

# Copper Beaten Skull: An Incidental Finding in Autopsy

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## Abstract

The Sutures in the human skull are zones of separation between skull bones, which also allows the skull bones to grow in a fashion along with increase in size of brain, early closure of sutures (craniosynostosis) may lead to increase in intracranial tension and it pushes the soft skull outward which leads to undulating patterns formation in inner plate of skull called as silver beaten or copper beaten skull. Here we document an incidental finding of copper beaten skull pattern in a case of road traffic accident brought to Mortuary of AIIMS Bhubaneswar.

**Keywords:** Copper beaten skull, silver beaten skull, skull sutures, autopsy.

## Introduction

Variations and anatomical anomalies of skull are usually related to primary maldevelopment of the brain.<sup>1</sup> 'Copper-beaten' skull refers to the projecting convolutional marks found in inner table of multiple bones of the skull. Underlying cause is thought to be related to increased intracranial pressure resulting from such processes as craniosynostosis, obstructive hydrocephalus and/or intracranial masses.<sup>2</sup> The growing brain wields a constant pulsatile pressure on the soft cranium, creating a gyral pattern on the inner table. This appears as 'copper-beaten skull' on plain skull X-rays. We report an incidental finding of Copper Beaten Skull which we came across during autopsy of an road traffic accident case brought to mortuary of AIIMS Bhubaneswar.

## Case Report

We received a case of Road Traffic Accident victim who had died during treatment six hours before the autopsy. On taking history from the relatives, we came to know that he was mentally retarded since childhood. On day of incidence he was travelling as a pillion rider when the motorcycle met with the accident. He suffered head injuries and died 7 days after.

Upon external examination, corpse of a 18 year old male with evident dwarfism. The total body length was 136cm and 52kg in weight. There was subconjunctival haemorrhage on left side. Evidence of bleeding from right ear in form of dried blood was present. All the teeth had braces to fix them in shape. Stapled surgical incision mark was present on left parieto-temporal region underneath of which sub-scalpal hematoma was present. Multiple fractures of facial bones were present. There was Multiple abrasions and contusions were present over the body. There was a palpable left femur fracture.

Upon removal of the skull cap, we noticed multiple gyral impressions over the inner table of the skull bones. The impressions were also present over the skull base. There was comminuted fracture of the frontal bone

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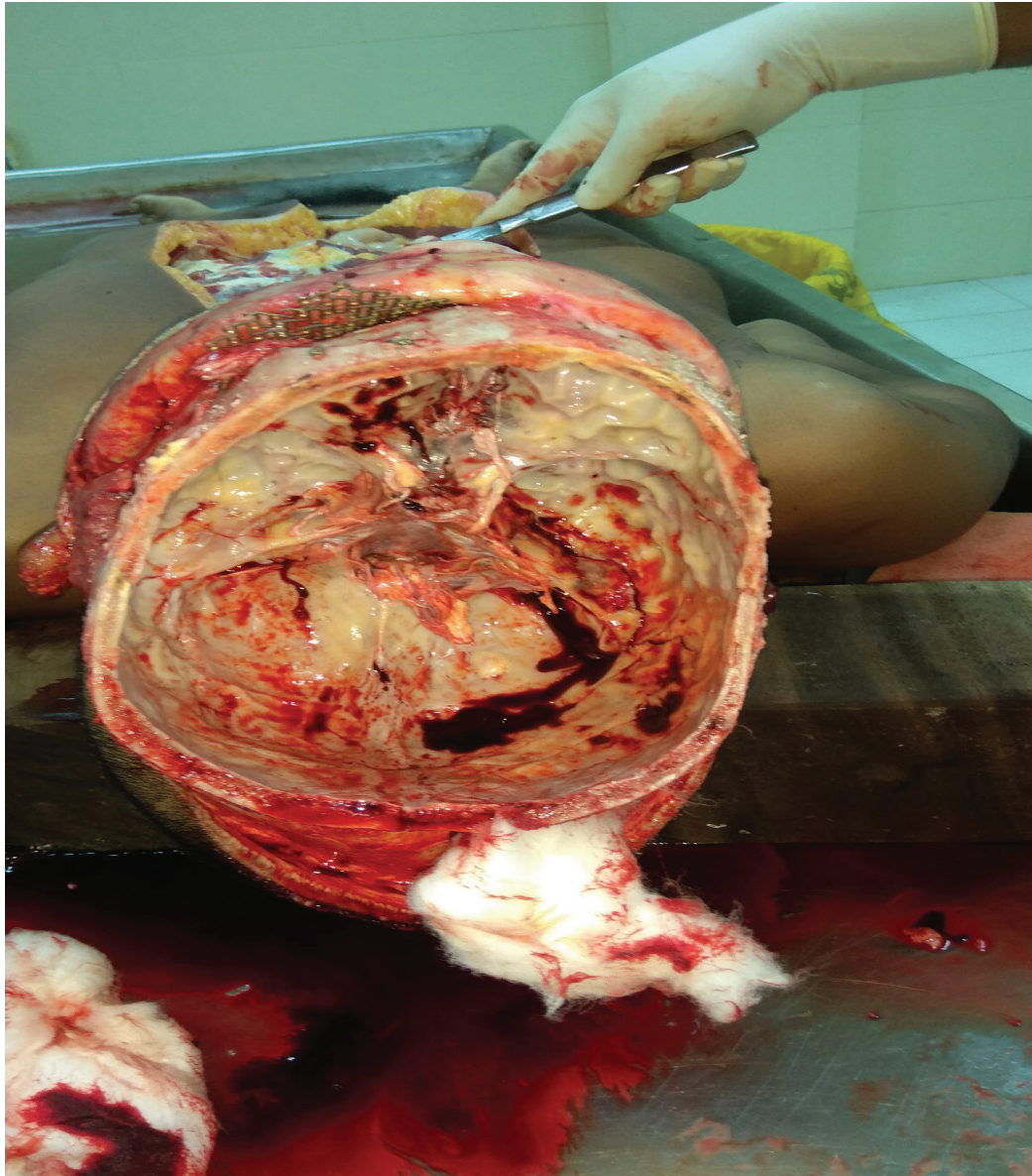
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and roof of left orbit. Skull base was fractured in right middle and posterior cranial fossas. Left frontal lobe was lacerated. There was transection of brainstem. The

cause of death was attributed to head injury and its complications.



**Figure: On opening the skull, the inner table of skull showing - COPPER BEATEN pattern .**

### **Discussion**

Copper beaten appearance of the skull is the least common appearance found in craniosynostosis of evolving skull.<sup>1,3</sup> The pattern was firstly presumed to have been caused from chronically raised intracranial pressure but currently widely thought to be a reproduction of normal brain growth on the inner table,

without pathological significance.<sup>3</sup> The markings are most prominent during periods of rapid brain growth that is between age 2 - 3 years and 5 - 7 years. They become less apparent after about 8 years of age.<sup>4</sup>

Diffuse, severe beaten-copper pattern is an indicator of chronic elevated intracranial pressure, which is more common in patients with craniosynostosis.<sup>5-6</sup> Van Der

Meulen et al. concluded that the occurrence of the copper-beaten skull pattern did not significantly affect long-term intelligence levels<sup>4</sup>. Though, there could be a negative effect on more subtle areas of development, like reading, spelling and behaviour.<sup>4</sup> These convolutional patterns should be distinguished from Lückenschädel (lacunar skull), which is due to mesenchymal dysplasia of calvarial ossification. It is characterised by many oval lucencies of the inner table and diploic space. These are generally present at birth and are related with meningocele/myelomeningocele/ encephalocoele, spina bifida, cleft palate and Arnold Chiari II malformation.<sup>6</sup> It is most prominent in the parietal and occipital bones. Seldom these findings are normal and disappear by 6 months of age.<sup>1</sup> Incidental finding of copper beaten skull in adult without pathological ICP rise is rare.<sup>7</sup>

Though an incidental finding we cannot wholly disagree on the fact that the copper beaten appearance of the inner table of skull presents lot of surfaces to the brain to have friction during a trauma to head like in case of head injury. This could be maximising the trauma caused to the brain. The hypothesis put forth need more studies for correlation.

**Conflict of Interest-** None

**Source of Funding-** None

**Ethical Clearance:** Taken from Institutional Ethical Committee, AIIMS Bhubaneswar. The identity of the deceased was not revealed in the manuscript.

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