

Research Article

EFFECT OF MUSIC AND THERAPEUTIC SUGGESTIONS UNDER GENERAL ANESTHESIA ON POST-OPERATIVE ANALGESIC AND ANTI-EMETIC OUTCOMES.

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ABSTRACT

A double blind randomized study was done to study the effect of intraoperative music and positive therapeutic suggestions on post-operative analgesic requirements and postoperative nausea and vomiting. We found that rescue analgesic given in twenty four hour was significantly less in music group as compared to control group. However the study didn't confirm the effect of music and therapeutic suggestion on postoperative antiemetic outcome.

Key words: Music, General Anesthesia, Rescue Analgesia, Nausea, Vomiting

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INTRODUCTION

“For all the happiness mankind can gain is not in pleasure but in rest from pain” John Dryden

Music for a long time has been shown to have characteristic psychological and physiological effects on human beings. In recent years investigators from fields like health psychology, behavioral medicine and newer fields of psychoneuroimmunology have provided data that explains how mind and body may interact as a whole to influence the recovery in the postoperative period¹.

Various studies have used music therapy as an intervention for preoperative anxiety, to reduce the need for intraoperative analgesia, to reduce postoperative morbidity like pain in the postoperative period, post-operative nausea and vomiting and depression.

Until recently, it has been assumed that general anesthesia renders patients oblivious to sensory events. However research suggests that, even when the depth of anesthesia is adequate, some processing of intraoperative events can occur. This registration of events, seem to affect patient morbidity in the postoperative period¹.

Hence, music and positive therapeutic suggestions may prove beneficial in patients under general anesthesia because auditory evoked potentials are found to be intact even in deeper planes of anesthesia.

The most commonly used methods for management of pain and nausea, vomiting in the postoperative period are as follows.

- For Post-Operative Nausea Vomiting (PONV)
 - Antacids
 - Antiemetics

- For pain relief in post-operative period --Narcotics
 - NSAIDs
 - Regional blockade or central neuraxial blockade
 - Local anesthetic agents.

All these commonly used methods have their own drawbacks and side effects. These range from hypotension, respiratory depression to life threatening anaphylactic reactions. Therefore various alternate methods are being studied.

On this background, music and positive therapeutic suggestions if used as an intervention during intraoperative period may prove to be more beneficial if found to be therapeutically effective, in the management of patient morbidity in postoperative period.

Music and positive therapeutic suggestions being non pharmacological method will obviously have no side effects which are associated with drug therapies. This method if found to be effective can be used on routine basis without being worried about patient's safety and complications.

It will certainly help in decreasing patient morbidity in the postoperative period and speeding patient recovery. Our study was done to study the effect of intraoperative music and positive therapeutic suggestions on post-operative analgesic requirements and postoperative nausea and vomiting.

SUBJECTS AND METHODS

The present study was conducted in attached teaching hospital after the approval by the ethical committee.

SELECTION OF PATIENTS

Inclusion Criteria

Study included patients of both sexes belonging to American Society of Anesthesiologists (ASA) grade I and II with age group 20-45 years scheduled for an elective surgery lasting from 1-3 hour requiring general anesthesia with endotracheal intubation and with patient having good understanding of local vernacular language.

ASA physical status classification system²

ASA-I: A normal healthy patient.

ASA-II: A patient with mild systemic disease.

ASA-III: A patient with severe systemic disease.

ASA-IV: A patient with severe systemic disease that is a constant threat to life

ASA-V: A moribund patient who is not expected to survive without the operation.

ASA-VI: A declared brain-dead patient whose organs are being removed for donor purposes.

E: If the surgery is an emergency, the physical status classification is followed by "E"

Exclusion Criteria

- Hearing defect.
- Language barrier.
- Psychiatric illness or memory disorders.
- Known addictions like alcohol consumption and drug abuse.
- Patient undergoing head, face and neck surgeries due to technical difficulties in using headphones.

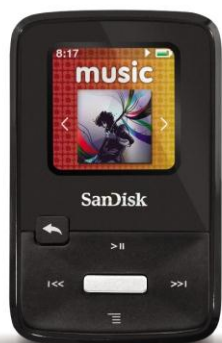
Methodology of Study.

A written informed consent was taken from each patient undergoing elective surgery.

Study was carried out by randomly allocating patients in two groups of 50 patients each.

-Group A- Will hear a tape with routine operating sounds from a previously recorded surgical operation.

-Group B- Will hear music with positive therapeutic suggestions. All patients satisfied ASA inclusion criteria.



Photograph.No.1 SanDisk Sansa Clip Zip



Photograph.No.2 Audio Technica ATH-T200

Patients were kept nil by mouth overnight and were premedicated in the preoperative room with Inj Glycopyrrolate 0.01 mg/kg intramuscular 30 minutes prior.

On arrival of the patients in the operating room, baseline vital signs were recorded and intravenous access were secured. Inj ondansetron 0.15 mg/kg IV was given to each of these patients. After pre-oxygenation for 3 min, preinduction was done by Inj fentanyl 2µg /kg IV, Inj midazolam 0.02 mg/kg IV, and induction by Inj thiopental sodium 5-7 mg/kg IV. Tracheal intubation with suitable sized cuffed endotracheal tube was facilitated with Inj succinylcholine 1.5-2 mg/kg IV.

Intraoperatively anesthesia was maintained with nitrous oxide in oxygen and titrated isoflurane concentration to maintain an acceptable PRST³ score and a non-depolarizing muscle relaxant like Inj Vecuronium.

Bain's circuit was used to provide intermittent positive pressure ventilation. Patients were applied with headphones (Audio Technica ATH-T200) (**photograph.no.2**) which covered the whole ear such that no sound from operation theatre would leak in.

The patient, anesthetist, surgeons and nurses were blinded to tape selection. Each tape (SanDisk Sansa Clip Zip) (**photograph.no.1**) were set on auto reverse mode and were played continuously from the time of skin incision to the time of wound closure.¹ The sounds were not audible to anyone in the immediate area. All the patients had headphone that covered the whole ear such that no sounds from the operation theatre could leak in.

The patient in Group B listened to music^{4, 5} composed of the sounds of waterfall, ocean waves, thundering rainstorms accompanied by relaxing and encouraging suggestion recorded in a male voice. The taped voice suggested a feeling of relaxation, security, absence of nausea, emesis and pain and encouraging a reduction in discomfort, quick healing and a quick recovery.

The control group listened to tape with operating room sounds, a playback from a previously recorded surgical operation. Each tape was set on an auto-reverse mode and played continuously from the time of skin incision to the time of wound closure.

Routine monitoring included continuous ECG, pulse oximetry, capnography and non-invasive blood pressure measurements^{1, 6}. Standard operating room temperature were maintained throughout the procedures. Clinical signs of shallow anesthesia (increase in blood pressure, heart rate, sweating and tearing) in conjunction with surgical stimulation were used.⁷

PRST score (pressure, rate, sweating, tears) were used for the detection of inadequate depth of anesthesia. The control parameter value that is before the induction. Adding up the points of all four parameters determines the total amount which can range from 0 to 8. There is inadequate depth of anesthesia if score is more than three.³

At the end of operation, neuromuscular relaxation was reversed with Inj neostigmine 0.04/kg IV and Inj glycopyrrolate 0.01/kg IV. Patients were extubated when extubation criteria meet. All the patients were kept in recovery room (PACU) for 2 hr before getting shifted to ward. These patients were followed until twenty four hour. Patients were evaluated for postoperative nausea and vomiting and pain intensity by every hour for 1st two hour. Thereafter at the 6th, 18th and at 24th hour.

Pain intensity was estimated by the visual analogue scale (VAS) where 0 represents no pain to maximal possible pain (=10).^{1,6}

Postoperative nausea and vomiting were evaluated on a 4 grade scale (no nausea, mild nausea, moderate nausea and severe nausea).^{1,6}

Twenty four hour consumption of analgesic and antiemetic were noted. Rescue analgesic were given when VAS score was ≥ 4 . Analgesic used were diclofenac sodium AQ 75 mg in pint and additionally tramadol 50 mg intravenously if required. Rescue antiemetic used was metoclopramide 0.25 mg/kg IV on demand.

On the second day patients were interviewed regarding recall of hearing either music or therapeutic suggestions intra-operatively.^{1,6}

Unpaired T test was used. A 'P' value of less than 0.05 was considered statistically significant.

RESULTS

The two study groups were as follows. Group A: Control group listening a tape with routine operating sounds from a previously recorded surgical operation.

Group B: Music group listening music with positive therapeutic suggestions.

Table. No. 1. Comparison of head phone time (in minutes) in Group A and Group B.

	Number of patients	Headphone Time (Mean \pm SD)	p-value
Group A (Control)	50	115.38 \pm 39.19	0.058
Group B (Music)	50	103.3 \pm 33.09	

Graph. No. 1. Mean Headphone time in Group A & Group B

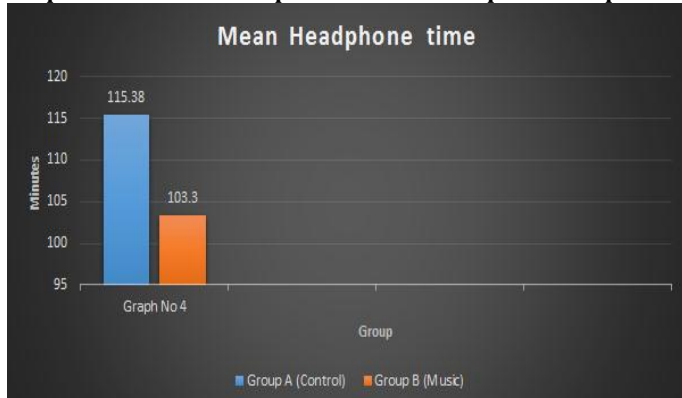


Table.No.1 and Graph.No.1 show the mean and standard deviation of headphone time of the patients in group A and group B. The mean headphone time of patients in Group A was 115.78 min with a standard deviation of 39.18 min and the mean headphone time of patients in group B was 103.3 min with a standard deviation of 33.09 min. This difference between the headphone time of the patients in Group A and Group B was not statistically significant since p value is 0.058.

Table. No. 2. Comparison of PRST score in Group A and Group B.

	Number of patients	PRST score (Mean \pm SD)	p-value
Group A (Control)	50	0.144 \pm 0.177	0.089
Group B (Music)	50	0.105 \pm 0.110	

Graph. No. 2. Mean PRST score in Group A & Group B

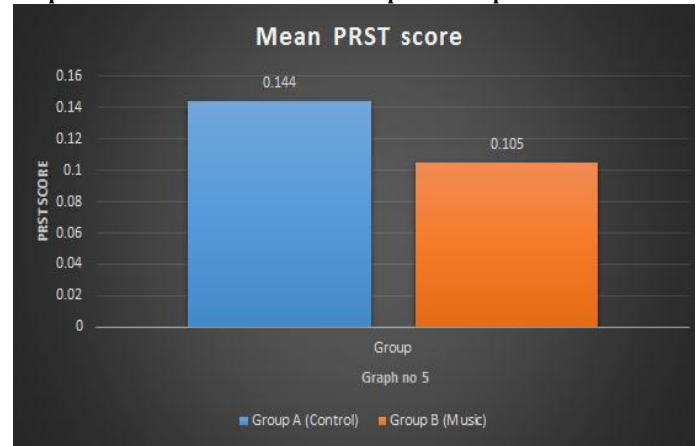


Table.No.2 and Graph.No.2 show the mean and standard deviation of PRST score of the patients in group A and group B. The mean PRST score of patients in Group A was 0.144 with a standard deviation of 0.177 and the mean PRST score of patients in group B was 0.105 with a standard deviation of 0.110. This difference between the PRST score of the patients in Group A and Group B was not statistically significant since p value is 0.089.

Table. No. 3. Comparison of Rescue Analgesic given in 24 hr. in Group A and Group B.

	Number of patients	Rescue Analgesic (Mean \pm SD)	p-value
Group A (Control)	50	2.92 \pm 0.804	8.781E-09
Group B (Music)	50	1.7 \pm 0.839	

Graph. No 3. Mean Rescue Analgesic given in 24 hr. in Group A & Group B

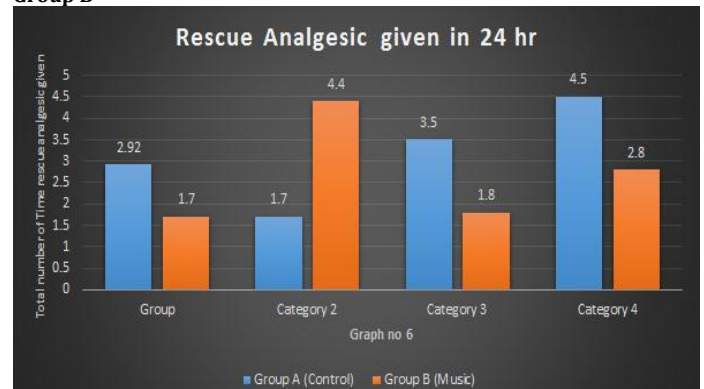


Table.No.3 and Graph.No.3 show the mean and standard deviation of Rescue analgesic given in group A and group B. The mean of Rescue analgesic given in 24 hr. in Group A was 2.92 with a standard deviation of 0.804 and the mean of Rescue analgesic given in 24 hr. in group B was 1.7 with a standard deviation of 0.839. This difference between the rescue analgesic given to the patients in 24 hr. in Group A and Group B was statistically significant since p value is 8.781E-09.

RESULTS

- Age, weight and sex were similar in the two group.
- Headphone time and intraoperative PRST scores were similar in the two groups.
- Rescue analgesic given in twenty four hour was significantly less in music group as compared to control group.

- Rescue antiemetic given in twenty four hour were nil in the two group.
- The incidence of intraoperative awareness in the two groups was nil.
- No complication was seen in the two group.

DISCUSSION

Recovery after surgery has focused on pharmacological interventions to minimize patient discomfort during the postoperative period. Our study tentatively looked upon a role for non-pharmacological intervention.

Efficacy of preoperative intervention with music as anxiolytic has been reported⁸. Several other studies have suggested efficacy of intraoperative music intervention on postoperative pain^{1, 6, 9, 10, 11, 12, 13} and also on intraoperative analgesia^{14, 15}. The efficacy of postoperative intervention with music on postoperative pain has also been reported^{16, 17}.

Regarding intraoperative music interventions, our results are different from several studies that did not show positive effects.^{7, 18} The discrepancy between these studies and our one could perhaps depend on the quality and type of music that was played. In our study we played a relaxing and calming music developed for relaxation.^{1, 4, 5}

Kliempt et al found that a combination of synchronized hemispheric sound and positive verbal suggestions reduced the need for intraoperative analgesia compared to patients listening to classical music or blank tapes. However they do not discuss the postoperative requirements.¹⁴

Ariane K. Lewis et al improved on the accuracy of Kliempt et al., who showed that listening to Hemi-Synchronised music during surgery greatly decreased the intraoperative analgesia requirement.¹⁵

In the present study a randomized double blind controlled study was conducted in two groups of 50 patients. Group A listened a tape with routine operating sounds from a previously recorded surgical operation and Group B listened music with positive therapeutic suggestions.

Out of 50 cases in Group A, 24 were males and 26 were females. In Group B, 20 were males and 30 were females. The difference between proportion of gender in group A and group B was not significant (Table no .1). The mean age of patients in group A was 35 years and that of group B was 32.56 years. (Table no.2). This difference was not statistically significant. The mean weight of patients in group A was 52.56 kg and mean weight of patients in group B was 54.98 kg. (Table no.3). This difference was statistically insignificant. The mean headphone time of patients in group A was 115.38 min and mean headphone time of patients in group B was 103.3 minutes. (Table no.4). This difference was statistically insignificant. The mean patient response to surgical stimulus (PRST) score in group A was 0.144 and that of group B was 0.105 (Table no .5). This difference was not statistically significant.

M.Marroof et al, L.H.J Eberhart et al and A.H Lebovits et al also reported similar results.^{19, 20, 21}

Lakshmi Jayaraman et al in 2006 studied the effect of intraoperative music therapy or positive therapeutic suggestions during general anesthesia on postoperative outcome. The result showed that soothing music does make the patient more in the positive frame of mind and

decreases the requirement of antiemetic and analgesic requirement in the postoperative period.⁶

U. Nilsson et al observed that patients listening music and therapeutic suggestions during general anesthesia required less rescue analgesic and at discharge they were less fatigued than control. No difference were noted in nausea, emesis, bowel function, well-being or length of hospital stay between the two groups.¹

The results of the present study suggest that music and therapeutic suggestion during general anesthesia have beneficial effect on postoperative outcome. In this study, patients in the music and therapeutic suggestion required significantly less rescue analgesia in the first 24 hour in the postoperative period. The mean rescue analgesic given in 24 hours in group A was 2.92 ampoules of diclofenac sodium and that given in group B was 1.7 ampoules of diclofenac sodium (Table no. 6). This difference was statistically significant.

In this study we didn't see any episode of postoperative nausea and vomiting in the control group. In the music group too we didn't see any episode of postoperative nausea and vomiting. This may be explained by preoperative medication with antiemetic as per our institutional protocol. Failure to improve postoperative nausea and vomiting with intraoperative therapeutic suggestions has been reported by other studies.^{7, 22}

Schwender et al.²³ demonstrated evidence for the preservation of intraoperative auditory perception during general anaesthesia by measuring auditory evoked responses that reflected the integrity of hearing ability. They showed that hearing ability is well maintained at clinical concentrations of general anaesthetic agents, which is in good agreement with other clinical findings indicating the presence of subconscious memory through auditory input following general anaesthesia. H.L.Bennett et al²⁴ demonstrated that patients listening to suggestion of importance of touching their ear during a postoperative interview significantly touched their ear and they did so more frequently on postoperative interview. J.A Hughes et al²⁵ demonstrated that patient listening active message designed to encourage give up smoking under general anesthesia had significantly stopped or reduced their smoking one month later.

The gate control theory is based on fact that pain is an integrated sensory, affective, motivational system that modulates noxious input and attenuates the perception of nociceptive inputs. It has been suggested that pain and auditory pathway inhibit each other. Perhaps the activation of auditory pathway by music during surgery inhibits the central transmission of nociceptive stimuli.⁶

The incidence of intraoperative awareness under general anesthesia is in the range of 0.1 to 0.2% and this may be associated with dissatisfaction, nightmares, anxiety and delayed or permanent mental disturbances²⁶. Monitoring techniques allegedly able to identify intraoperative wakefulness has been proposed.^{3, 27}

However, monitoring techniques such as Bispectral index or mid latency auditory evoked potentials were not used in this study. In our study adequacy of anesthesia was adjusted according to clinical signs. The inhalational anesthetic agent isoflurane was adjusted to keep pulse and blood pressure within an acceptable limit²². The incidence of intraoperative awareness in the present study was nil as evident by interview done on second day

regarding recall of hearing either music or therapeutic suggestions intra-operatively.

B. Bonke et al and Carlton Evans et al demonstrated that patients listening to positive therapeutic suggestion under general anesthesia protected patients against prolonged post-operative stay in hospital.^{9,11}

M. Tsuchiya et al concluded that relaxing intraoperative natural sound blunts hemodynamic change at the emergence and increases the acceptability of anesthesia to the patients.²⁸

New data has also been provided that explains how the mind and body may interact as a whole to influence healing and the immune system^{29,30} and also to increase immunoglobulin levels during suggestion.

For patients undergoing surgery it should be recognized that they are sometimes subjected to potentially adverse and threatening operative theatre events and conversation. Noises associated with standard procedures such as opening a package of surgical instruments and alarms attached to monitors can be very frightening to the patient. Listening to music in the operative theatre masks such unpleasant ambient noise.²⁸

In our opinion, music with therapeutic suggestions should be offered to surgical patients because the technique is inexpensive, non-pharmacological, and non-invasive and has beneficial effects with no side effects.

SUMMARY AND CONCLUSION

This study was carried out to compare the effect of music with therapeutic suggestion under general anesthesia on postoperative rescue analgesic and antiemetic outcome with control group listening the operative theatre sounds.

We found that rescue analgesic given in twenty four hour was significantly less in music group as compared to control group.

In conclusion, this double-blind, randomized, controlled trial has shown that music in combination therapeutic suggestion during surgery under general anesthesia have a beneficial effect on postoperative rescue analgesic doses.

However the study didn't confirm the effect of music and therapeutic suggestion on postoperative antiemetic outcome.

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