Skull Paget’s Disease Developing into Chiari Malformation

To the Editor;

Paget’s disease of bone is a chronically progressive disease, showing localized disorder of bone thickening and deformity caused by excessive turnover of bone remodeling. The incidence of Paget’s disease is varied by ethnicity; namely, it occurs very rare in Africans and Asians while relatively common in northern Europeans. Paget’s disease arises in the skull, pelvis, vertebrae and femur, in which multiple regions are often involved. We here present a rare case of monostotic Paget’s disease in the skull that was accompanied by Chiari malformation type I. A 79-year-old Japanese woman who had developed hearing loss and gait disturbance was referred to our hospital. She had not been treated for more than 10 years since increased level of serum alkaline phosphatase (ALP) was initially found at age 60. Bone scintigraphy using technetium-99 m diphosphonate exhibited specific and remarkable accumulation in the skull through whole body scanning (Fig. 1A). Serum ALP level at first visit was markedly high (>2000 IU/l [normal, 110–360]) and found to be predominantly originated from the bone (ALP isozymes: ALP2 and ALP3, 19% and 81%, respectively). Serum calcium level (10.0 mg/dl [8.0–9.5]) was moderately increased while serum inorganic phosphate, intact parathyroid hormone levels and other biochemical markers of bone metabolism were within the normal ranges.

Notably, brain magnetic resonance imaging (MRI) showed striking thickening of the skull (Fig. 1B, T1-image). Furthermore, cerebello-tonsillar herniation and syringomyelia, which comprise Chiari malformation type I, were coincidentally uncovered by sagittal views of T2-image (Fig. 1B, T2). Bone biopsy from skull confirmed the pathological diagnosis of bone Paget’s disease, demonstrating the thick and irregular plates of the bone trabeculae, in which the number of basophilic cement lines was significantly increased and formed the typical mosaic structure of Pagetic bone (Fig. 1C). Paget’s cases are mostly asymptomatic with only 5% of the patients developing the symptoms. Skull involvement, shown in half of the cases of Paget’s disease, compresses vessels and nerves, resulting in neurological complications such as headache, cranial nerve palsies, spinal cord compression and loss of auditory acuity [1]. In many studies on Paget’s disease, effectiveness of bisphosphonate administration has been evident although the underlying mechanism of Paget’s is still poorly understood except for its viral etiology [2]. In the present case, a bisphosphonate,
ethidronate disodium (200 mg/day), was administered daily for 6 months. During this period of bisphosphonate therapy, serum levels of ALP and calcium gradually decreased to 738 IU/l and 8.8 mg/dl, respectively, and her tinnitus was concurrently alleviated. However, her hearing loss and neurological symptoms due to skull compression and syringomyelia remained unchanged.

In Paget’s cases with skull involvement, brain MRI study is very informative to evaluate the neurological states secondarily affected by thickening of the skull [3]. This includes basilar impression, brainstem compression, spinal stenosis, and/or hydrocephalus. To our knowledge, only two cases of skull Paget’s associated with acquired Chiari type I malformation have been reported to date [4, 5], although the complication of syringomyelia in Chiari malformation has not been reported. Syringomyelia shown in our present case is likely due to prolonged congestion of cerebrospinal-fluid flow caused by compression of the cervical spine and brainstem. Surgical treatment including decompression of the brain or ventricular shunting may be required to release the neurological damages unless bisphosphonate therapy is adequately efficacious. Early discovery of skull Paget’s disease and early commencement of bisphosphonate therapy are necessary to prevent progress of the neurological involvement by Pagetic skull.

References


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