



ORIGINAL ARTICLE

To determine the difference between experience of post-operative pain after craniotomy in emergency versus elective cases.

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ABSTRACT... Objective: To determine the differences in post-operative pain experienced by patients undergoing emergency versus elective craniotomies. **Study Design:** Cross-sectional study. **Setting:** General Hospital, Karachi. **Period:** January 2017 to December 2019. **Material & Methods:** We included all the patients who underwent craniotomy at our institute and we measured their pain assessment levels. Further we excluded patients whose data was missing any variable of interest or whose measurements could not be taken at the time they were admitted to the hospital. All the data was analyzed using SPSS statistical software. **Results:** We included 152 patients in our study population. The mean age of the patients in our study group was 50 years of age and there were 81 males and 71 females included in our study. The combined pain scores for patients undergoing elective and emergency procedures was found to be 5.5 (Standard deviation= 2.6 for day one, 4.8 (Standard deviation= 2.6) for day two and 4.5 (Standard deviation=2.9) for day three post-operation respectively. When analysis was done to compare the differences in the VAS score for patients of the two categories we found no significant difference between the groups for day one having a p value of 0.485, for day two there was no significant difference as well having a p value of 0.957. **Conclusion:** We did not find any statistical difference in the two groups under study. The postoperative pain experience was similar in patients who underwent elective as compared to emergency craniotomies.

Key words: Craniotomy, Opioids, Pain Management, Post operative Pain, Visual Analog Scale.

INTRODUCTION

The challenge of controlling pain post craniotomy has been a task that neurosurgeons around the globe are working towards achieving success in. Various studies have been published whose authors have been trying to identify the most efficient analgesic regimens to control this pain.¹⁻⁹ The authors have described the various methods along with their risks and benefits, however, it is widely accepted that postoperative pain of craniotomy is not managed well with 55% to 70% patients reporting severe pain symptoms.^{8,10-15} Pain control in these patients is a delicate process and one must consider the risk of over medication, especially when opioids are used. Opioids are analgesics and may impair the neurological functions of the body thus hindering the neurological examination of the patient. It is

known to have effects on the mental status of the patient as well as some cranial nerves such as the cranial nerve III which controls miosis and may mask important signs and symptoms.^{1,3,5,6,7,11,15,16,17} Other types of analgesics such as the non-steroidal anti-inflammatory drugs or NSAIDs are known to be disruptors or platelet functioning and hence increase the risk of bleeding in the patients.^{6,7,15-18} Regardless of the risks involved in these types of analgesics neurosurgeons still must control the pain and they are actively searching for better methods to control this pain. Other methods such as scalp blocks have also been studied and have show good results.⁸ It is known in the literature that when a procedure is planned ahead of time the neurosurgeons involved have a better control over the course of the illness. They can plan the pain management strategy ahead of time and this

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can help reduce post operative pain levels.^{3,4,5} The objective of this study is to determine the differences in post-operative pain experienced by patients undergoing emergent versus elective craniotomies.

MATERIAL & METHODS

The type of study is a retrospective cross-sectional study, where we looked at data collected over three years from January 2017 to December 2019, by going through the health records at a single large tertiary care center in Karachi, Pakistan. Ethics approval was provided by the department and was approved in November 2016. We included all the patients whose data was complete, especially looking for postoperative pain assessment as done by our nursing staff and house officers during medication in the first three days post-surgery. All the craniotomies performed during the study period were included in our study. We have been using the visual analog scale to measure pain levels in our department. Which consists of a scale from 1 to 10, where 1 is the least possible perceived pain and 10 is the most excruciating pain felt of their lives. Further we included patients with age equal to or greater than 18 years and excluded patients whose data was missing certain variable of interest or whose measurements could not be taken at the time they were admitted to the hospital for a multitude of reasons (lack of time to evaluate the patient to be included in the study, unwillingness of patient or care givers, surgeon deciding not to include in the study etcetra). One of these reasons was an inability to communicate via any means. The other exclusion criteria were previous craniotomies, or when the patient had other pain syndromes. The decision to perform the emergency procedure was made by the on duty neurosurgery resident in consultation with the attending neurosurgeon. Since we are not performing any direct comparison of two groups from within our original data we do not need to define operationalizations for the elective and emergency management groups. Data analysis was performed using IBM SPSS 20 software and a p-value of <0.05 was considered as statistically significant.

RESULTS

After completion of review of all the patients whose craniotomies were performed during the pre-defined time period, we included n= 152 patients our study population. The mean age of the patients in our study group was 50 years of age and there were 81 males and 71 females included in our study. The reasons for surgery and other demographic information is given in Table-I. The combined pain scores for patients undergoing elective and emergency procedures was found to be 5.5 (Standard deviation= 2.6 for day one, 4.8 (Standard deviation= 2.6) for day two and 4.5 (Standard deviation=2.9) for day three post-operation respectively. The pain scores for emergent and elective cases are provided in Table-II. When analysis was done to compare the differences in the VAS score for patients of the two categories we found no significant difference between the groups for day one having a p-value of 0.485, for day two there was no significant difference as well having a p-value of 0.957. Hence, no significant difference is found in the two groups undergoing craniotomy at our institute. We could not analyze the differences for day 3 as there were few data points. In our patient population n=144 (94.73%) received opioids for pain control. The analysis of variance scores are as follows for post-operative day one we found a p-value of 0.485, for post-operative day 2 we found a p-value of 0.143 and for post-operative day three we found a p-value of 0.957 respectively.

| Demographic Variable | Frequency (%) |
|---|---------------|
| Gender | |
| Male | 81 (53.28%) |
| Female | 71 (46.72%) |
| Tumor resection | 106 (69.73%) |
| Vascular anomalies (AVM, aneurism etc.) | 9 (5.92%) |
| Hematoma evacuation (Epidural, intraparenchymal, subdural) | 32 (21.05%) |
| Other | 5 (3.28%) |
| Surgery <24 hours from presentation i.e. emergency procedures | 20 (13.15%) |
| Non emergent or elective procedures | 132 (86.85%) |

Table-I. Demographic and other important variables for the study population.

| Number of Days Postoperatively | Mean Score | Standard Deviation |
|--------------------------------|------------|--------------------|
| Emergency procedures | | |
| Day 1 | 5.0 | 2.8 |
| Day 2 | 5.8 | 2.0 |
| Day 3 | 4.6 | 3.0 |
| Elective procedures | | |
| Day 1 | 5.6 | 2.5 |
| Day 2 | 4.7 | 2.7 |
| Day 3 | 4.5 | 2.9 |

Table-II. Visual analog scale score for three days after surgical intervention.

DISCUSSION

We were unable to find a significant difference when it comes to the post-operative pain scores for patients undergoing emergency and elective craniotomies. We also had a disproportionate number of patients in the two groups, this was because patients undergoing emergency procedures were intubated or communication was not possible. Hence the patients we present the data of were not severely injured and were able to be successfully extubated after the procedure. Scalp nerve blocks were performed at the site of procedure and its main goal was to help in reducing bleeding. This could be a potential confounder; other confounding variable could be the multiple injuries inflicted on patients undergoing emergency treatment. The perception of pain is also different among subjects. The comparison in our study was a challenge as both the groups had disproportionate number of patients. One of the patients in our study who received opioids had to be returned to the operating room as they had a change in their mental status which was observed regardless of the effects of the opioids we administered. The main concern with opioids is masking of significant signs and symptoms.^{1,3,5,6,7,11,15,16,17} Some neurosurgeons have recommended that it is still possible to provide relief to the patients with opioids and that symptoms requiring an intervention would still be observed by the physician.^{3,4,5} It is also probable that lowering one's threshold for repeat imaging would allow the use of opiates. Other recently conducted studies also did not find any significant differences in craniotomies in

emergency and elective procedures.^{19,20} Adding acetaminophen and NSAIDs as adjuncts to opioids increase patient satisfaction with pain management.^{21,22,23} There are several limitations to our study, firstly it is a single center study, and we did not have enough number of patients or enough variables changing over time that may hint towards a significant change. Secondly, the study was conducted at a large tertiary care hospital in a large metropolitan city. Out institute by its design caters to more emergency cases than elective cases, this could have skewed our results towards emergency cases having the same levels of pain. Lastly, we are bound by our study methods, we used the VAS scale which is subjective, as different patients have different levels of pain tolerance.

The pain that is experienced by the patient is subjective in nature. However physicians can read the signs of pain experienced through the physiological changes such as, tachycardia, tachypnea among others. These signs if not managed may lead to post-operative complications, further deteriorating the health of the patient.¹³ Hence pain management is of vital importance in patient recovery and care should be taken when administering opiates.

CONCLUSION

We did not find any statistical difference in the two groups under study. The postoperative pain experience was similar in patients who underwent elective as compared to emergency craniotomies. We acknowledge the importance of adequate pain management and also acknowledge the risks involved in using opiates. For neurosurgeons maintaining the balance between side effects and reduction of symptoms continues to be a challenge.

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

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