CASE REPORT

Osteomyelitis of the jaws associated with osteopetrosis: case report of two sisters

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Abstract

Osteopetrosis is a rare metabolic bone disease caused by a congenital defect in the development or function of the osteoclasts, resulting in generalised increase in skeletal mass. Osteomyelitis is a recognised complication, and prevention of dental infections can be difficult. Osteomyelitis is typically located in the mandible; the disease can also occur in the maxilla, but only rarely. We describe two cases of osteopetrosis complicated with osteomyelitis that occurred in sisters. In one sister, osteomyelitis was located in the mandible; in the other sister, the disease occurred in the maxilla. The sisters received antibiotic treatment, as well as incision and drainage of the fluctuant areas and removal of sequestra with minimal surgical trauma, after which they both improved satisfactorily. These cases underscore the importance of screening family members of patients with osteopetrosis for early detection and appropriate intervention.

Introduction

Henrich Albers-Schönberg, a German gynaecologist and radiologist, described the first case of osteopetrosis in 1904 in a patient whose cortical bone increased at the expense of medullary bone1. The name osteopetrosis was introduced in 1926 by R. G. Karshner2. This disease is also known as marble bone disease and is characterised by abnormal bone formation with consequent marked tucking of the cancellous and cortical bones along with bone marrow space encroachment or disappearance. Production of bone is normal in this disease, but there is a lack of physiologic resorption because of failure of the normal osteoclast function1. Bone involved with osteopetrosis is considered to have a compromised blood vessel supply. Local infections, such as odontogenic infections, are more likely to lead to osteomyelitis, which is reported as a complication in the mandible in 10% of osteopetrosis patients. Osteomyelitis as a complication in the maxilla, however, is rare4.

Osteopetrosis exhibits a vast spectrum of clinical, physiological and genotypic expressions5. The main clinical findings of autosomal dominant osteopetrosis (ADO) (adult benign osteopetrosis) are fractures and osteomyelitis, with increased susceptibility to osteomyelitis being the most serious complication after tooth extractions6. As the vascular supply to the jaw is compromised after dental extractions, vascular necrosis and infection are more likely to occur and may lead to osteomyelitis. There are numerous case reports of osteomyelitis associated with osteopetrosis but few reports of familial cases7,8. We report two cases of ADO complicated by osteomyelitis of the jawbone that occurred in sisters, with one case involving the maxilla.
Case reports

Case 1

A 49-year-old woman presented to our clinic after 5 days of pain and purulent drainage from the gum at the left mandibular molar. Seven years previously, the patient had experienced pain and swelling on this same site and had received antibiotic treatment at her general dentist. Fifteen years before the patient presented to our clinic, she had experienced back pain and was examined by an orthopaedic surgeon who diagnosed idiopathic thrombocytopenic purpura associated with osteopetrosis. The patient subsequently experienced occasional rib fractures as a result of ptarmus. The patient’s father, aunt and younger sister had also been diagnosed as having osteopetrosis.

On general examination at our clinic, laboratory tests revealed 24,000/mm³ of platelets, indicating thrombocytopenia. Intraoral examination revealed that the patient was edentulous with purulent drainage from a fistula on the gum at the left mandibular molar. Submucosal bleeding was visible on the soft palate and on the gum at the left mandibular molar. Sequestrum was palpable at the fistula with a probe. There was no lymph node swelling or mental nerve paresis. Panoramic X-ray films revealed generalised sclerosis of the maxilla and mandible and sequestrum at the left mandibular molar (Fig. 1A). A chest radiograph showed generalised sclerosis involving vertebrae and ribs (Fig. 1B). On admission, the patient’s thrombocytopenia was corrected with platelet transfusion, and she was given intravenous piperacillin at 1000 mg twice daily for 7 days. Then, curettage of the sequestrum was performed under local anaesthesia. The histopathological diagnosis was necrotic bony fragments at bony tissue; the bone was totally composed of cortical bone with bone marrow space barely present (Fig. 1C). The patient was followed up every week for 3 months. Healing was slow, but when signs of infection were no longer seen, follow-up was discontinued.

Case 2

The 44-year-old younger sister of the case 1 patient was diagnosed 24 years previously with osteopetrosis by an orthopaedic surgeon. Three years before she presented to our clinic, the patient had undergone extraction of the left maxillary second molar because of severe dental caries at an outside institution. As the diagnosis of osteopetrosis was not appreciated at the surgical site, the patient underwent another tooth extraction of the left maxillary third molar in an effort to treat her persistent infection. Unfortunately, the infection at this site never healed when she presented to our clinic with 7 days of purulent drainage from a fistula on the left maxillary molar buccal gingiva.

We found nothing remarkable about the patient’s general condition at her first examination, and her face showed bilateral symmetry. The panoramic X-ray films and computed tomographic scan revealed generalised sclerosis of the maxilla and mandible, and both maxillary sinus appear radiopaque along with the opacification of bilateral maxillary sinuses (Fig. 2A,B). The shape of the maxillary sinus, moreover, was typical of
osteopetrosis. A chest radiograph showed generalised sclerosis involving vertebrae and ribs (Fig. 2C). The patient was diagnosed as having left maxillary osteomyelitis associated with osteopetrosis.

The patient was treated with intravenous cefazolin at 1000 mg twice daily for 7 days. Then, curettage of the sequestrum was performed under general anaesthesia. The histopathological findings were necrotic bone with very thick laminated bone and very little bone marrow space, indicating osteopetrosis (Fig. 2D). The patient healed satisfactorily, and no recurrence of osteomyelitis was observed during the 4-month follow-up period.

Discussion

Osteopetrosis is a hereditary disease, and its pathogenesis is still unclear. However, it involves an osteoclastic activity defect, particularly in bones derived from endochondral calcification, that plays a predominant role as a causative factor. Osteopetrosis is generally divided into three types: severe infantile malignant autosomal recessive osteopetrosis, intermediate autosomal recessive osteopetrosis and ADO. Malignant autosomal recessive osteopetrosis with onset in the first decade of life has a poor prognosis because of the severe anaemia caused by the destruction of the bone marrow; ADO, in contrast, is discovered later in life and has less severe manifestations. In both of our cases, the type of osteopetrosis was autosomal dominant.

There are two types of ADO. In type I (ADO I), cranial nerve compression is common but fractures are rare; this type is caused by mutations in the lipoprotein receptor-related protein 5 gene, which is an osteoblast-expressed gene. In type II (ADO II), nerve compression

Figure 2 A 44-year-old patient with osteomyelitis in the maxilla. (A) Panoramic X-ray shows sclerosis of the maxilla and mandible. (B) Computed tomographic scan of the left maxillary sinus was radiopaque. (C) Chest radiograph shows generalised sclerosis. (D) Histopathological findings indicated osteopetrosis (hematoxylin-eosin, magnification ×200).
is uncommon but fractures are frequent; this type is caused by mutations in the chloride channel protein 7 gene (ClCN-7). Based on the nature of the ClCN-7 gene mutations, the ADO II phenotype probably results from the dominant negative effects. However, the mutations of ClCN-7 gene have been shown to be involved in another type and can be found in 15% of autosomal recessive osteopetrosis patients. We did not conduct a genetic study to confirm the diseases in these cases; diagnosis was based exclusively on clinical and radiological features. Biopsy as a diagnostic tool is not needed and must be avoided to prevent infections.

Osteomyelitis is a well-recognised complication of osteopetrosis. Osteomyelitis associated with osteopetrosis tends to be refractory because of the reduced blood supply and accompanying anaemia and neutropenia. In our cases, we performed antibiotic treatment, incision and drainage of the fluctuant areas, and removal of sequestra with minimal surgical trauma, after which the patients improved satisfactorily. Osteomyelitis requires rapid intervention with early diagnosis, drainage, debridement, bacterial culture and sensitivity testing followed by appropriate antibiotic therapy. Surgical intervention is limited to necessary extractions, incision and drainage, and possible palliative debridement. Infection often requires prolonged and adequate intravenous antibiotic therapy. We used piperacillin (case 1) and cefazolin (case 2) to treat these infections; in addition, Ogutcen-Toller et al. described fluoroquinolones and lincomycin as useful antibacterial agents for treating these infections. Hyperbaric oxygen may be useful in promoting healing in recalcitrant cases.

In our cases, the two patients were sisters. Osteopetrosis is a hereditary disease; however, only a few cases of osteomyelitis of the jaw associated with osteopetrosis have been reported as familial cases. These series have involved the two different sites systematically. Family members of a patient with osteopetrosis should be screened for this disease based on clinical and radiological features, and genetic evaluation would be fundamental to determine the type of osteopetrosis. If they have osteopetrosis, steps must be taken to prevent osteomyelitis of the jaw. To reduce the risk of osteomyelitis arising from dental caries, patients need to be recalled for dental treatments and motivated to maintain oral hygiene, starting at an early age. In the event that teeth extractions or any oral surgery is planned for patients with osteopetrosis, high-dose antibiotic prophylaxis and primary wound closure should be the first approach to avoid subsequent osteomyelitis of the jaw.

References