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**EFFECTS OF MUSIC INTERVENTION ON ANXIETY- AND PAINREDUCTION IN
AMBULATORY MAXILLOFACIAL AND OTORHINOLARYNGOLOGY SURGERY:
A DESCRIPTIVE SURVEY OF 27 CASES**

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ABSTRACT

PURPOSE. The aim of this study is to determine patients' opinion regarding listening to music before an ambulatory maxillofacial surgery and effects on anxiety and pain reduction.

METHODS. This study was conducted on outpatients having a maxillofacial surgery between December 2015 and April 2016 at Poissy/Saint-Germain-en-Laye hospital (France). Patients listened with headphones to an easy-listening music in the operation theatre before the first ambulation. A questionnaire including a Visual Analog Scale (VAS) for pain and anxiety was given to participants. The primary endpoint was to determine patients' opinion regarding listening to music before surgery. Secondary endpoints were to determine VAS pain mean, VAS anxiety mean before surgery, VAS anxiety mean after surgery and if patients wanted to listen to their own playlist. We decided to compare VAS anxiety and pain mean between patients who Accepted to Listen to Music (ALM) and who Refused to Listen to Music (RLM).

RESULTS. 19 patients ALM and 8 patients RLM to music. 78,9 % of patients considered that listening to music before surgery decreased their anxiety. In patients who ALM, the mean (Standard Deviation, SD) of VAS pain after surgery was 3,42 (1,95), the mean (SD) of VAS anxiety before surgery was 3,1 (2,3), the mean (SD) of VAS anxiety 1,21 (0,85). There was a statistically significantly difference of the VAS anxiety mean (SD) before surgery between patients who ALM 3,10 (2,30) and who RLM 6,12 (1,88) ($p = 0,005$). There was a statistically significantly difference of the VAS anxiety mean (SD) after surgery between patients who ALM 1,21 (0,85) and who RLM 2,62 (1,30) ($p = 0,009$). 50 % of the patients wanted to choose their own music.

CONCLUSION. Music seems to reduce anxiety before maxillofacial surgery. An interventional randomized study is needed to demonstrate the positive impact of music on anxiety before maxillofacial surgery.

Key-words: Maxillofacial surgery; Otorhinolaryngology surgery; Ambulatory Surgery; Pain; Anxiety; Music.

INTRODUCTION

Most research regarding anxiety and pain management after maxillofacial and OtoRhinoLaryngology (ORL) surgery has focused on the effect of local and general anesthesia and anxiolytics delivered orally or intravenously [1, 2]. Pain and anxiety are linked. Pain causes stress that leads the cardiovascular system to respond by activating the sympathetic nervous system, resulting in increased heart rate, blood pressure, and oxygen demand. These mechanisms can complicate the quality of a local or general anesthesia during surgery. Furthermore, opioids have sometimes negative side effects such as respiratory depression, vomiting, constipation... One promising but insufficiently understood nonpharmacologic approach to pain and anxiety after maxillofacial and ORL surgery is music therapy. Music has been associated with lower anxiety levels, reduction in analgesic requirements, reduction in anesthetic drugs and shorter procedure times during gastrointestinal procedures and hip surgery [3, 4]. A 2011 randomized controlled study on music for surgical abortion care noted a trend toward a faster decline in anxiety post procedure in music group ($p=0.065$) [5]. A 2008 and 2015 systematic review of randomized controlled trials of the effects of music interventions in peri and postoperative settings in general surgery concluded that music intervention had positive effects on reducing patients' anxiety and pain [6, 7]. Combining pharmacologic and nonpharmacologic methods on anxiety and pain control could probably have a synergistic effect to improve pain relief for the patient. However, we know little about nonpharmacologic approaches to anxiety and pain after maxillofacial surgery. It could be an inexpensive method to reduce pain and anxiety. The main objective of this study is to describe the effects of music intervention on anxiety and pain reduction in maxillofacial and ORL surgery for outpatients.

PATIENTS AND METHODS

This study was a descriptive study with a quantitative approach to information. This study was conducted between December 2015 and April 2016 in the department of ORL and maxillofacial surgery of Poissy/Saint-Germain-en-Laye hospital at Saint-Germain-en-Laye (France). Participants were enrolled in the study if they fulfilled the following criteria: aged > 16 years, agree to participate in the study and to answer to a questionnaire, alert and oriented regarding person, place, time, and situation, having tooth extraction surgery which was the most frequent surgery for outpatients in our hospital. Exclusion criteria for patients were: non french-speaker, mental retardation, dementia, bilateral anacusia, psychiatric disorders, and the inability to see sufficiently to mark the visual analog scale (VAS). Informed consent of all patients was obtained before treatment.

The music intervention consisted of listening with headphones to an MP3 easy-listening and relaxing music for at least fifteen minutes in the waiting hall of the operation theatre before the first ambulation. The music had 50-80 beats per minute or less, to decrease the chance of increasing anxiety. MP3 easy-listening music is shown in Table 1. A 8-questions questionnaire (Figure 1) was constructed to obtain relevant information from participants about their opinion regarding listening to music before surgery. The questionnaire was including a scale pain and anxiety. Patients who listened to music had to answer to the questionnaire one hour after the surgery in the ambulatory department. Patients who didn't listen to music were asked to give the measure of their pain after surgery and the measure of their anxiety before and after surgery. Demographic and anesthesiologic data as specified in Table 2 were also collected. None of the patients had anxiolytics medication before general anesthesia and surgery. None of the patients had local anesthesia. For patients who underwent tooth extractions, general anesthesia and surgical duration were similar. The measures used in this study included a Visual Analog Scale (VAS) for pain, and a VAS for anxiety. The VAS is used to measure various subjective clinical phenomena, including pain and anxiety. The VAS consists of a 10-cm horizontal line with right angles at each end with

word anchors depicting extremes in the phenomenon being measured. Patients mark on the line exactly where they perceive the phenomenon to fall on the continuum. A ruler is used to measure from the far left of the scale to the subject's mark, and the score is reported as the length measured in millimeters. The VAS is quick, easy to use, and easy to score, and it provides a method to compare the findings to previous results. The VAS also provides ratio-level data, allowing more robust parametric statistical analysis. When used to assess pain, the far left anchor indicated "no pain", and the far right anchor indicated "pain as bad as it could possibly be". The VAS pain is commonly use in surgery. Concurrent validity of the VAS to measure the self-report of anxiety has been demonstrated when scores were compared with Spielberger's (1983) State Anxiety Inventory [8].

The primary endpoint was to determine patients' opinion regarding listening to music before maxillofacial surgery: whether or not helping to decrease anxiety before surgery (question 7 of the questionnaire, figure 1). Secondary endpoints were to determine the VAS pain mean after surgery in patient who Accepted to Listen to Music (ALM), the VAS anxiety mean before surgery in patients who ALM, the VAS anxiety mean after surgery in patients who ALM and to determine if patients wanted to listen to their own playlist.

In addition, we decided to compare VAS anxiety and pain mean between patients who Accepted to Listen to Music (ALM) and who Refused to Listen to Music (RLM). Tooth extraction surgery patients were chosen because there were few biases in this group: same surgeon, same surgery, same procedure, many patients. P values for the analysis of the secondary endpoints were obtained using the test of Wilcoxon signed rank, with $p < 0.05$ considered statistically significant.

RESULTS

A total of 19 patients accepted to listen to music and 8 patients refused to listen to music (Figure 2). Analysis of the patients characteristics (Table 2) showed that the average (standard deviation) age was $25,5 \pm 4,8$ years. The sex ratio was 1:1. No significant differences were found between the ALM patients and the RLM patients regarding any of the demographic characteristics, including gender, age, and ethnicity. Concerning the primary endpoint, 78,9 % of the patients considered that listening to music before surgery have decreased their anxiety (Table 3). Among the patients that considered that listening to music before surgery have decreased their anxiety, 31,5 % of them said music is helpful before surgery, partially helpful for 58 % of them, needless for 10,5 % of them (Table 4). The mean (Standard Deviation, SD) of VAS pain of patients who ALM after surgery was 3,42 (1,95), the mean (SD) of VAS anxiety of patients who ALM before surgery was 3,1 (2,3), the mean (SD) of VAS anxiety after surgery in patients who ALM was 1,21 (0,85) (Table 5). There was a statistically significantly difference of the VAS anxiety mean (SD) before surgery between patients who ALM 3,10 (2,30) and who RLM 6,12 (1,88) ($p = 0,005$). There was a statistically significantly difference of the VAS anxiety mean (SD) after surgery between patients who ALM 1,21 (0,85) and who RLM 2,62 (1,30) ($p = 0,009$) (Table 6). 50 % of the patients wanted to choose their own music.

DISCUSSION

In this study, music therapy before an ambulatory maxillofacial surgery appears to have a synergistic effect with anesthesia to improve anxiety relief for the patient. 78,9 % of the patients considered that listening to music before surgery decreased their anxiety. We noted a statistically significantly difference of the VAS anxiety mean (SD) before and after surgery between patients who ALM and who RLM.

Most of the studies on music therapy in surgery concern digestive and gynecologic surgery [9]. To our knowledge, there are few studies on music therapy before maxillofacial or ORL surgery [10]. This study is the first that study the effects of music intervention on anxiety and pain reduction in maxillofacial and ORL surgery. Many studies have evaluated the effects of music on sedative use, neurohormonal responses, heart rate, blood pressure, respiratory rate [11, 12]. These criteria are signals of stress and anxiety. We studied the VAS pain and the VAS anxiety that are hard criteria.

A limitation of this study is the lack of a control group and the small number of patients. We didn't propose to our patients to listen to their own music to reduce bias. Most of the studies have included around two to three hundred patients but these studies were multicentred and were studying effect of music on patients undergoing gynecologic surgery. Despite the low number of patients enrolled, our values of pain after surgery in patients who ALM were consistent with those obtained in other studies [13, 14]. Our results should be taken carefully into account because this study is a descriptive study with low-level evidence. However, our results of VAS anxiety mean and VAS pain in patients who listened to music before undergoing tooth extraction can be a helpful basis for statistical considerations if a randomized controlled study is conduct in maxillofacial surgery.

In this study, 78,9 % of the patients felt that listening to music before surgery decreased their anxiety. Among the patients that felt that listening to music before surgery decreased their anxiety, 10,5 % of them said music is not helpful probably because these patients had a low

anxiety. Easy-listening music was offered because music with relaxing melody and pleasant rhythms has been shown to produce a calming effect and to decrease anxiety [15].

Regarding the pathophysiology, the chronology of events in acute stress is as follows. In response to a perceived event, catecholaminergic transmissions and CRH (Corticotropin Releasing Factor produced by the hypothalamus) are activated in less than seconds, followed by ACTH (AdrenoCorticoTrophic Hormone produced by the pituitary gland) and other pituitary hormones including glucagon. Gonadotropins are inhibited. Several minutes' later corticosteroids are released by the cortex of the adrenal gland. The hypothalamus tract project to the brainstem structures and the release of CRH is activating the sympathetic system. Thus, the adrenal medulla is stimulated and release adrenaline into the blood circulation. The physiological stressor increases cardiovascular rythm, immune system, mobilization of energy sources. It reduces sexual and reproductive potential, appetite and increases cerebral blood flow, and the initiation of the memory consolidation process (central action on the hippocampus). Music therapy seems to decrease stress by a negative feedback on production of CRH [16, 17].

In conclusion, music seems to be an easy and inexpensive approach to help patients to reduce anxiety before surgery. An interventional controlled and randomized study is needed to demonstrate the positive impact of music on anxiety before maxillofacial surgery.

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Declaration of interests

The authors declare that they have no conflicts of interest related to this article.

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Tables:

Table 1. MP3 easy-listening music

Table 2. Characteristics of the study population

Table 3. Primary outcome: patients' opinions regarding listening to music before maxillofacial or ORL surgery: whether or not helping to decrease anxiety before surgery.

Table 4. Patients opinions regarding listening to music before maxillofacial or ORL surgery

Table 5. Secondary outcomes: VAS pain mean and VAS anxiety in patients who ALM

Table 6. Secondary outcomes: VAS pain mean and VAS anxiety mean comparison between the patients who ALM and who RLM

Figures

Figure 1. 8-questions questionnaire

Figure 2. Flowchart of the study.

Tables:**Table 1.**

Label	Origins – 000273, Silent Music
Series	Collection Oxygène – Magie de la musique et du son naturel
Format	CD, compilation
Country	France
Date	1997
Type	Electronic
Style	New Age, Field Recording

Table 2.

Characteristics	ALM patients (n = 19)	RLM patients (n = 8)
Gender n (%)		
Male	47,3	50
Female	52,7	50
Age, years, mean (SD)	25,5 ± 4,8°	35 ± 18,8°
Ethnicity n (%)		
European	75	72
African	20	28
Asian	5	0
Anesthesia n (%)		
General	100	100
Local	0	0

SD: Standard Deviation

° The more or less correspond to mean values +/- standard deviation

Table 3.

	ALM patients (n=19)
Decreasing anxiety (%)	78,9
Not decreasing anxiety (%)	21,1

Table 4.

	ALM patients (n=19)
Helpful (%)	31,5
Partially helpful (%)	58
Not helpful (%)	10,5

Table 5.

	ALM patients (n=19)
VAS pain after surgery	3,42 ± 1,95°
VAS anxiety before surgery	3,1 ± 2,3°
VAS anxiety after surgery	1,21 ± 0,85°

° The more or less correspond to mean values +/- standard deviation

Table 6.

	ALM patients (n = 19)	RLM patients (n = 8)	p values
VAS pain after surgery	3,42 ± 1,95°	4,50 ± 2,07°	p = 0,30
VAS anxiety before surgery	3,1 ± 2,3°	6,12 ± 1,88°	p = 0,005*
VAS anxiety after surgery	1,21 ± 0,85°	2,62 ± 1,30°	p = 0,009*

° The more or less correspond to mean values +/- standard deviation

* Statistically significant result p <0.05

Post operative questionnaire translated in English

1. Please mark on the line the number that corresponds to the intensity of your pain after surgery



2. Please mark on the line the number that corresponds to the intensity of your anxiety before surgery after listening to music



3. Please mark on the line the number that corresponds to the intensity of your anxiety after surgery



4. In your opinion, how would you characterize listening to music to relieve anxiety? (check the box)

- Helpful
 Partially helpful
 Not helpful

5. Would you like to listen to music again if you needed another ENT surgery? (check the box)

- Yes
 No

6. Would you like to choose and listen to your own music? (check the box)

- Yes
 No

7. Do you feel that listening to music decreased your anxiety? (check the box)

- Yes
 No

8. Do you have any comments about this device? (If so, thank you to indicate it below)

