



(CASE REPORT)



An exception or not? of Puppe's rule

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Abstract

When two fracture lines of a solid surface intersect, it is always possible to tell which one has been made first. In fact, any fracture lines caused by later impacts are halted by any prior surface damage. This well-known principle (which Puppe established in 1903) has primarily been used in glass fracture analysis, but it can also be used to examine skull fractures. It can help sequencing and determining blunt force injuries. In this context, we report the case of a 43 years old man, working as an industrial labourer, met with a road traffic accident in which he sustained multiple injuries and demised. His autopsy and examination of skull revealed an exception in Puppe's rule.

Keywords: Puppe's rule; Blunt force injury; Road Traffic Accident; Glass fracture analysis

1. Introduction

It has been more than a century since the German forensic pathologist Puppe reported in 1903 that it is possible to determine the order of trauma in skull fractures caused by blows to the head. When dealing with intersecting fractures, Puppe's rule¹ states that it is easy to determine which injury occurred first since the undamaged skull permits fractures to develop properly whereas the fractures brought on by the following injury are blocked where other fracture lines are already present (Figure: 2). As a result, future hits do not cause more fractures to develop along the lines of the skull's pre-existing fractures. Reconstructing the order of injuries is conceivable.¹⁻³ This judgment was supported by tests carried out by additional forensic pathologists. It became clear right away that this clause also applies to fractures brought on by bullets. When it comes to gunshot wounds, even more detailed statements might be made. However, Puppe's rule only partially holds true because of ossification disorders or insufficient ossification. In a thorough analysis of skulls, glass, and eggs that had received further blows, there had been no exceptions to this rule⁴. In this case we are reporting an exception of puppe's rule followed by road traffic accident.

2. Case Report

A 43-year-old man, working as an industrial labourer, met with a road traffic accident in which he sustained multiple injuries. He was shifted to a private hospital for management. Despite of the necessary treatment he could not survive. As it was a medico legal case, the dead body was sent for post mortem examination to the Department of Forensic Medicine. There was a laceration of 10x2 cm, bone deep, over the left side of forehead extending upwards up to mid frontal area of the head, under which depressed comminuted fracture over fronto parietal bones of the skull. A horizontally placed fissure fracture (line 1) is present over frontal bone of the skull, extending vertically up to the

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parietal bone of the skull. Another fissure fracture (line 2) of 8 cm, is present which is placed horizontally over mid parietal bone of skull intersecting the above-mentioned fracture (Figure:1).

Two successive impacts from a blunt force or gun shots are necessary to apply puppe's rule. Here we cannot come to an opinion by observing the above fractures that they are caused by single impact or successive impacts. As this is a case of road traffic accident, if fracture was due to single impact, it will not accept Puppe's rule. If it was due to successive impacts then it accepts puppe's rule and this case is an exception for Puppe's rule, because second fracture intersects first fracture and doesn't terminate before first fracture.

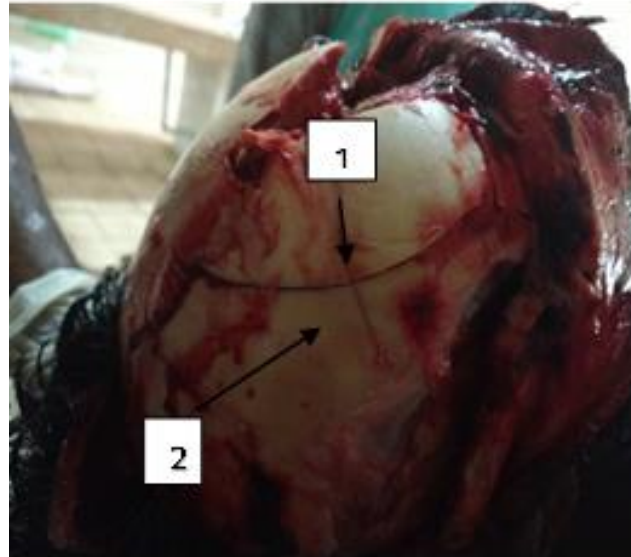


Figure 1 Arrow showing second fracture intersecting first one

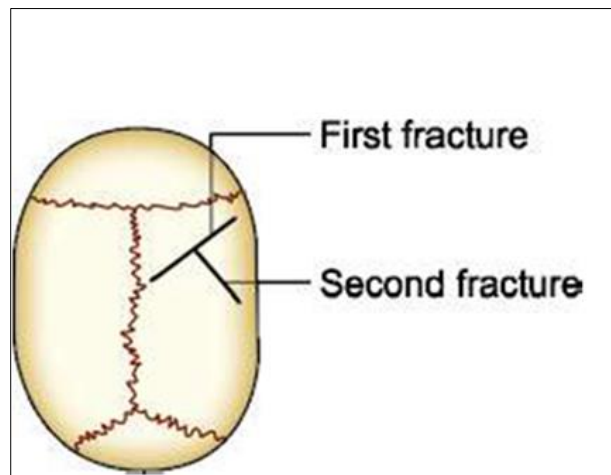


Figure 2 Puppe's Rule

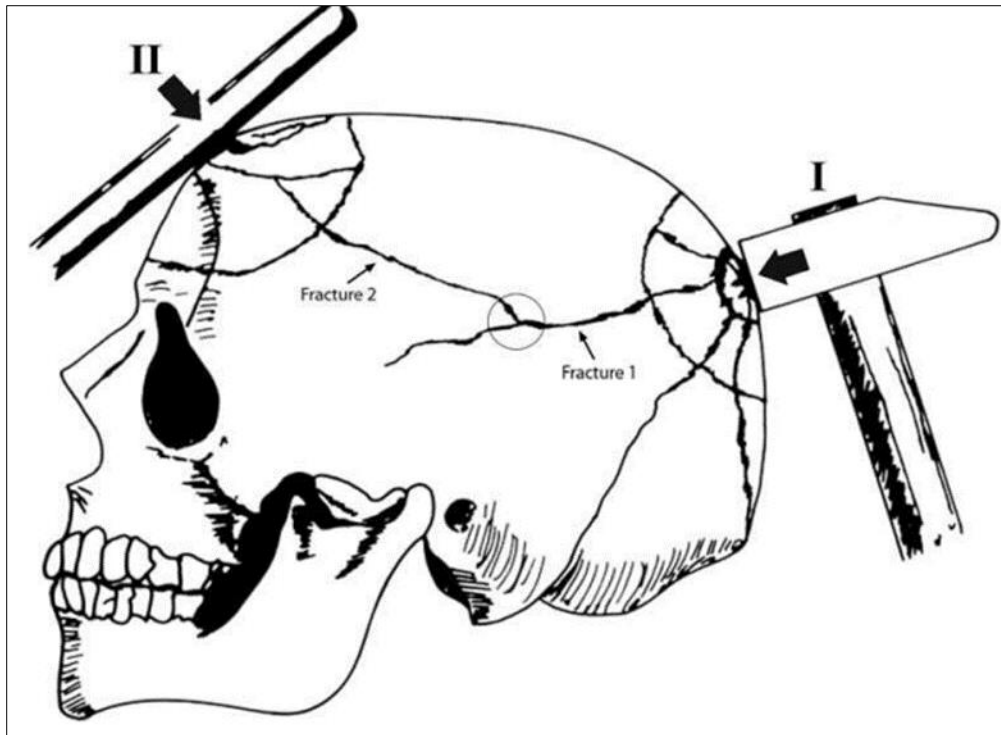


Figure 3 Illustration of Puppe's rule, modified after Madea⁶. Two blunt force injuries to the skull with an intersecting fracture. A fracture line produced by the second impact is arrested at a pre-existing fracture line (black circle)

3. Discussion

It is possible to tell which fracture line on a solid surface—ice, glass, eggshell, etc.—was created first when two fracture lines cross¹. In actuality, all fracture lines caused by later impacts are halted by an existing surface damage¹⁻⁴. This well-known principle, which Puppe introduced in 1903, has primarily been employed in glass fracture analysis, but it may also be used to examine skull fractures (Fig. 3)¹⁻⁸. Puppe's rule enabled the pathologist in several cases of multiple gunshot wounds that Madea et al. have recorded to reconstruct the precise firing order⁵⁻⁶. Similar to how Spitz and Fisher accurately predicted the order of determination of two entrance holes into the cranium in close proximity while analysing the bone fractures⁹. Additionally, several authors have talked about how Puppe's rule can be used to identify exit gunshot injuries^{3,6}. This may be especially crucial if there are no external bevelling or overlaying skin signs present (such as in cases of animal or insect damage, cremation, or decomposition of the body) or if external bevelling is also present at the site of entry¹⁰⁻¹¹. Alberto Amadasi¹² et al. presented an peculiar case is a subject undergoing cranial fractures due to blunt force trauma has fracture lines continued exactly in the opposite direction, as though they were “skipping” the hole, following the same direction and the same axis and stopping a few centimeters over on the opposite side of the craniotomy hole.

4. Conclusion

In our case we found that a middle age male met with a road traffic accident and demised and on autopsy and examination of skull revealed that exception of puppe's rule where blunt trauma force causing exception of puppe's rule is a very rare.

Compliance with ethical standards

Disclosure of conflict of interest

There are no conflicts of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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