

# Atypical Clival Fracture Due to Minor Trauma and Cerebrospinal Fluid Rhinorrhea

Hajime Ono

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In some previous cases of clival bone fracture in patients with severe head injury, the diagnosis of clival bone fracture was relatively complicated. Regarding the incidence of clival fractures, some reports have shown an incidence of between 0.21% and 1.2% among traumatic brain injury victims who are admitted to hospital (1-3). The relationship between the site of the head and the type of fracture is well described in previous reports. The majority of clival bone fractures appear as linear fractures on CT and can be classified into three types: longitudinal, transverse and oblique (4). However, there are fractures that do not display the typical fracture pattern. Tohge et al. showed a case of an atypical clival fracture in a 38-year-old man with a history of head trauma (5). The clival bone fractures appeared as a round-shaped defect, and no continuous linear fracture was recognized on CT. The relationship between traumatic force and clival bone fractures is very interesting. In the previously mentioned case, the atypical fracture shape cannot be explained by osteoporosis, because the patient was young. In many reported cases, the main mechanism was occipital trauma (6), which fractured the low-resistance floor of the anterior skull base, due to the combined effect of osseous and cerebral oscillations-causing a pressure gradient inside the skull. Atypical bone injury is considered to be related to the state of the clival bone, including the development of a well-pneumatized sphenoid sinus. On the other hand, some reports describe cerebrospinal fluid (CSF) rhinorrhea and subsequent bacterial meningitis as a result of clival bone fracture. In previous reports, CSF occurred in 7.7% of pa-

tients with clival fractures (3). Endoscopic nasal surgical procedures have been developed for the treatment of CSF leakage, and this endoscopic repair method is considered a reliable technique for achieving fistula closure.

**The author states that he has no Conflict of Interest (COI).**

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