Postoperative Analgesic Effects of Favorite Music After Cesarean Delivery Under General Anesthesia

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Postoperative Analgesic Effects of Favorite Music After Cesarean Delivery Under General Anesthesia

Abstract
Background: This systematic review was designed to evaluate the analgesic effects of patient’s “favorite music.” The music was chosen by the elective cesarean section patient undergoing general anesthesia and it was played during the perioperative period. The review was designed to evaluate the evidence using GRADE and determine the effectiveness of music in reducing the overall pain and opioid usage in postoperative cesarean section patients.

Method: The medical literature was exhaustively searched using the keywords listed below. The search was limited to randomized controlled trials on humans in the English language published between 2000-2011. MEDLINE, Web of Science, Cochrane Systematic Reviews and CINAHL were searched and three relevant studies performed in Turkey or Iran since 2008 were isolated.

Results: Three RCTs were reviewed with a total of 250 patients. Half listened to favorite music prior to, or immediately after, undergoing cesarean section under general anesthesia. The control groups listened to no music. Overall opioid usage was significantly lower in the music group. The music group also had consistently lower pain scores. GRADE ratings for both outcomes of pain levels and opioid usage were considered High and suggested a strong recommendation for favorite music as adjunct therapy for pain relief.

Conclusion: Favorite music, played either before or after c-section surgery to a conscious, uncomplicated patient undergoing elective cesarean section under general anesthesia, reduces postoperative pain and the use of opioid analgesic medication administered by PCA. The music intervention was determined to be risk free.

Degree Type
Capstone Project

Degree Name
Master of Science in Physician Assistant Studies

First Advisor
Torry Cobb, DHSc, MPH, PA-C

Keywords
analgesia, cesarean section, music, pain

Subject Categories
Medicine and Health Sciences

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The student author attests that this work is completely his/her original authorship and that no material in this work has been plagiarized, fabricated or incorrectly attributed.
Biography

[Redacted for privacy]

Acknowledgements

To my Pacific University professors: Thank you for your dedication, support and excellent professional and personal example. I could not have found a better fit for my graduate education or be more proud of the Pacific University Physician Assistant program.
ABSTRACT

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Keywords: analgesia, cesarean section, music, pain
INTRODUCTION

Background

Cesarean section is a prevalent operation that accounted for up to 32% of deliveries in the United States in 2007 (Menacker, Hamilton, 2010). Opioid drugs are routinely administered by intravenous patient-controlled analgesia (PCA) for postoperative pain. Opioid drug side-effects and postoperative pain can potentially affect the bonding of mother and child and a mother’s ability to care for her infant. One of the most common PCA delivered drugs, Tramadol, has the common side effects of dizziness, drowsiness, headache, nausea, insomnia, vomiting and weakness. These are aside from any allergic reaction a patient could develop. Any side-effect, along with the normal postsurgical pain from cesarean section, could lead to delayed hospital discharge, increased recovery time and contribute to increased cost of care. Chronic pain is another potential complication. Rates of chronic pain after cesarean section have been between 6 and 18% (Vermelis, Wassen, Fiddelers, Nijhuis, Marcus, 2010). The review by Vermelis et al. (2010) showed chronic pain can be predicted by pain levels during and in the immediate postoperative period. Furthermore, there is concern for opioid transmission to the neonate through breastfeeding. Several studies have determined a dose-related adverse effect on breastfeeding by the use of systemic opioid analgesics. Decreased neonatal Apgar scores, respiratory depression and low tone are possible side effects with the use of opioids in the mother, so the reduction of opioid use is desirable (Reynolds, 2011).
Music has been studied extensively as an adjunctive therapy in the perioperative period. It has none of the side-effects of opioids, is low-cost, and adds no additional physical trauma to mother or neonate. While one study in Lebanon showed Spanish guitar music played to the unconscious cesarean section patient under general anesthesia was without analgesic effect it is reasonable to evaluate whether a patient’s own chosen music would reduce pain (Nikandish, Sahmedini, Khademi, Avand, & Tabatabaee, 2007). Pain has a prominent emotional component and music has been shown to decrease anxiety and decrease pain postoperatively in other surgeries and during vaginal delivery. Several studies of music’s analgesic effects were reviewed including one in which the subjects undergoing a painful stimulus with chosen music, tolerated it longer than the other 2 groups which had either white noise or author selected relaxation music. The authors suggested that the preference of music by an individual was important in pain relief. Playing favorite music to the patient in the conscious perioperative period could have greater effect on analgesia than any music played while unconscious (Chi & Young, 2010).

This systematic review focused on the effects of patient chosen “favorite” music played to a conscious patient prior to, or immediately after, cesarean section under general anesthesia. The effects of music on pain reduction and decreased opioid analgesic use were the primary concerns. The studies reviewed were performed in Turkey and Iran. However, the fact that the patients chose the type of music suggests similarly structured trials in the United States could have an equivalent outcome and relevancy.
Purpose of the Study

This paper was designed to perform a systematic review of the literature on the use of music as adjunct therapy for analgesia in cesarean section using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) tool developed by the GRADE Working Group (Guyatt et al., 2008).

METHOD

An extensive literature search was performed using MEDLINE, Web of Science, Cochrane Systematic Reviews, Google Scholar and CINAHL. All but Google Scholar were accessed through the Pacific University Library system. The search was conducted by searching by keyword and combining “music,” “cesarean,” and “pain” which yielded 2 articles. An additional search substituting “analgesia” for “pain” brought up an additional article. The search was limited to articles published since 2000, human subjects and the English language. Only studies of cesarean section patients were included. The results on MEDLINE included three articles, all of which were randomized, controlled trials and these were retained to review. A similar search on Google Scholar yielded an additional randomized, controlled trial from Iran which could not be obtained in a timely manner. Of the three obtained studies, two were performed in Turkey and one in Iran and these three were included in the final analysis.
RESULTS

The first study reviewed was conducted by Mohseni and Ebneshahidi (2008) in Iran. The authors evaluated the effects of patient selected music on early postoperative pain. The 80 patients ranged in age from 18-36 and had similar demographics. All were uncomplicated patients with scheduled elective cesarean sections under general anesthesia. Headphones were used on both the group randomly selected to hear favorite music 30 minutes postoperatively and the group not receiving music. Morphine usage by PCA and pain score by 100mm visual analog scale (VAS) was measured immediately after the music treatment period. Both pain scores and postoperative opioid usage in the postoperative period were lower in the music group. Pain scores for the music group vs. the control were 27 +/- 21 vs. 46 +/- 23. Morphine usage was 1.6 +/- 1.7 vs. 2.5 +/- 1.9. Measures of anxiety by VAS and hemodynamic parameters including heart rate and blood pressure were found to have no significant differences in the same time period between groups. The authors determined that both pain scores and morphine usage were lower in the group that listened to favorite music in the first postoperative 30 minutes.

The second study reviewed was conducted in Turkey by Sen et al. (2009). It evaluated the analgesic effects of music administered during the preoperative cesarean section period. Neonate Apgar scores were also assessed and recorded. Two groups of 50 women age 20-40 undergoing elective cesarean section were randomly allocated to either, listen to patient-selected favorite music
through headphones (Group 1), or to not listen to music for the one hour immediately prior to surgery (Group 2). The patient characteristics regarding age, weight, height had no significant differences. The duration and type of anesthesia was standardized.

Postoperative pain and patient satisfaction with perioperative care were recorded by 10 cm VAS. Overall, Group 1 patients used 21% less PCA tramadol compared to Group 2 (289 +/- 64 vs. 364 +/-107) and less diclofenac (48 +/- 42 vs. 87 +/- 41). Patient satisfaction scores were higher and pain scores consistently lower over the 24 hour period of monitoring. Apgar scores in Group 1 neonates were significantly greater (p<0.05) than Group 2 in both the 1st minute (8.28 +/- 0.61 vs. 7.84 +/- 0.68) and 5th minute (9.96 +/- 0/20 vs. 9.72 +/- 0.54). It was determined by the authors that both pain scores and overall tramadol and diclofenac use were lower in the group that listened to favorite music prior to surgery.

The final study reviewed was conducted by Sen et al. (2010). They performed further study with similar design to the one published in 2009 that sought to discover the effects of music therapy on postoperative analgesia but also to investigate the duration of effects. This study involved 70 elective, uncomplicated cesarean section patients, aged 20-40, randomly allocated by computer into two groups of 35. Group 1, who listened to music an hour after surgery and Group 2, who did not listen to music. There were no significant differences in patient characteristics between groups regarding age, weight, height or duration of standardized anesthesia. In the first 24 hours after surgery,
patients were monitored every four hours for PCA tramadol usage and pain level, assessed by 10 cm VAS. Postoperative tramadol usage at hour four (52.57 +/- 30.32 vs. 72.00 +/- 30.75, p=0.007) and total tramadol usage (307.43 +/- 62.51 vs. 352.57 +/- 109.02, p=0.037) was lower in Group 1. All VAS pain scores were lower in Group 1. The authors concluded that listening to favorite music after surgery lowered postoperative tramadol usage and overall pain scores in the first 24 hours after surgery.

DISCUSSION

Favorite music played in the period immediately before or after undergoing general anesthesia and cesarean section significantly reduces pain and opioid use in low-risk patients. The GRADE table was used to evaluate the three RCTs (see Appendix A, Table 1). GRADE, which was developed in 2000 to simplify recommendations based on studies of different quality, allows the evidence to be evaluated by individual outcome and then given a strength of recommendation. In this instance, pain and opioid usage were evaluated by all three randomized, controlled trials. All three trials were similar in size, patient demographics, design and quality and the quality of evidence rated “high” initially by GRADE standards. The definitions established for quality by the GRADE working Group are very low, low, moderate and high:

Very low = any estimate of effect is very uncertain.

Low = further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Moderate = further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.

High = further research is very unlikely to change our confidence in the estimate of effect.

(Guyatt et al., 2008).

There were no deductions in scores for quality, consistency, directness, precision or publication bias. As the score was already high, no additional points could be made for large study size, dose response or confounders. Therefore, the overall recommendations of the GRADE table remained “high” for both the outcomes of decreased pain and decreased opioid usage with favorite music. The overall recommendation was then analyzed to be either strong or weak. The overall recommendation for favorite music therapy was ‘strong’ based on GRADE working group's definition that the evidence outweighs the risks and burdens of therapy.

All of the studies reviewed were performed outside the United States in Iran and Turkey. The difference in patient population is unlikely to affect the relevance of the research in the U.S. as the patients chose the music in the studies. Still, only about 5% of cesarean sections in the United States are performed under general anesthesia currently, as regional blocks have longer term pain control postoperatively and are deemed safer for the mother in non-emergent deliveries (Grant, 2011). With longer term pain control from regional blocks, the study designs might need to be extended to be relevant to the
majority of c-section patients in the U.S., but could otherwise be applied to other surgical patients undergoing general anesthesia.

The cost of supplying favorite music as an adjunct therapy to opioids is relatively low. Many patients could potentially provide the audio devices themselves and that would eliminate the need for replacement of headphones or sterilization of equipment. It could be more enticing to note cost savings and complication reduction as a result of favorite music therapy. These studies were of short duration, 24 hours of patient monitoring maximally, and the view of cost saving measures could be expanded beyond simply the overall use of opioids. None of the studies discerned whether post-cesarean complications were higher or time to discharge was decreased in patients receiving favorite music therapy. It seems the most useful interpretation derived from these studies is music therapy based on favorite music and the playing of the music to the patient while conscious. Studies of longer duration in the United States could be designed to further evaluate the reduction of pain, complication and opioid usage in postoperative patients, including those c-section patients not undergoing general anesthesia and non-pregnant surgical patients.
REFERENCES


## APPENDIX

### Table 1: GRADE Table

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Outcome</th>
<th>Quantity and type of evidence</th>
<th>Findings</th>
<th>Decrease GRADE</th>
<th>Increase GRADE</th>
<th>Grade of Evidence for Outcome</th>
<th>Overall GRADE of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Favorite music vs. no music</td>
<td>Decrease in pain on VAS</td>
<td>3 RCT</td>
<td>Decreased Pain</td>
<td>High</td>
<td>0</td>
<td>0</td>
<td>High</td>
</tr>
<tr>
<td>Decreased use of opioids</td>
<td></td>
<td>3 RCT</td>
<td>Decreased use of opioids</td>
<td>High</td>
<td>0</td>
<td>0</td>
<td>High</td>
</tr>
</tbody>
</table>

**Note:** GRADE stands for Grading of Recommendations, Assessment, Development, and Evaluation.