

## Utility of the Routine Follow-up Head CT in Complicated Mild TBI

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### Introduction

More than 1.3 million people visit the emergency room every year for a mild traumatic brain injury. (1) Of this cohort, 6-15% have intracranial bleeding on computed tomography (CT) and are diagnosed with complicated mild traumatic brain injury.(2-4) Amongst patients diagnosed with complicated mild TBI, only 1-3% require immediate neurosurgical intervention.(5-6) The standard of care for complicated mTBI patients after initial CT scanning consists of observation and repeat head CT 24-48 hours after admission.(7) The purpose of the repeat HCT is to rule out progression of the intracranial bleed.(3,7) However, the superiority of this approach has never been proven.

In a retrospective study of 179 patients with mild head injury and a non-operative first CT scan, only 4% of patients required subsequent intervention.(8) Others found that only 1% of patients with mTBI and initial non-operative management required neurosurgical intervention.(9) The purpose of this study is to evaluate the need for repeat head CT scanning in patients with complicated mild TBI that were determined non-operative after the first CT scan.

**We conducted a prospective observational study to determine how often routine follow up head CTs lead to a neurosurgical intervention.**

### Methods

Over a three-year period data on patients presenting with a complicated mild TBI were prospectively enrolled in this study. Complicated mild TBI is defined as GCS 13-15 with head CT positive for traumatic brain injury. All patients must have been deemed non-operative after their first head CT and have a follow up CT scan during their hospital stay.

### Results

We reviewed data from 380 patients with complicated mild TBI. Complicated mild TBI is defined as GCS score 13-15 with a positive head CT scan. Three patients required neurosurgical intervention (0.79%). The other 377 patients did not (99.21%). All of the operative patients demonstrated symptoms of neurological worsening, compared to only 2.65% of the non-operative patients ( $p < 0.0001$ ).

On repeat head CT, there was a significantly higher incidence of subdural hematomas among the operative group (100%) compared to the non-operative group (35.81%) ( $p = 0.0472$ ).

The time between first and second head CT was not different between both groups. The mean time was 11.85 hours.

### Demographics

Demographics	Intervention N=3	Non-Intervention N=377	P-value
Age (years)	67.67 (17.5)	54.01 (20.9)	0.2688
Gender (F/M)	0%/100%	33 /67%	0.5538
Alcohol Consumption (%)	0%	28.30%	0.5624
Time Between 1st and 2nd CT (hours)	7.51 (7.30)	11.84 (7.61)	0.2332
Median GCS-Admission	14	15.00	0.2607
Median GCS-Discharge	15	15.00	0.5380

### Conclusions

- With this prospective observational cohort study we could show that the event rate for craniotomy after a non-operative first head CT in the setting of complicated mild TBI is low,  $< 1\%$ . All patient needing a neurosurgical intervention had a neurological decline before the second CT scan.
- All patients in the operative cohort had acute subdural hematomas that showed increased in size on the follow up CT scan prompted by neurological worsening. In pervious studies epidural hematomas are often highlighted because of their potential to cause late deterioration. This study emaphazies the fact that patients with acute subdural hematomas also should be watched closely.

- None of the patient with contusion or traumatic subarachnoid needed a neurosurgical intervention, although 14% had worsened imaging findings on the routine follow-up CT scan.
- Overall this data support the notion that a routine follow up head CT is not useful in identifying patients with the need for a craniotomy. However clinical observation for at least 10 hours is paramount for this patient population.

**Learning Objectives:**  
**The routine follow-up head CT in complicated mild TBI is not necessary to identify patient in the need for a trauma craniotomy, but observation and serial neurological exams are.**

### References

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