

# Computed Tomography Scan Findings and Glasgow Coma Scale 15 in Head Trauma Patients

Raja S Vignesh<sup>1</sup>, H Chelladuraiandian<sup>2</sup>, Heber Anandan<sup>3</sup>

<sup>1</sup>Senior Assistant Professor, Department of Neurosurgery, Thoothukudi Medical College Hospital, Thoothukudi, Tamil Nadu, India, <sup>2</sup>Consultant Neurosurgeon, Department of Neurosurgery, Manipal Group of Hospitals, Salem, Tamil Nadu, India, <sup>3</sup>Senior Clinical Scientist, Department of Clinical Research, Dr. Agarwal's Healthcare Limited, Tirunelveli, Tamil Nadu, India

## Abstract

**Introduction:** Traumatic brain injuries have been an important problem of public health for a long time. Most common and important complication of traumatic head injury is the development of a traumatic intracranial lesion which results in increased intracranial pressure and brain damage. Computed tomography (CT) scan is used as an important and non-aggressive method to diagnose and treat patients.

**Aim:** The aim is to study the incidence of positive CT brain in head-injured patients with Glasgow coma scale (GCS) score 15.

**Methods:** Patients who were admitted with head injury were included in the study. All patients were subjected to CT scanning without any historical or clinical selection criteria. Patients with GCS <15 were excluded from the study.

**Results:** Patients with findings in CT correspond to 12.86% of the study patients. About 39% of patients had fracture, 25% of patients had contusion, and 5% of patients multiple findings.

**Conclusion:** CT scan is essential in the management of patients with minor head injuries.

**Key words:** Computed tomography scan findings, Glasgow coma scale, Head trauma

## INTRODUCTION

Head injury refers to traumatic brain injury (TBI) which is classified into mild, moderate, and severe types based on Glasgow coma scale (GCS). Many times, the clinical status correlates well with the radiological findings in computed tomography (CT) scan.<sup>1</sup> On some occasions, they do not match. Most of the patients with GCS 15 do not have a positive finding in a CT scan. Still, some may have findings in CT scan. On few occasions, they may require intervention if there is deterioration in clinical condition or worsening of CT findings. Even though severe complications requiring neurosurgical intervention are usually rare in mild TBI patients, fear of the consequences of delayed treatment has led many to

do CT scanning in patients with mild TBI. This follows the trend of increasing CT usage in diagnosis.<sup>2,3</sup> A certain percentage of patients with “mild” head injury who present with no or minimal disturbance unconsciousness subsequently deteriorate.<sup>4</sup> Incidence of this phenomenon often referred to as “talk and deteriorate” has been reported to between 1.0% and 3.0% of those patients who were initially diagnosed as having a mild head injury. Emergency physicians need to decide which patients need urgent imaging, who needs observation, and which patients can be sent home. Nearly 90% of head CT scans have negative results for clinically important brain injury.<sup>5</sup> Only 1% of all cases of these cases require neurosurgical intervention. The incidence of abnormal CT findings in mild head injuries varies in various reports ranging from 5% to 28%, of which 0.76% to 8.57% required surgical interventions. Most physicians rely on clinical criteria such as GCS score, loss of consciousness, mode of injury, and changes in mental status to predict the probability of intracranial lesion; however, some studies have demonstrated that normal neurological examination does not reliably rule out intracranial lesions. This had led some authors to recommend liberal use of CT scanning

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**Corresponding Author:** Dr. Raja S Vignesh, 961 A, T.V.S. Nagar, Maharajanagar Post, Tirunelveli - 627 011, Tamil Nadu, India.  
Phone: +91-8144414272. E-mail: drsvignesh78mch@gmail.com

even in patients with a GCS score 15 or a history of the significant mechanism of injury. In this study, we study the patients with TBI admitted with GCS 15 and have positive findings in CT.

### Aim

The aim is to study the incidence of positive CT brain in head-injured patients with GCS score 15.

## MATERIALS AND METHODS

The study was done at the Department of Neurosurgery at the Madras Institute of Neurology, Madras Medical College, and Rajiv Gandhi Government General Hospital, Chennai. The Institutional Ethics Committee approval and informed consent from patients' relatives were obtained. Patients who were admitted with head injury were included in the study. All patients were subjected to CT scanning without any historical or clinical selection criteria. Exclusion criteria: Patients who were admitted in head injury ward 24 h after the occurrence of injury, patients referred with CT brain from outside our institution, and patients with GCS <15 were excluded from the study.

## RESULTS

5308 patients were screened for this study, in that 3536 patients presented with GCS 15 which corresponds to 66% of the study group. All the patients with GCS 15 were taken CT brain, out of the total patients, 455 patients had one or more findings in CT brain. Patients with findings in CT correspond to 12.86% of the study patients. About 39% of patients had fracture, 25% of patients had contusion, and 5% of patients had multiple findings (Figure 1). In 455 abnormal CT brain, 383 were male patients and 73 were female patients. The most common mode of injury is road traffic accidents, 95 patients (65%), next common mode of injury was fall, 134 patients (29%), followed by assault 35 patients (6%). Nearly 92% of patients were treated conservatively (Figure 2).

The total patients admitted with GCS 15 and were operated corresponds to 0.9% compared to total population of patients with GCS 15. Out of the 455 patients who had positive CT scan, 37 patients (8.1%) had no symptoms. Out of the 27 patients of depressed fractures, 1 was a compound depressed fracture which was operated. One case of extradural hematoma which had no symptoms was operated.

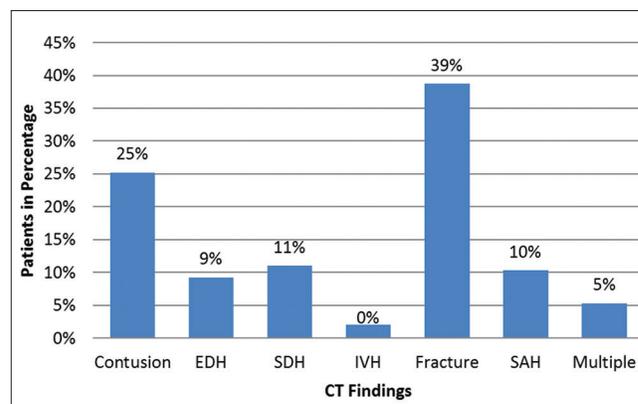


Figure 1: Distribution of computed tomography findings

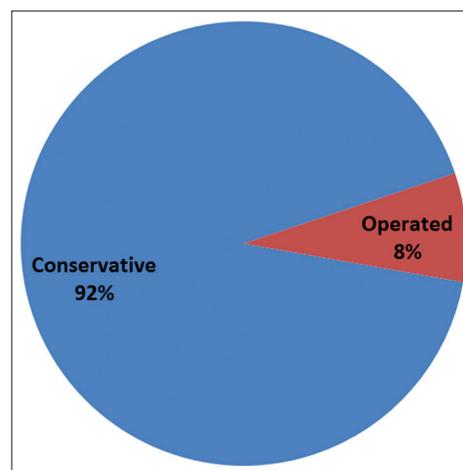


Figure 2: Distribution of treatment provided for the study patients

## DISCUSSION

Head injury is a major health problem and a frequent cause of death and disability. In developing countries, the incidence of TBI is increasing as traffic increases, besides other confounding factors such as industrialization, falls, and ballistic trauma. Radiographic examination of the skull is an essential part of the management of head trauma, but its limitations in plain radiographs are now recognized even in the diagnosis of skull fractures. CT facilitates a comprehensive diagnosis and permits early and targeted intervention.<sup>6,7</sup>

The reported incidence varies from place to place and so are the management guidelines. The variable management practices could be attributable to availability of resources and neurosurgical care. CT examination has become a standard tool in the investigation of head injury owing to its better sensitivity over skull radiographs and lower cost compared to magnetic resonance imaging. Although CT

has almost revolutionized the diagnostic workup of head injury, its applicability in all cases is now debatable. Careful patient selection based on clinical parameters and selective ordering of CT scan without jeopardizing patient care would not only reduce the cost of hospital stay but also undue radiation exposure in many.<sup>8,9</sup>

In a study by Joseph *et al.*,<sup>10</sup> a mild GCS score (GCS 13-15) in patients with an intracranial injury does not preclude progression on repeat head CT and the need for neurosurgical intervention. Melo *et al.*<sup>11</sup> also indicated that of patients with mild brain injury, neurosurgery was performed in 6.7% and 9.2% had neurological disabilities. In fact, mild brain injury based on GCS score may be associated with significant abnormalities in CT scan, require of neurosurgical procedure and intensive care unit admission. Moreover, Chierigato *et al.*<sup>12</sup> showed that the GCS scoring system was not enough for assessing brain injury, and therefore, it should be combined with other systems such as TBI classification.

## CONCLUSION

CT scanning is the primary modality of choice in the diagnostic workup of patients with acute TBI for identification of various intracranial consequences, especially within 48 h, which helps in the initial assessment, treatment planning, and follow-up and long-term management of patients. CT scan allows rapid assessment of the extent and type of brain pathology which ensures patients who require urgent surgical intervention at the earliest opportunity. CT scan is essential in the management

of patients with GCS 15 as a positive CT will guide a more vigilant and better management and also the treatment outcome is better.

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