Revista Chilena de Neurocirugía 41: 2015

Headache and Analgesic in Postoperative Craniotomy

Maria do Carmo de Oliveira Ribeiro, Dr[a1,] Carlos Umberto Pereira, Dr.[2], Ana Maria Calil Sallum, PhD[3], Thomas Barboza da Silva[4], Íkaro Daniel de Carvalho Barreto[5], Karla Vanessa de Oliveira Ribeiro[6], Mariangela da Silva Nunes, Msc[7], José Antonio Barreto Alves, Dr.[8], Valmira dos Santos Dr.[9]

1 Department of Nursing, Federal Universityof Sergipe, Aracaju-SE, Brazil.
2 Department of Medicine, Federal Universityof Sergipe, Aracaju-SE, Brazil.
3 SyrianLebanese Hospital, São Paulo-SP, Brazil.
4 Department of Statistics, Federal Universityof Sergipe, Aracaju-SE, Brazil.
5 Department of Statistics, Federal Universityof Sergipe,Aracaju-SE, Brazil.
6 Departament of Civil Engineering. Tiradentes University, Aracaju-SE, Brazil.
7 Department of Nursing, Federal Universityof Sergipe,Lagarto-SE, Brazil.
8 Department of Nursing, Federal Universityof Sergipe,Lagarto-SE, Brazil.
9 Department of Nursing, Estácio de Sá, -SE, Brazil.

Rev. Chil. Neurocirugía 41: 39-44, 2015

Palavras-chave: Headache, analgesia, pain, craniotomy, surgical procedures, pain measurement.

Abstract

Objective: To identify the most prevalent type of pain in postoperative craniotomy patients and evaluate the use of analgesic in this group of patients. **Method**: The case studies consisted of 55 patients undergoing craniotomy. Patients were evaluated from the first to the seventh postoperative day. Data were stored and analyzed using the Statistical Package for Social Sciences (SPSS) version 17.0. The variables analyzed were gender, demographic data, assessing the presence of pain, location of pain, severity of pain, use of analgesic, professionals who recorded the pain on the patients' charts, and presence of insomnia. **Results**: The results show that headache, the main pain reported by the patients, is present from the first to the seventh postoperative day. It was observed that in some cases there was no prescription of analgesics and even in the group of patients who took analgesics, these drugs were not effective for the relief of headache. The final logistic regression model revealed that insomnia (OR = 10.6, p = < 0.001), the pain recorded in the patients' charts (OR = 2.38 , p = 0.016) and use of analgesic (OR = 2.03 , p = 0.014) adequately explained the outcome. **Conclusion**: Headache was the chief complaint of pain after postoperative craniotomy, and its intensity varied from mild to severe. The analgesic used was not effective for the control of postoperative headache. Proper handling of post-craniotomy headache by the multidisciplinary team can contribute to early neurological recovery of patients undergoing craniotomy, and should make the post-surgical care, with a view to early recovery and the humanization of care.

Key words: Headache, analgesic, craniotomy, pain, patients.

Introduction

Brain tumors, cancer or neoplasms of the central nervous system (CNS) are responsible for 142 thousand deaths a year and 189,000 new cases occur annually. These impair the individual's consciousness, causing paralysis, seizures, cognitive disorders, personality disorders and pain. Research on neoplasia showed that in 72.8% of patients pain was present. Another study identified moderate pain intensity in patients with meningioma[1-3].

Cancer pain is characterized by being, at the same time, chronic, acute, nociceptive, inflammatory and neuropathic pain. The pain resulting from brain tumors when not relieved may hinder daily living activities and therefore, the quality of life of individuals. The most common symptom of brain tumors is headache. This pain is characterized as intermittent, from mild to intense in severity. It can be located in a particular area or it may extend throughout the brain. Another feature of this type

Table 1.
Description of Postoperative Craniotomy Patients

Variables	Categories	Frequency (%)
Age, mean (standard deviation). Gender Female	Male Female	44 (16.24) 25 (45.5) 30 (54.5)
Nationality	State of Aracaju Out skirt cities of Aracaju Other Counties of the City of Sergipe Other States	18 (32.7) 16 (29.1) 19 (34.5) 2 (3.6)
Marital status	Single Married Widowed	37 (67.3) 16 (29.1) 2 (3.6)
Previous diseases	Diabetes Hypertension Diabetes and Hypertension	4 (23.5) 11 (64.7) 2 (11.8)
Pain before surgery	Yes	30 (54.5)
Location of Pain	Headache Headache and Neck Other 1	28 (93.3) 1 (3.3) (3.3)
Type of analgesic	No Analgesic 31 (56.4) Non-opioid analgesics + NSAIDs Weak opioids	31 (56.4) 23 (41.8) 1 (1.8)
Pain intensity before surgery	Zero - No Pain 1-4 – Mild Pain 5-7 - Moderate Pain 8-10 – Intense Pain	25 (45.5) 1 (1.8) 6 (10.9) 23 (41.8)

of headache is its appearance at night time and when the patient wakes up.
The International Headache Society classifies headaches into three groups: primary (headache disease), which are subdivided into migraine, tension-type, cluster headache and other primary headaches. Another classification is in regards to symptoms of headache, which in turn are presented in eight subgroups. Finally, the group represented by cranial neuralgia, central and primary facial pain, and other headaches[4].
The presence of persistent headache needs to be investigated and treated appropriately, in order to ensure the patient's quality of life. After diagnostic investigation and before the confirmation of brain tumor, a method commonly used for the treatment of brain tumors is the partial or total resection of the tumor through craniotomy[5]. After surgical procedure the pain commonly reported by patients is also headache.
Headache in postoperative craniotomy occurs after surgical procedure, continues during the healing process and tends to disappear. However, in some patients even after complete healing of the surgical wound, the pain persists. There are some factors that could be related to the occurrence of this event: headache resulting from injury and tissue changes, infections, and neuropathic sequelae and hyperalgesia. According to the International Headache Society, the post- craniotomy headache improves seven days after surgical procedure, and less than 25% of individuals develops chronic headache[5].
Recent research, which investigated the presence of headache after postoperative craniotomy, demonstrated that the prevalence of headache has not changed significantly during the follow- up period, resulting in a higher value on the second day after craniotomy (29.2%) and a lower value on the fifth day (14.1%)[7].
The study aims to identify the most prevalent type of pain in patients in postoperative craniotomy and evaluate the use of analgesic in this group of patients.

Methods

A prospective study of patients subjected to resection of brain tumor. The survey was conducted in the neurosurgical intensive care unit of a philanthropic hospital in Sergipe, Brazil. Data collection took place from September 2011 to October 2012, and included fifty-five patients. As exclusion criteria, the following was used: patients with less than 15 points on the Glasgow Coma Scale (GCS) at the time of the interview, age less than 18, victims of traumatic brain injury and patients who subsequently died. This study was approved by the Ethics and Research Committee of the Federal University of Sergipe, Brazil. All patients or legal guardians signed an informed consent form (IC).
Document analysis and semi-structure interviews with patients who were included in the inclusion criteria of the study were conducted, the variables analyzed were sociodemographic data, assessing the presence of pain, location of pain, severity of pain, use of

Table 2.
Description and pain record-keeping in the charts of patients submitted to craniotomy

Poso-perative days		1st	2nd	3rd	4th	5th	6th	7th	p-value
	Headache	14 (64)	19 (70) (5)	14 (64) 4	13 (62)	6 (50)	7 (58)	7 (54)	
Pain Area	Surgical Incision Other	5 (23) 3 (13)	5 (18) 3 (11)	4 (18) 4 (19)	3 (15) 5 (24)	5 (41) 1 (8)	3 (25) 2 (17)	3 (23) 3 (23)	0,043
Intensity of Pain	No Pain Mild Pain Mild Pain Severe Pain	3 (14) 7 (32) 8 (36) 4 (18)	6 (22) 10 (37) 7 (26) 4 (14)	2 (9) 10 (45) 8 (36) 2 (9)	2 (10) 9 (43) 8 (38) 2 (10)	1 (17) 6 (50) 4 (33) - -	2 (8) 4 (33) 6 (50) 1 (8)	(15) 3 (23) 5 (38) 3 (23)	< 0,001
Use of Analgesic	No Analgesic Non-opioid analgesics + NSAIDs Weak opioi-ds	8 (36) 1 (50) 3 (14)	14 (52) 1 (41) 2 (7)	8 (36) 1 (50) 3 (14)	11 (52) 9 (43) 1 (5)	7 (58) 4 (33) 1 (8)	9 (75) 1 (8) 2 (1)	6 (46) 5 (38) 2 (15)	0,015*
Pain after Analgesic	Yes	19 (86)	21 (77)	20 (91)	19 (90)	10 (83)	11 (92)	11 (85)	< 0,001*
Record of Pain	Doctor Nurse	3 (38) 1	2 (40) 1	9 (82) -	2 (33) -	1 (33) -	- 1	5 (100) -	
Professio-nal	Nurse Technician Nurse Assistant More than one Professional	(12) 1 (12) 2 (25) 1 (12)	(12) - 1 (20) 1 (20)	1 (9) 1 (9) - -	1 (17) 2 (33) 1 (17)	- 2 (67) -	(100) -	- -	< 0,001

*Chi-square and Fisher Exact tests.

analgesic, professionals who recorded the pain in the patients' charts and presence of insomnia. To assess the intensity of pain it was used a categorized numerical scale was used as follows: no pain (0), mild pain (1-3), moderate (4-7) and severe (8-10)[8].

All patients were evaluated from the first to seventh post-surgery day. Each patient was evaluated at two different times: one hour prior to administration of analgesic (routinely prescribed by the patient's physician) and one hour after the administration of analgesic. The period of one hour after the administration of the analgesic was adopted as the measure to assure the beginning of the analgesic effect. Patients who did not take analgesic and/or did not report pain were also evaluated one hour after the first evaluation, and questioned about the presence of pain.

Data were stored in a computerized database in the software Statistical Package for Social Sciences (SPSS) version 17.0. Generalized estimating equation was used to evaluate the longitudinal relationship between the presence of pain during the 7 days of the study with the use of analgesics and the registration of pain in the chart. Thus, as the dependent variable has a binomial distribution (presence and absence of pain) and since the frequency of presence of pain or problems of overdispersion do not decrease, a longitudinal

Table 3.
Use of analgesia, pain and insomnia log in postoperative craniotomy

	Received Analgesic		Pain Registered on Chart		Insomnia caused by pain	
	Yes	No	Yes	No	Yes	No
1st Day	16 (73)	6 (27)	8 (36)	14 (64)	7 (32)	15 (68)
2nd Day	13 (48)	14 (52)	5 (19)	22 (81)	7 (26)	20 (74)
3rd Day	14 (64)	8 (36)	11 (50)	11 (50)	8 (36)	14 (64)
4th Day	10 (48)	11 (52)	6 (29)	15 (71)	4 (19)	17 (81)
5th Day	5 (42)	7 (58)	3 (25)	9 (75)	2 (17)	10 (83)
6th Day	3 (25)	9 (75)	1 (8)	11 (92)	4 (33)	8 (67)
7th Day	7 (54)	6 (46)	5 (38)	8 (62)	3 (23)	10 (77)

Table 4.
Logistic Regression

	OR (95% CI)	p-value
Insomnia by pain	10,647 (4.803 to 23.601)	< 0.001
Recording-keeping of pain in charts	2,385 (1.179 to 4.824)0.016	
Use of analgesic	2.034 (1,152-3,591)	0.014

logistic regression was used to produce marginal odds ratios unadjusted and marginal odds ratio adjusted. The correlation structure proposed was self-regressive[9].

Results

Sixty-eight patients were selected for the study; however it was excluded (n = 1) by virtue of death during follow-up, (n = 8) by having less than 15 points in the EKG and (n = 4) for being younger than 18 years of age. The final sample consisted of 55 patients, 25 women and 30 men. Their ages ranged from 18 to 67 years, with an average of 44 years. Of these patients 23.5% had diabetes, 64.7% had a history of hypertension, 11.8% diabetes mellitus and associated hypertension. In 54.5% of the cases, the pain was present before the surgery, and headache was the type of pain reported by 93.3% of patients. Although the pain was intense in 41.8% of the cases, 56.4% of patients did not use analgesics to control pain, as shown in Table 1.

In the postoperative period, pain was present on all days of the evaluation, and headache was the chief pain reported by patients. It is possible to verify that the pain did not change substantially during follow-up, with the highest prevalence in the second post-operative day. The surgical area was the second biggest complaint of pain reported by the patients, which was present from the first to the seventh day post-cranio-tomy. During the entire study follow-up period, the pain was rated as mild and moderate and in some periods, it was reported as severe (Table 2).

Although headache and pain in the surgical incision were present throughout the entire evaluation period, one could observe that in some cases there was absence of prescription analgesics and even within the group of patients who used analgesics, the pain persisted. The data also reveal that there is a statistically significant difference between pain and drug action, p = < 0.001 during follow-up (Table 2).

Throughout the study, it was found that the record-keeping of pain is not a common practice in the institution, and the doctors contributed to the highest number of occurrences (Table 2 and 3). Patients also reported that the pain prevented getting adequate sleep (Table 3).

The final logistic regression model revealed that insomnia (OR = 10.6, p = < 0.001), record-keeping the pain in the charts (OR = 2.38, p = 0.016) and use of analgesic (OR = 2.03, p = 0.014) adequately explained the outcome.

Discussion

Headache was the chief complaint of pain after craniotomy and its intensity ranged from mild to severe, demonstrating the need for a multidisciplinary approach aimed at reducing the harmful effects of the pain[10]. Inadequate handling of the pain causes hypertension, increased heart rate, decreased oxygen supply to the muscles, shallow breathing, physical and mental suffering.

In craniotomy there occurs the presence of bone fragments caused by bone drilling which generates aseptic meningitis and therefore postoperative headache[11,12].

Recent research that assessed the presence of post-craniotomy headache identified an incidence of persistent headache after three postoperative months in the group of patients with a history of anxiety before surgical procedure[13]. It is important to point out that the headache may become a problem when not treated properly and systematized by the multidisciplinary team. The multidisciplinary team upon evaluating and treating the patient's pain must consider that the experience of pain is unique to each person; therefore, they should provide assistance guided by scientific principles, technical training and attitude, which are the three essential professional training that makes well trained professionals suited to working with[7].

In this research, before the surgical resection, headache was present in 93.3% of patients. A possible explanation for the preoperative headache in our study was the presence of intracranial tumors. Other studies have shown that headache in brain tumor patients is

related to the size of the tumor and the magnitude of the deviation of midline structures, as well as by traction or displacement of brain structures sensitive to pain[14-15].

Although headache was present throughout the study, both in preoperative and postoperative periods, one could notice that the headache was not handled properly, considering that for several days, even with the presence of pain, analgesics were not administered. It is important to note that even patients who received analgesics in the postoperative period, the analgesics were not enough to relieve pain (Table 2 and 3). The logistic regression model indicated regarding analgesics (OR = 2.03, p = 0.014) (Table 4). It was found in this study the low use of opioids, even though the headache, in some cases, was characterized as moderate and severe. In contrast, another study claims that for the proper handling of post craniotomy pain, strong opioids, such as codeine, morphine and oxycodone, should be administered for providing better pain relief in comparison to weak opioids and simple analgesics such as tramadol, acetaminophen and ketoprofen[16].

Other drugs also used for the control of pain after craniotomy are tramadol associated with acetaminophen, which provide better control of moderate pain, reduce unwanted effects, allow early ambulation, in addition to reduce hospitalization expenses[17]. The appropriate pharmacological treatment of pain post-craniotomy must begin before the pain starts; in other words, with preestablished times, or right after the pain starts. Besides reducing the discomfort, prophylactic analgesic also decreases the chances of long-term complications and avoids hyperalgesia. The duration and efficiency of the adequate analgesics are the most important factors in pain treatment as well as the prevention of hyperalgesia, after surgical procedure[18,19].

The data from our study show that although there are several options of treatment for post-craniotomy headache, the persistence of such pain requires a more accurate approach by the multidisciplinary team as well as the need to implement pain management protocols in the institution, aiming to improve patients' care.

The surgical area was the second complaint of pain reported by patients from the first to the seventh post-surgery day. The pain at the incision area may be related to allergic reaction to suture material, local infection, muscle tension, free nerve endings found superficially in the skin[20]. The surgical trauma resulting from the craniotomy releases inflammatory mediators and algogenic substances that stimulate nociceptors and therefore increase the pain[21]. It is important to point out that the proper handling of pain is a patient's right, and that the appropriate assessment and measurement of pain as well as the administration of pharmacological and non-pharmacological techniques to control pain are crucial to therapeutic success and proper recovery of the patient.

The logistic regression model indicated in regards to pain, OR = 2.38, p = 0.016 (Table 4). In addition, it was found in this study that there were few reports of pain in the patients' charts, from first to the seventh day after surgery and that doctors were the professional category that contributed with the largest number of record-keeping of the pain. The United States Agency for Research and Quality in Public Health, the American Pain Society and the Joint Commission on Accreditation on Healthcare Organizations (JCAHO), define pain as the fifth vital sign and suggest that it should be systematically recorded in the same way as the other vital signs (temperature, pulse, respiratory rate and blood pressure)[22]. The evaluation and systematic recording of pain allow monitoring the postoperative craniotomy procedure, enabling therapeutic adjustments and adequate control of pain and, therefore, greater satisfaction with the result of the treatment.

In this study, the logistic regression model indicated that headache increases the likelihood of insomnia (OR = 10.6, p = < 0.001) (Table 4). Pain causes insomnia which impairs daily activities and results in complications such as fatigue and depression[23,24]. Adequate sleep is essential for the maintenance of basic physiological functions and physical and mental well-being, hence proper handling of headache is critical to recovery and early surgical rehabilitation of patients after craniotomy.

One of the limitations of this study relates to the characteristics of postoperative headache reported by patients and lack of specification of the diagnosis of brain tumor, given that there was no such information on patients' charts, as it was also not possible to have access to the results of pathological examinations thereof.

We conclude that the most prevalent type of pain post-craniotomy was headache, characterized from mild to severe. The surgical incision was the second largest area of pain reported by the patients and was present throughout the study's follow-up. The analgesics used were not effective to control pain. The patients were still in pain after taking the analgesics. The data from this study show that insomnia, analgesics and pain record-keeping are important to evaluate the pain. We point out that the proper handling of post-craniotomy headache by the multidisciplinary team can contribute to early neurological recovery of patients undergoing craniotomy, and should be part of the post-surgical care, with a view to early recovery and humanized care.

Recibido: 24 de agosto de 2014
Aceptado: 24 de octubre de 2014

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Author responsible for correspondence
Maria do Carmo de Oliveira Ribeiro
Nursing Department of the Federal University of Sergipe
Rua Cláudio Batista, S/N, Bairro Sanatório, CEP 49.060 - 100- Aracaju-SE, Brazil.
Brazil, Phone: 55-79 2105 18- 13.
E-mail: enffer2@gmail.com