Clinical Neurology and Neurosurgery 170 (2018) 132–139

Contents lists available at ScienceDirect

Clinical Neurology and Neurosurgery

journal homepage: www.elsevier.com/locate/clineuro

Anxiety, memories and coping in patients undergoing intracranial tumor surgery

Tom J. van Ark[a,1], Markus Klimek[a,*,1], Peter de Smalen[a], Arnaud J.P.E. Vincent[b], Robert Jan Stolker[a]

[a] Dept. of Anesthesiology, Erasmus University Medical Center, Rotterdam, The Netherlands
[b] Dept. of Neurosurgery, Erasmus University Medical Center, Rotterdam, The Netherlands

ARTICLE INFO

Keywords:
Anesthesia
Anxiety
Awake craniotomy
Brain tumor
Coping
Memory
Neurosurgery
Patient satisfaction

ABSTRACT

Objectives: The diagnosis and the surgical removal of a brain tumor can have serious impact on the quality of life of a patient. The question rises, whether having more or just less memories of the procedure is better for coping with such an event. Furthermore, for preoperative information of future patients it is important to know how patients process their emotions and memories. The primary objective of this study was to investigate the link between preoperative anxiety, the perioperative experience and the quantity and quality of postoperative memories in patients who underwent intracranial tumor surgery.

Patients and methods: This study was a retrospective observational study; all patients who underwent intracranial tumor surgery at the Erasmus Medical Centre Rotterdam between January 1st 2014 and December 31st 2015 were identified. In May 2016, all patients who were not registered as deceased were sent a questionnaire about their anxieties, perceptions and memories of the perioperative period.

Results: In total 476 patients were included. 272 patients responded, which resulted in a response rate of 57.14%. In the general anesthesia (GA) group there was a significant negative correlation between anxiety in the perioperative period and the quantity and quality of memories. In the awake craniotomy group, there was a significant negative correlation between anxiety after the operation and the quantity of memories.

Conclusion: Patients in the GA group who experienced anxiety in the perioperative period had less quantity and quality of memories and less patient satisfaction. Patients in the AC group who experienced anxiety after the operation had only a lower quantity of the memory; there was no correlation with patient satisfaction.

1. Introduction

The diagnosis of a brain tumor and the surgical removal of this tumor can have serious impact on the quality of life of the patient. As patient centered care and value-based health care have become increasingly important, information about the quality of postoperative recovery and management of patient expectations are especially relevant [1,2]. Patients may undergo this procedure awake or under general anesthesia (GA), which has impact on the quantity, but possibly also on the quality of the memories about the perioperative period. It may be questioned, whether more or less memories about the procedure are an advantage for coping with such a major life event?

Only a few earlier studies investigated patient experience of patients who underwent an awake craniotomy (AC) [3–5]. These studies showed that according to the patients' memories this anesthesia technique is well tolerated by the patients, but nevertheless still can have considerable impact. This impact did not only reflect on the direct perioperative period, but also on the period of recovery and rehabilitation after the procedure.

Therefore, we strived to learn more about how patients process and cope with their emotions and memories of the perioperative period in order to better inform future patients and manage their expectations about the operation.

Recently, we published data of a different, previous, small patient population on the quality and quantity of memories in patients who all underwent an awake craniotomy [6]. These data showed, that patients did not remember a lot of the procedure despite being awake during the whole period of resection, but also that the majority of these memories were very positive.

Inspired by these findings, this study is the first one to compare the correlation between anxiety and the quantity and quality of memories of the perioperative period, in patients who underwent brain tumor

* Corresponding author at: Dept. of Anesthesiology, Office Na-1719, Erasmus University Medical Center, P.O. box 2040, 3000 CA Rotterdam, The Netherlands.
E-mail address: m.klimek@erasmusmc.nl (M. Klimek).
[1] Both authors contributed equally to the manuscript.

https://doi.org/10.1016/j.clineuro.2018.05.013
Received 21 March 2018; Received in revised form 30 April 2018; Accepted 13 May 2018
Available online 17 May 2018

resection awake or under general anesthesia. The primary objective of this study was to investigate the link between preoperative anxiety, the perioperative experience and the quantity and quality of postoperative memories. Our hypothesis was, that preoperative anxiety will result in more negative memories and less patient satisfaction.

2. Materials and methods

The institutional medical ethics committee of the Erasmus University Medical Centre approved this study (MEC-2016-125). Written informed consent was obtained from all patients who participated in this study.

2.1. Study design

For this study, all consecutive adult patients who underwent neurosurgery at the Erasmus Medical Centre Rotterdam between January 1st 2014 and December 31st 2015 were identified. Based on surgery coding, 739 patients with an intracranial tumor resection were found.

2.2. Participants

In May 2016, after excluding patients registered as deceased in our hospitals patient registry, 503 of these 739 patients received a questionnaire about their perception of the perioperative period. Patients who did not reply, were sent a reminder in August 2016. Non-responders were included in the final analysis to check for structural factors differing significantly between responders and non-responders.

2.3. Setting

In case of general anesthesia, the technique was chosen by the responsible anesthetist (Total Intra-Venous Anesthesia or balanced anesthesia). Our standardized technique of awake craniotomy has been described previously, and has not been changed for the patients included in this study [6]. In summary, we rely on a detailed, personal preoperative patient information and psychological preparation. Intraoperatively we use a combination of local anesthesia with propofol sedation during craniotomy and closure in spontaneous breathing patients with a nasal oxygen probe (non-invasive asleep-awake-asleep technique).

2.4. Study size

In this study, all adult patients who underwent (stereotactical) biopsies, intra-cranial tumor surgery and pituitary adenoma surgery were included. After removing double cases (of patients who had multiple operations in this period only the first procedure was included), a total number of 739 cases remained (see Fig. 1).

Patients undergoing a supratentorial tumor resection were mostly extubated on the OR, patients with infratentorial tumors were frequently transferred intubated to the Intensive Care Unit/Post Anesthesia Care Unit (ICU/PACU), where extubation was performed on a later moment. For uniformity reasons in our questionnaire extubation was put after the transport to the PACU/ICU. It is worth mentioning, that in our hospital the PACU is a high dependency unit with the option for mechanical ventilation, which is independent from the recovery room and dedicated to postoperative care for up to the first 24 h.

2.5. Variables

Our questionnaire focused on anxiety and memories. Questions addressing anxiety referred to different time-points of the perioperative process and to the patients and their relatives. The measured anxiety in the relatives of patients was reported by the patients. These questions could be answered on a 10-point scale (0 = no anxiety, 10 = maximum anxiety). The questions addressing the quality and quantity of memories were divided in 13 sub-questions, referring to the consecutive events during the perioperative period, e.g. preoperative night on the ward, arrival on the OR etc. (see Table 1). The questionnaire is added (appendix).

All 13 sub-questions could be answered on a 5-point scale. For the sub-questions in question 1 the scale ranged from no memory at all (1) to a full and complete memory (5) and in question 2 the scale ranged from totally negative (1) to totally positive (5). To analyze the quantity and quality of memories the authors computed a sum score per patient of all given answers. If the patient underwent an awake craniotomy the answers to the questions about in- and extubation were not taken into account for the sum scores concerning the quantity and quality of the memories. So, the maximum sum scores of questions 1 and 2 were 11×5 (= 55) (Table 1). Furthermore, if the patient received general anesthesia, the answers to the question about testing of the brain function were not taken into account for the sum scores of the quantity and quality of the memories. So the maximum sum scores of question 1 and 2 in the general anesthesia group was 12×5 (= 60) (Table 1).

If the respondent did report to have no memories of the specific subquestion of the perioperative period when asked about the quantity, any quality score on that specific sub-question was considered invalid and not taken into account.

If the respondent did report to have any memory of the specific subquestion of the perioperative period, answered “no memories” when asked about the quality, the quality score was counted as ‘’neutral’’ for that specific sub-question. Furthermore, if a respondent did not completely answer a question, then for the respective sub-question(s) the responder was counted as a non-responder.

2.6. Data sources

The following data were collected from the electronic patient record system of the Erasmus MC: age, gender and ASA (American Society of Anesthesiologists)-class of the patient - a rough indicator of the general state of health [1 = healthy to 4 = seriously reduced vital functions], type and side of the tumor, pathological determination of the tumor and degree of resection of the tumor. The degree of resection of the tumor was extracted from postoperative MRI scans and was categorized as complete resection or a resection with remnant of tumor. If the first postoperative MRI scan was inconclusive due to edema or residual blood, findings from later scans were analyzed.

Our primary outcome was the correlation between the quantity and quality of memories of patients and the experienced anxiety. We also analyzed the following possible influencing factors on the quantity and quality of the memories: the amount of time elapsed between answering the questionnaire and date of surgery (time-q) and the technique of anesthesia (awake craniotomy or general anesthesia). Furthermore, we analyzed the correlation between the overall satisfaction score and the quantity and quality of the memories, the correlation between anxiety prior and anxiety after the surgical procedure with the quantity and quality of memories and the correlation between anxiety prior and after the operation procedure and the overall satisfaction score. In addition, we analyzed which parts of the procedure were seen as discomforting by patients.

Because we had a quite large group of patients (91/476) who underwent surgery for pituitary adenoma or craniopharyngeoma, we also analyzed whether there was a difference between those operated via a transphenoidal approach and those via a frontal craniotomy.

2.7. Statistical methods

All data were gathered by two of the authors (TvA, PdS) and any inconsistencies and controversies were discussed with a third author (MK), until consensus was reached. Processing of data and statistical analysis was done using IBM SPSS Statistics, version 23, (Armonk, NY: