'Board' out of my skull: penetrating skull fracture from a surfboard nose

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DESCRIPTION

A 45-year-old man attended our emergency department with a suspected scalp laceration sustained while surfing at a local break. He was an experienced surfer and described attempting to dive under an oncoming wave that contained a stray surfboard; this caught him on the head and broke in the process. He swam to shore and was transferred to hospital, via ambulance, where he was triaged as a non-urgent case. On examination, fibreglass debris was seen protruding from the wound that appeared to be deep to bone. He was subsequently transferred to resus and underwent a CT brain, demonstrating a penetrating skull fracture with a 30×10×10 mm foreign body in situ (figure 1). The images also demonstrated a small associated subdural haematoma, significant air in the subdural space and some minor midline shift (figure 2). The patient had no neurological features on history or examination. In discussion with the local neurosurgical team he was loaded on levetiracetam (Keppra), given intravenous antibiotic cover and transferred for surgical intervention. He underwent an emergency craniotomy and titanium cranioplasty to remove the segment of surfboard and a 30×30 mm section of contaminated, comminuted fractured skull to minimise the risk of osteomyelitis (figure 3). His postoperative course was uncomplicated although the infectious disease team were involved extensively due to the high risk of osteomyelitis. The patient initially had intravenous ciprofloxacin and clindamycin due to the saltwater exposure. Intraoperative cultures grew *Propionibacterium acnes*, commonly found in sebaceous follicules of healthy adults, and he was switched to oral amoxicillin and moxifloxacin.[1]

The majority of surf-related injuries consist of superficial lacerations, sprains of the neck or back and fractures of limbs or facial bones. These

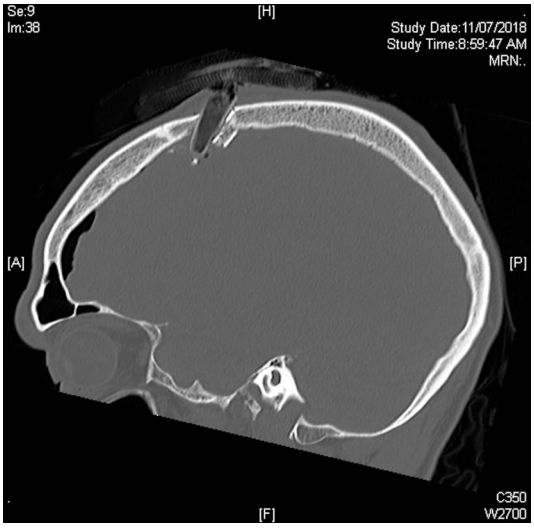

Figure 1 A sagittal image slice from the CT in the bone window clearly demonstrating the penetrating skull injury, foreign body and free air.

Figure 2 A coronal image slice from the initial CT showing small subdural haematoma and subtle midline shift.

Figure 3 A postoperative slice of CT demonstrating removal of foreign body, titanium mesh cranioplasty and resolution of subdural haematoma.

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$$E = \frac{1}{16} p g H_{m0}^2$$

Figure 4 The wave energy equation based on linear wave theory. *E,* mean wave energy density per unit of horizontal area (J/m^2) *p,* density of water; *g,* gravitational acceleration; H_{m0}, height of wave in metres.

presentations are common to emergency departments located near popular beach areas.[2–4] When assessing patients with such injuries, we must also consider contributory factors to the injury such as alcohol and illicit drug use.

It is important to obtain a good history and not to underestimate the forces that can be transferred by ocean waves (figure 4).[2 5] In this case the stray surfboard likely struck the patient square on its long axis at a speed of ~10–18 km/hour, transmitting considerable force as opposed to a glancing blow. The severity of the injury was initially underestimated by both the paramedics and triage staff, which could have led to a poorer outcome and may have been avoided if effectively using trauma triage guidelines.[6 7] It is also important to remember antibiotic prophylaxis may vary from standard guidelines if injuries are sustained in/exposed to salt or freshwater. In saltwater the use of doxycycline (*Vibrio* sp) and in freshwater ciprofloxacin (*Aeromonas* sp) may be appropriate.[8]

This case also highlights the importance of protective headgear use in surfing, a safety measure that is often referred to as 'kookie' by some members of the surfing community. In fact, a recent Australian study demonstrated only 38% of surfers consider the sport to be associated with a moderate to high risk of head injury and only 2% of those questioned wear protective headgear regularly.[9]

Patient's perspective

During an early morning surf, I was paddling back out and just as I was about to duck dive under some white water I saw another surfer fall off a wave, approximately 10–15 m ahead of me. Due to the distance between us I felt no sense of danger, but as I was coming up from the duck dive there was a large impact on the top, front right side of my head. When I checked the wound with my hand I could feel something hard and jagged. I paddled back to the beach accompanied by the surfer whose board had hit me. On inspection we could see that the nose of his board was crumpled and broken. An ambulance was called, and I was initially taken to the emergency department at Manly hospital.

Initially I was feeling pretty shaken up, but when at first it seemed as though the wound just needed to be cleaned and sutured I started to relax. However, when the nurse called in a doctor and they then suggested a CT scan I started to feel nervous again and when I was wheeled into the resuscitation room and had a cannula inserted in my arm I knew I was in trouble. By the time I was wheeled into the operating theatre a few hours later I was terrified (at least until they give me something to help me relax) and just kept telling myself I was going to be ok. As for surfing again, I have to wait 3 months and then I'll give it another go. I'll be wearing a helmet though!

Learning points

- Triage category may not represent true acuity of a case.
- It is important to consider the mechanism of injury and exercise caution in cases where water sports are involved.
- The antibiotic treatment of wounds that have been exposed to fresh/salt water may vary to normal guidelines.

Contributors JJG was the treating doctor in this case, have obtained consent, organised and written the first draft of the following case. Co-author of revisions made. HR was involved in the care of the patient, has been involved in the production of the first draft and advised on the content for learning points. DC has contributed to the acquisition of images and critical appraisal of the first draft. Co-author of revisions made. MA has provided critical appraisal for the first draft.

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