Of a crash helmet and a cranial bolt: A design change recommendation

Sir,

A 30-year-old male was admitted after his motorcycle skidded causing his crash helmet to shatter. Apart from a transient loss of consciousness, the patient did not have any neurological deficits. On examination, he had stable vitals and a full Glasgow coma score. He was distraught as the helmet side-bolt anchoring the facial visor had penetrated his left frontal scalp [Figure 1].

A CT scan of the head revealed that the bolt was lodged against the outer table of the left frontal bone [Figure 2] with no intracranial injury. At surgery, the bolt, nut and a fiberglass helmet shard [Figure 3] were disimpacted from bone and removed. The wound was debrided and closed primarily under local anesthesia. The patient was discharged the next day and had a healthy wound at a follow-up of six weeks.

Moped and motorcycle riders are involved in more than half of all road traffic fatalities with helmetless riders being three times more likely to sustain head injuries than those with helmets.\(^1\) Crash helmets help reduce head-injury-related mortality by 71%.\(^2\) It is to be emphasized in the strongest possible language that this crash helmet was instrumental in saving the patient from a potentially fatal outcome. The authors are unaware of any such case as has been recorded in this report. However, the ‘cranial bolt’ does indicate that performance tests for crash helmets may not exactly replicate ground conditions. This may result in unpredictable patterns of injury as in this case.\(^3\)

As the bolt, nut and a shard of the helmet were recovered in toto after surgery, it is hypothesized that the side impact smashed the helmet at its attachment with the face visor. This was then driven inwards. The sharp threads of the bolt pierced the scalp and lodged against the frontal bone where the projectile’s kinetic energy dissipated. It is our suggestion that the nut-bolt assembly anchoring the face visor be replaced by a rivet system or else by simply reversing the direction of the bolt’s existing out-to-in direction. This will bring the broad bolt head

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on the helmet’s inside and the sharper threads on the outside thus, perhaps, decreasing the possibility of a penetrating head injury in the event of a side impact.

The epidemiological benefits of using crash helmets remain unequivocal. However, minor design alterations may further decrease the incidence and severity of head injuries after two-wheeler accidents.

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References


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