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Course of Fracture Line in Sagittal Splitting of Human Mandible

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Abstract: We performed sagittal splitting osteotomy using fresh, unfixed cadavers. Observation was carried out macroscopically and with light microscopy and 3-dimensionally reconstructed images. The aim of this study was to clarify the relationship between the fracture line and the Haversian canal and Haversian lamellae. Macroscopic observation revealed that the fracture line run through the mandibular angle from the inferior rim of the mandibular ramus towards the posterior rim, passing almost through the center of the ridgeline. Histological observation showed that the fracture line tended to run along the curve of the lamellar structure. The incidence of the fracture line running along the lamellar structure of the Haversian lamellae was approximately 65% (21 cases), and the incidence of the fracture line also cutting across the Haversian canal without passing along the lamellar structure of the Haversian lamellae was approximately 35% (11 cases). Observation of 3-dimensional reconstruction images revealed that the section of Haversian canal near the mandibular angle essentially runs from the mandibular head to the inferior rim of the mandible, and that the fracture plane ran similarly. The direction of an impact-associated bone fracture line is infiuenced by the structures that constitute the lamellar bone such as Haversian canals, Haversian lamellae and interstitial lamellae, with fracture lines tending to run through those parts of the bone that have a low physical bond strength. This suggests that the ideal direction of action of the bone chisel in sagittal splitting surgery is the one in which no resistance to the path of the Haversian canal is encountered.

Key words: Fracture line, Haversian canal, Haversian lamella, Sagittal splitting method

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