

# COMPUTED TOMOGRAPHIC SCAN FINDINGS IN HEAD INJURY PATIENTS

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## ABSTRACT

**Objective:** To assess the efficacy of addition of tramadol to bupivacaine in prolonging the duration of post operative analgesia in spinal anaesthesia.

**Study Design:** Double blinded randomized controlled clinical trial.

**Methodology:** One hundred ASA I-II patients listed for urological surgery were randomized to two groups of 50 patients each. Group A (n=50) received 2 ml of 0.75% hyperbaric bupivacaine (15 mg) with 0.2 ml of normal saline and Group B (n=50) received 2 ml 0.75% hyperbaric bupivacaine and 0.2 ml (20 mg) tramadol by intrathecal route at L3-4 inter space. Standard monitoring of the vital parameters was done during the study period. Postoperatively, the pain score was recorded by using visual analog pain scale (VAS) between 0 and 10 (0 = no pain, 10 = most severe pain). The patient was medicated and the time was recorded. Duration of analgesia or pain free period was estimated from the time of completion of spinal injection to administration of rescue analgesic administered on demand or when the VAS score was greater than 4. Diclofenac 75 mg was given intramuscularly as rescue analgesia.

**Results:** The duration of analgesia was  $216 \pm 12.18$  min in Group A; whereas, in Group B, it was  $392 \pm 11.78$  min, which was found to be extremely statistically significant. P-value less than 0.0001.

**Conclusion:** In conclusion, this study has demonstrated that tramadol 20 mg when added to 0.75% hyperbaric bupivacaine intrathecally, significantly prolongs postoperative analgesia after major urological surgeries.

**Key Words:** Spinal anaesthesia, bupivacaine, intrathecal, post operative analgesia, tramadol.

## INTRODUCTION

Traumatic head injury is increasingly common and is a serious public health problem. Every year, traumatic brain injuries contribute to a substantial number of deaths and cases of permanent disability. If urgent necessary treatment is given within 48 hours of head injury it can effectively reduce the mortality rate. Neuroimaging techniques can localize the extent of the injury and help surgeons for planning and minimally invasive interventions.<sup>1</sup> Neuroimaging can determine chronic changes, prognosis, and treatment.

Imaging may be not done in all patients with head injury.<sup>2</sup> Neurosurgeon and radiologist can decide which patient need neuroimaging, as it is costly and time consuming. Different studies show that less than 10% of patients with minor head injuries have positive findings on CT and less than 1% need neurointerventional surgery.<sup>3</sup> Decreasing the number of CT with mild head trauma may be of benefit in many ways like safety from radiation hazards and money saving. But neuroimaging would benefit some number of low risk patients.<sup>4</sup>

Computed tomography is the diagnostic modality

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of choice for head injury due to its accuracy, reliability, safety, non invasiveability and widespread availability. After head injury changes occur in microcirculation and auto-regulation leading to brain edema, injury to axons and manifest as clinical, pathological and radiological changes. Correct diagnosis of the head injury patients can lead to proper therapeutic management. CT scan helps in detection and correct localization of the intraparenchymal hematomas, contusions, cerebral edema and foreign bodies. As CT scan is widely available, arteriography rate is reduced along with interventional surgery and skull radiography.<sup>5</sup> The present study was done to ascertain CT scan findings in head injury victims.

New Orleans criteria stated that all head trauma patients having age more than 60 years should undergo imaging. The Canadian CT head rules stated that head injury patient having age more than 65 years is at high risk for requiring interventional surgery.<sup>6</sup> Imaging should be aggressively done in younger children having head trauma and with no signs or symptoms as their imaging showed high incidence of intracranial injuries as stated by different studies.<sup>7</sup>

## Fractures

Depress fracture is when the outer table of the skull was displaced lower than the inner table. Paranasal sinuses or mastoid air cells showing an air-fluid level was secondary to a skull base fracture. Linear, comminuted fractures were also found.

### **Intraparenchymal Hematoma**

Intracerebral hematomas were hyperdense having clear margins, surrounding edema and mass effect. They showed ring-like enhancement from the proliferation of adjacent capillaries.

### **Extradural Hematoma**

Extradural hematoma was hyperdense biconvex, lentil shaped or irregular. The adjacent brain tissue was compressed and displaced with associated herniations in few patients.

### **Subdural Hematoma**

It was a hyperdense crescent-shaped or concavo-convex, extra-axial collection overlying the cerebral convexity.

### **Subarachnoid Hemorrhage**

Acute Subarachnoid hemorrhage was visualized as hyperattenuating material filling the subarachnoid space.

### **Brain Swelling and Edema:**

There was loss of grey and white matter differentiation with external CSF spaces effacement. The ventricles were squashed or compressed.<sup>8</sup>

Majority of the Patients were examined clinically during the hospitalization and routinely were re-imaged by followup CT scans. The CT scans were evaluated by different radiologist. The findings reported in the present study are the final consensus accepted by the radiologist responsible for the reporting.<sup>9</sup>

## **MATERIALS AND METHODS**

### **Sampling**

A total of 300 patients, visiting the emergency of Hayatabad Medical Complex Peshawar, were included in this cross-sectional study spanning two years duration. Head injury patients of all ages, both the sexes were included. Sampling procedure was simple non probability consecutive sampling. Informed consent from the patient or attendant was obtained. Explanation was given to the patients regarding the nature of the procedure, time consumed, and risk to the patient, data, data review and publication.

### **Data Analysis Procedure**

The data was analyzed with the help of statistical programme SPSS, version 10. Mean and standard deviation was computed for numeric variables like age. Frequency and percentage were computed for categorical variables like gender, presence of various findings on CT scan. All the results were presented in the form of tables.

## **RESULTS**

The age group involved commonly was between 20-50 years, and less than 9% were elderly (> 60years) patients. Mostly males had head trauma than females (249 vs. 51) [Table-1].

History of altered consciousness was the most common presenting symptom, followed by nausea, vomiting, headache, convulsions and shock .

Brain edema was presented in 60% of the cases, followed by fracture of the skull (58.3%), hemorrhagic contusion (49.3%), and extradural hematoma (30.6%). Acute subdural hemorrhage was present in 17.3% and subarachnoid bleed was seen in 28.6% patients, midline shift in 24% patients, pneumocephalus in 7% and intra-ventricular bleed in 7.3% of the patients [Table-2].

In 48.9% patients extradural hemorrhage was seen in temporo-parietal region, frontal region in 38.4%,

**Table 1:Age and gender wise distribution**

<b>Age Groups (years)</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
0-20	3 (1.2%)	1 (1.96%)	4
21-50	185 (74.29%)	40 (78.43%)	225
51-60	35 (14.05%)	8 (15.68%)	43
>60	26 (10.44%)	2 (3.9%)	28
<b>Total</b>	<b>249</b>	<b>51</b>	<b>300</b>

**Table 2: CT findings in head trauma patients**

<b>Findings</b>	<b>No. of Patients</b>
Brain edema	180 (60%)
Skull fracture	175 (58%)
Intraparenchymal Hematoma	148 (49%)
Extradural Hematoma	92 (30.6%)
Subarachnoid Hemorrhage	86 (28.6%)
Midline shift	72 (24%)
Subdural Hemorrhage	52 (17.3%)
Pneumocephalus	21 (7%)
Intraventricular bleed	19 (6.3%)

**Table 3: Location of extradural hematoma**

<b>Site</b>	<b>No. of Patients</b>
Frontal	35 (38.04%)
Temporoparietal	45 (48.9%)
Parietooccipital	12 (13.04%)
<b>total</b>	<b>92 (30.6%)</b>

and 13.4% in parieto-occipital location. Intraparenchymal hematoma was present in the frontal region in almost half of the patients. [Table-3].

## DISCUSSION

The head injury radiology has undergone dramatic evolution since the advent of computed tomography, which has helped to modify every aspect of the management of head trauma. CT scan imaging has confirmed that the most common victim of head injury are young males and variety of abnormalities are found in head injury patients.

Our results show consistency with previous studies that have shown that the peak incidence of road accident head injury was seen in young age ranging from 20-50 years. Bharti et al stated that 64% patients have head trauma in road traffic accidents,<sup>10</sup> while Reverdin has stated that 60-70% of head trauma occur in young people.<sup>11</sup> In the present study, 75% of the patients belonged to the 20 to 50 years age group. The young is most susceptible because they are involved in driving. Hukkelhoven et al concluded that the outcome become worse in older age group.<sup>12</sup>

It was concluded that mostly males had head trauma as compared to females because males are exposed to traffic and outdoor activities more than females in Peshawar. The male to female ratio was 4:1. Our study was consistent with Bharti et al who stated that mostly males suffered from head injuries (85%).<sup>10</sup> In the present study, skull fracture mostly involved the frontal region, secondly the temporo-parietal region. Zimmerman reported that temporo-parietal region was commonly involved by extradural hematoma (65%).<sup>13</sup> Samudrala et al reported that extradural hematomas are associated with skull fracture in more than 90% of patients.<sup>14</sup> According to Phonprasert the extradural hematomas are commonly associated with linear fracture.<sup>15</sup> In the present study, in 48.9% of the cases extradural hematoma was found in the temporo-parietal region.

Hirsh have stated that intraparenchymal hematoma of frontal and temporal lobe was commonest in head injuries.<sup>16</sup> In the present study, the intraparenchymal hematoma was found in 148 patients (49.3%).

Cortical contusions was the second common traumatic brain injury. The CT scans was normal initially. Delayed hemorrhages occurred in previously non-hemorrhagic hypodense regions in about 20% of the cases. Intraparenchymal hemorrhages were differentiated from hemorrhagic contusions.

Seeling et al reported that Subdural hematoma occurred in about 5% to 22% of patients with severe head injury and was commonly associated with parenchymal brain injuries. It was also reported that subdural hematoma had the gravest prognosis.<sup>17</sup> It was found in 17.3% of the patients in the present study.

Different authors reported that the incidence of subarachnoid hemorrhage ranged from 12% to 44% in head injury patients.<sup>18</sup> It was 86 patients (28.6%) in the present study.

The prognosis is worsen if there is associated systemic injuries in head trauma patients. If there is traumatic sequelae like brain herniation, hypoxic-ischemic changes, infarction and diffuse brain edema it will worsen prognosis otherwise the patient with minimal brain injury will recover uneventfully.<sup>19</sup>

The coronal reformation images improve the detection of intracranial injuries as compared to axial images alone. It can precisely detect the intra cranial injury which is in the axial plane adjacent to bony surfaces, reported by Wei et al. It should be included in the routine imaging of CT head examination in head trauma patients.<sup>20</sup>

CT scan has precisely and accurately evaluated the intracranial injuries in head trauma patients. It is rapid and non invasive procedure. It has assessed accurately type of injury, location, size, impending hydrocephalus and herniation. Its wide availability and non invasive property made the CT scan the investigation of choice in head trauma patients. It can accurately differentiate the various types of intracranial lesions, which has helped in the effective management. Other important factors in predicting .Poor outcome was seen in patients with presence of an intraparenchymal hematoma, parenchymal damage and old age. Serial CT scans help in the diagnosis of subsequent complications. The arteriography and surgical intervention are greatly reduced because of the precise evaluation of injuries and wide availability of CT scan.

## CONCLUSION

Computed Tomography has precisely and accurately evaluated the intraparenchymal injuries of the brain of head trauma patients. It is rapid, widely available and non-invasive which helps in the prompt and effective treatment of head injury patients. Continuous improvements in the CT Scan technology helps to reduce scan time, radiation dose and better resolution. New techniques are developed to evaluate and quantify damage on CT images thus making it the investigation of choice.

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