

Histopathological Examination of Experimentally Retarded Rat Molar Eruption Induced by Bisphosphonate Injection

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In order to clarify the involvement of osteoclasts in the tooth eruption, the osteoclastic function of newborn rats was inhibited by the administration of bisphosphonate, a strong osteoclast inhibitor, and then the developing maxillary molars and their surrounding tissue were histopathologically examined.

Newborn rats were received daily injections of 0.2 mg/kg of incardronate, a member of aminobisphosphonate, that started at 3 days of age. The maxillae were dissected on the 9th, 12th, 15th, 17th and 20th days after birth and the paraffin sections of the first molars and surrounding tissue were stained with H-E or tartrate-resistant acid phosphatase (TRAP). The specimens from the age-matched non-injected rats served controls.

In the control group, the resorption of the bone tissue covering the occlusal surface began on the 9th day after birth, the covering completely disappeared on the 15th day after birth, and the tip of the tooth crown was exposed to the oral cavity. In the experimental group, on the other hand, the covering bone tissue still remained on the 15th day after birth and the formation of both root and interradicular septum was greatly disturbed.

Between the 9th and 15th days after birth, the injury of survival surface of the crown, and the distortion and interruption of Hertwig's epithelial sheath caused by the invasion of unresorbed bony trabeculae were evident in the experimental group. Osteoclasts observed in the experimental group tended to be large in size and often showed apoptosis.

From the present study, it is speculated that the disturbed bone resorption induced by the administration of bisphosphonate brings about multiple derangements in the tooth morphogenesis and their reciprocal influence leads to the retarded tooth eruption.

Key words : bisphosphonate, osteoclast, bone resorption, tooth eruption