among the 5 categories, the music group had a higher pain category score than the control group. The postoperative pain score was significantly lower in the music group at 36 hours postoperatively, although the requirement for rescue analgesics was similar in both groups. The incidence of postoperative nausea did not differ at any time point.

Conclusion: Intraoperative music intervention enhanced postoperative functional recovery and reduced postoperative pain in patients who underwent laparoscopic gynecological surgery.

Abbreviations: NRS = numeric rating scale, PACU = postanesthetic recovery unit, QoR-40 = quality of recovery-40.

Keywords: gynecological surgery, music therapy, pain, postoperative, quality of recovery

1. Introduction

Postoperative pain control is a main cornerstone of patients undergoing surgery. Well-controlled pain improves the quality of comprehensive recovery and facilitates a quick return to daily life. Opioids have been predominantly used to control postoperative pain; however, multimodal pain management (pharmacological and/or nonpharmacological) has been recommended to reduce opioid-related complications, such as nausea, sedation, and respiratory depression.

Among the various nonpharmacological techniques, music therapy has been of interest in the field of perioperative pain and anxiety control.[1] While any analgesic regimen has potential side effects, music interventions have few side effects. This treatment is safe, inexpensive, simple, and has relaxation properties for mental and physical capacities. In addition to alleviating postoperative pain, many studies have shown numerous benefits with regard to improved patient satisfaction and reduced intraoperative awareness, postoperative nausea, and vomiting.[2] However, the efficacy of music interventions remains controversial. Some studies have shown its beneficial analgesic effects,[3] while others have shown that it has limited effects.[4]

To date, no study on the effect of music intervention has been performed in patients undergoing gynecological laparoscopic surgery. Moreover, no study has examined recovery quality via patient-reported supervision, quality of recovery-40 (QoR-40), or music therapy. Therefore, we evaluated the effect of music intervention on comprehensive recovery quality and postoperative pain in patients undergoing gynecological laparoscopic surgery.

2. Material and Methods

This study was conducted after obtaining approval from the institutional review board of our hospital (YUMC-2019-09-052) and informed consent from the patients. This study

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The authors have no conflicts of interest to disclose.

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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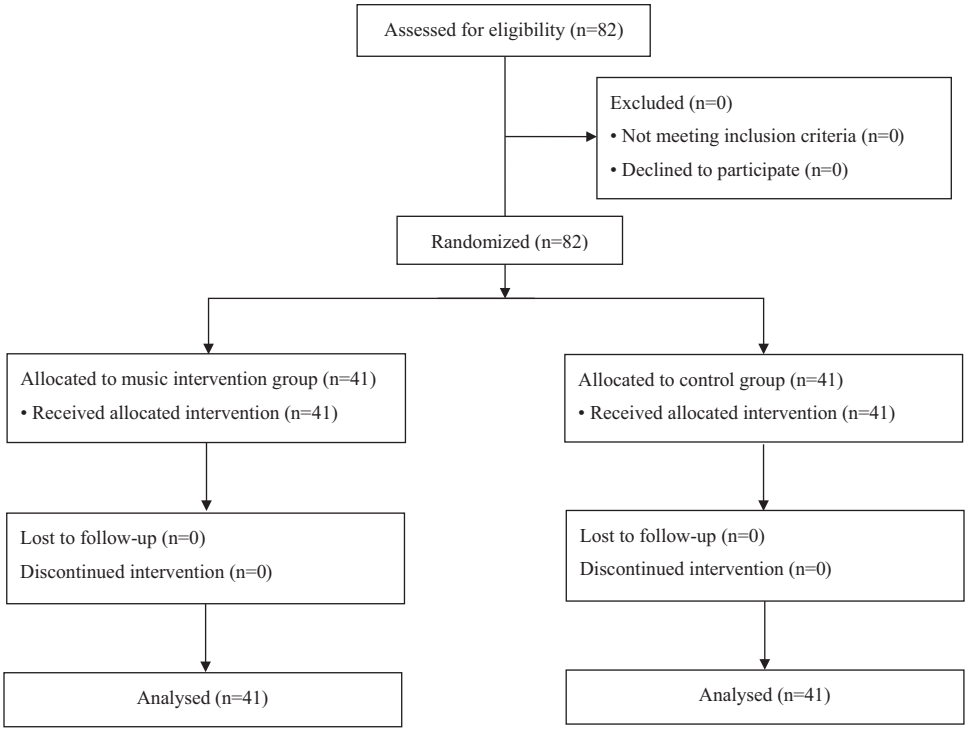

Figure 1. Flow diagram for the study.

was registered in ClinicalTrials.gov (registration number: NCT05320783). Using a prospective, randomized, controlled clinical protocol, 82 patients (aged 20–65 years), American society of anesthesiologists physical status I and II, undergoing gynecological laparoscopic surgery were included in the study. The exclusion criteria were as follows: any hearing impairment, known psychiatric or memory disorder, alcohol or analgesic abuse, and inability to complete the questionnaires.

Patients were allocated to the music intervention group (group M, n = 41) or control group (group C, n = 41) using a random number sequence, which ensured adequate concealment. The patients did not receive any premedication. Routine monitoring was initiated, and anesthesia was induced with propofol and maintained with sevoflurane in 50% oxygen/air, with an adjuvant infusion of remifentanil to maintain intraoperative bispectral index values (40–60) and hemodynamic stability.

After induction, headphones were placed on each patient. The classical music selected by the investigator was started in group M patients with an individual comfortable volume. Preoperatively, each patient was asked to choose a comfortable sound volume. The sound was maintained throughout the surgical procedure. Likewise, headphones were also placed on patients in group C, but the player was not started. Approximately 30 minutes before the completion of surgery, ketorolac and ramosetron were administered for postoperative pain and nausea control, respectively. All anesthetics, including sevoflurane, were discontinued at the end of the surgery, and residual neuromuscular blocking was reversed. Tracheal extubation was performed, and the patient was transferred to the postanesthetic recovery unit (PACU).

In the PACU, postoperative pain was assessed using a numeric rating scale (NRS, 0–10) at 30 minutes. At 3, 24, and 36 hours postoperatively, the pain score was also assessed using NRS in the ward. Rescue analgesics (fentanyl 50 μg) were administered when the NRS score was > 4 or patients requested. The incidence of nausea and vomiting was measured at 30 minutes and 3, 24, and 36 hours after surgery, and a rescue drug, metoclopramide 10 mg, was administered, if needed. An anesthesiologist who was blinded to the study protocol estimated the overall data.

At 24 hours postoperatively, QoR-40 was surveyed by an anesthesiologist who was not assigned to the patient group. The questionnaire contained a total of 40 items regarding the quality of recovery that were classified into 5 dimensions, namely, emotion, physical comfort, psychological support, physical independence, and pain, comprising 9, 12, 7, 5, and 7 items, respectively. Each item was rated on a 5-point scale, with the sum scores ranging from 40 (poor quality of recovery) to 200 (excellent quality of recovery).

2.1. Statistical analysis

According to our preliminary study on the quality of recovery using QoR-40, the effect size in the control group was 0.769. The average difference in the total QoR-40 score of 10 points was considered a clinically relevant effect.[5] The estimated sample size was 37 patients, with a power of 90% with an α error of 5%. A total 82 patients were selected to consider possible dropouts. Statistical analyses were performed using SPSS version 23.0 (Chicago, Armonk, NY). The *t* test was used to compare continuous data, and the chi-squared test or Fisher exact test was used to compare categorical data. Continuous data are expressed as mean ± standard deviation, whereas categorical data are expressed as numbers (%). Statistical significance was set at $P < .05$.

3. Results

A total 82 patients were enrolled and assigned to 2 groups, each comprising 41 patients (Fig. 1). The patients demographic and baseline characteristics (age, height, weight, duration of surgery, and anesthesia) are shown in Table 1. There were no clinically significant differences in the baseline data.

Postoperative pain score was significantly lower in the music intervention group 36 hours after surgery ($P = .002$); however, there were no significant differences at other time points

(Table 2). The requirement for rescue analgesics was similar in both groups at 30 minutes and 3, 24, and 36 hours postoperatively (Table 3). Similarly, the incidence of postoperative nausea did not differ at each time point (Table 4). The QoR-40 scores for both groups are presented in Table 5. The total QoR-40 score was significantly higher in the music intervention group (P = .043). Among the 5 categories, the pain category showed a significant score difference between the 2 groups. Compared to the control group, the music group had a higher pain score (P = .003). Except for pain, the scores of other categories in both groups (emotional state, physical comfort, psychological support, and physical independence) did not show clinically significant differences.

4. Discussion

We assessed the effects of music during surgery on postoperative recovery quality using QoR-40 questionnaires, and postoperative pain after gynecological laparoscopic surgery. Our results showed that the pain category scores in the QoR-40 and total QoR-40 scores were higher in the music group. However, the difference in scores in other categories, except pain, were not statistically significant, although overall scores were higher in the music group. In terms of postoperative pain, the NRS score was higher 36 hours after surgery in the music group; however, neither of the music interventions had any effect on the requirement for rescue analgesics and postoperative nausea.

Pain management after surgery has been emphasized with regard to fast recovery and a decreased risk of complications. Regarding the optimization of postoperative pain, numerous strategies, such as the development of novel analgesics, minimally invasive surgery techniques, and multimodal opioid-sparing analgesia, have been investigated.[6] In the context of gynecological laparoscopic surgery, despite being a minimally invasive surgery, patients experience somatic, visceral, and neuropathic pain, this slows recovery, delays discharge, and interferes with patients return to normal activities.[7] Moreover, pain after minimally invasive surgery has been reported in up to 80% of patients undergoing gynecological laparoscopic procedures.[7] Thus, multimodal therapeutic methods (pharmacological and/or nonpharmacological) might be a better choice for controlling postoperative pain related to gynecological laparoscopic surgery, as well as to achieve a balance between analgesia and side effects.

Music intervention is a simple and safe adjuvant therapeutic method that has been studied in the field of postoperative recovery and shown to have numerous beneficial effects, including improved patient satisfaction and reduced perioperative pain, anxiety, stress, nausea, and vomiting.[8,9] Owing to the above benefits, various positive effects have been demonstrated, including attenuation of intraoperative awareness, stability of vital signs, and reduced cortisol levels.[10,11] Music is an intentional auditory stimulus with organized elements. Music therapy facilitates the management of perioperative adverse sequelae in clinical settings.[12] Music therapy may also benefit patients both physiologically and psychologically. With regard to physiological benefits, music changes the neuronal activity in the cortical and lateral temporal areas devoted to movement, and increases heart rate variability and cardiac autonomic balance.[13,14] In a stressful environment, cortisol levels were lower in the music intervention group,[15] and mu-opioid receptors were affected by music.[16] Furthermore, many previous articles have shown that music therapy has beneficial effects on psychological outcomes (improvement of mood and reduction of anxiety) and is devoid of side effects in patients undergoing surgery.[17,18]

The effects of music therapy on pain can be explained by several possible mechanisms. Attenuated central transmission of nociceptive stimuli due to auditory pathway activation may result in reduction in the perception of pain impulses.[19] Moreover, reduced autonomic nervous systems, such as decreased blood pressure, heart rate, and respiration rate, might be explained as a potential music effect on pain.[14] Finally, the stimulation of endogenous opioid signaling and action on psychomotility may affect the analgesic effects of music.[9,20] In this study, music intervention significantly reduced pain intensity during the recovery period. This result is consistent with those of other studies that showed the analgesic effects of music after surgery.[2,21] Moreover, a study by Li et al[22] revealed that music had long-term positive effects on pain alleviation in patients who underwent radical mastectomies.

As described above, music therapy can be used easily and feasibly in surgical settings. Sufficient research has shown the

Table 1

Demographic and baseline characteristics.

	Group M (n = 41)	Group C (n = 41)	*P* value
Age (yr)	46.4 ± 11.8	48.3 ± 13.8	.505
Height (cm)	160.1 ± 6.1	159.1 ± 5.6	.523
Weight (kg)	60.9 ± 12.3	58.8 ± 8.2	.369
Duration of surgery (min)	49.5 ± 17.7	52.5 ± 19.7	.471
Duration of anesthesia (min)	77.1 ± 17.1	83.1 ± 22.3	.170

Values are presented as mean ± standard deviation.
Group C = control, Group M = music.

Table 2

Postoperative pain during the first 24 hours after surgery.

	Group M (n = 41)	Group C (n = 41)	*P* value*
Pain score			
30 min	5.66 ± 1.08	5.82 ± 1.07	.476
3 h	2.24 ± 0.53	2.41 ± 0.54	.158
24 h	1.46 ± 0.67	1.59 ± 0.59	.386
36 h	1.07 ± 0.26	1.34 ± 0.48	.002*

Values are presented as mean ± standard deviation.
Group C = control, Group M = music.
* Statistically significant at P value < 0.05.

Table 3

Rescue analgesics during the first 24 hours after surgery.

	Group M (n = 41)	Group C (n = 41)	*P* value
Rescue analgesics			
30 min	25 (61.0)	23 (56.1)	.823
3 h	40 (97.6)	38 (92.7)	.616
24 h	37 (90.2)	33 (80.5)	.349
36 h	31 (75.6)	27 (65.9)	.467

Values are presented as number (%).
Group C = control, Group M = music.

Table 4

Postoperative nausea and vomiting.

	Group M (n = 41)	Group C (n = 41)	*P* value
PONV			
30 min	1 (2.4)	2 (4.9)	1.000
3 h	3 (7.3)	9 (22)	.116
24 h	7 (17.1)	12 (29.3)	.295
36 h	1 (2.4)	2 (4.9)	1.000

Values are presented as number (%).
Group C = control, Group M = music, PONV = postoperative nausea and vomiting.

Table 5

Quality of recovery-40 scores on post operative day 1.

QoR-40 dimensions	Group M (n = 41)	Group C (n = 41)	*P* value
Emotional state	37.60 ± 5.13	35.87 ± 6.13	.170
Physical comfort	49.12 ± 5.84	47.43 ± 8.74	.309
Psychological support	32.75 ± 3.62	31.26 ± 4.96	.125
Physical independence	19.78 ± 4.10	19.17 ± 4.81	.539
Pain	29.63 ± 4.16	26.34 ± 5.55	.003*
Total QoR-40 scores	168.90 ± 17.0	160.09 ± 21.46	.043*

Values are presented as mean ± standard deviation.
Group C = control, Group M = music, QoR-40 = quality of recovery-40.
* Statistically significant at *P* value < 0.05.

availability of music for patients undergoing operative procedures. Here, the selection method, intervention time, and volume of music were considered. All types of music had similar physiological effects.[2,3] However, in 2 large meta-analyses evaluating music intervention for postoperative recovery, anxiety, and pain during surgery, individual music preference played an important role in the positive effect of music therapy.[1,9] Music intervention timing (pre-, intra-, and postoperative) did not lead to much differences in outcomes, and the appropriate volume to be used is also unclear.[9] In this study, music selection was restricted to comforting classical music, which was chosen by the investigator and administered intraoperatively at a volume that was comfortable for each patient.

Recovery quality after general anesthesia has focused on assessing various physical and psychological indices, such as awakening time, PACU stay time, or adverse complications (pain, nausea, confusion, or fatigue). However, a patient comprehensive perception of their outcome may represent an important point in clinical studies. Therefore, we evaluated QoR-40, which is a useful outcome measure in perioperative settings, and for assessing functional recovery quality.[24] In this study, not only were total QoR-40 scores higher in the music intervention group, but also pain among the 5 clinically relevant dimensions of QoR-40 was most affected by music therapy. This result was consistent with pain NRS scores during the recovery period (36 hours after surgery).

This study has some limitations. First, we did not check the preoperative baseline anxiety levels. Preoperative anxiety is associated with pain perception, and this could affect the quality of recovery.[25] Second, the music choice was limited to 1 type and chosen by the investigator, which may have hindered the effects of music. In a large meta-analysis, although the music effect does not seem to be associated with a specific music type, patient-preferred music from a list provided is an important factor as an aid for postoperative recovery.[9] Further studies allowing music choice based on patient preferences are needed.

In conclusion, intraoperative music intervention enhanced postoperative functional recovery and reduced postoperative pain scores in patients who underwent laparoscopic gynecological surgery.

Author contributions

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Project administration: Eun Kyung Choi.
Supervision: Eun Kyung Choi.
Writing – original draft: Eun Kyung Choi.
Writing – review & editing: Jongyoon Baek, Deokhee Lee, Do young Kim, Eun Kyung Choi.

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