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Clinical Case Presentations

Henry G. Bone III, MD,* and Louis V. Avioli, MD†

This was an interesting session, presenting a spectrum of clinical disorders of bone and mineral metabolism, which provided for ample discussion and was most instructive to those in attendance. One of these papers (1) is presented in its entirety in this issue of the Journal.

Familial Expansile Osteolysis: Current Research

Drs. Wallace, Osterberg, and Mollan from Musgrave Park Hospital, Belfast, Northern Ireland, focused on an autosomal dominant disorder of bone which produced progressive dysplasia and hearing loss. Great pain is suffered by the affected patients in the limbs which are afflicted with the disease. These patients have expansile focal lesions in the peripheral skeleton, which typically begin in the third decade, resulting in deformities which resemble those of Paget disease but which are much more severe and progressive in many cases. Deafness due to unique middle ear changes is manifested early in life, as is a loss of dentition due to a characteristic pattern of resorption of the teeth. Second-generation biphosphonate treatment has produced only transient benefit, and in most cases amputation is required to relieve the severe pain.

Endemic Multiple Epiphyseal Dysplasia: Epidemiological, Radiological, and Genealogical Study

Drs. Teotia and Teotia of the LLRM Medical College, Meerut, India, described extensive studies in several hundred patients who were clinically affected with endemic multiple epiphyseal dysplasia. Most patients had either a subnormal or a short stature and presented with limping, pain and stiffness in the hips and knees, hip flexion, genu valgum, genu varum, and rotational deformities of the legs. There was considerable heterogeneity in the clinical and radiological presentation, but various patterns of the multiple epiphyseal dysplasia were characterized by the authors. Epidemiologic data suggest an autosomal dominant form of inheritance in most cases of this disease, which the authors called the "Handigodu syndrome," after the name of the village where the disease was first described.

Paget Bone Disease and Heredity: A Case Report

Agnusdei et al (1) described a case of a young woman who was referred for evaluation of an elevated serum alkaline phosphatase level and who had a family history of Paget disease of

bone (the patient's father and paternal grandmother) which suggested an autosomal dominant inheritance pattern. An extensive evaluation revealed generalized osteopenia, coupled with a high bone turnover rate, but without focal lesions. The authors suggested that this case may indicate the presence of a "Pagetic trait" of Paget disease of bone which was already established in the older family members.

Clinical and Radiological Improvement During High-Dose Oral Calcium Treatment in Four Patients with Hereditary Resistance to 1,25-Dihydroxycholecalciferol

Drs. Woodhouse, Sakati, and Marx of the King Faisal Specialist Hospital, Riyadh, Saudi Arabia, and the National Institutes of Health, Bethesda, Maryland, focused on four male children of related parents who presented with severe rickets and alopecia. They were hypocalcemic, but had elevated circulating 1,25-dihydroxycholecalciferol levels. Only one of the four responded with a calcemic effect to ergocalciferol treatment at doses of 80,000 to 6 million units per day. High doses of oral calcium were then prescribed for periods of one-half to five years. This produced a striking improvement. The patients' height and weight increased, and they had significant radiological improvement as well. They remained mildly hypocalcemic. The authors concluded that high-dose oral calcium therapy was of potential benefit in patients who are unresponsive to calciferols.

Rickets due to Calcium Deficiency

Drs. Proesmans, Legius, Eggermont, and Bouillon of Leuven, Belgium, described three young children with rickets in whom the 1,25-dihydroxyvitamin D levels were elevated and the 25-hydroxyvitamin D levels were normal. These patients also had generalized hyperaminoaciduria, and two had low tubular phosphate reabsorption. Urinary calcium was low to very low in all patients. These patients had been fed with a commercial soya drink which was not adapted for infant feeding but which had been their principal source of calories for at least six months.

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This drink has a very low calcium content in comparison to either milk or commercial infant feeding formulas. The authors' interpretation of the pathophysiology was that the insufficient calcium intake caused secondary hyperparathyroidism and hypophosphatemia. The stimulated 1,25-dihydroxyvitamin D production, coupled with the low intestinal calcium intake, resulted in the bone lesions.

Ectopic Calcification in a Patient with Hypophosphatemic Rickets

Drs. Suh and Jones of the University of Hawaii, Honolulu, described a young girl with hypophosphatemic rickets. She was born with calcification of the aorta and the subclavian arteries which resolved by four months of age. Her right hand also had a calcification which was surgically removed during her infancy. She had impaired hearing due to fixation of the ossicles by abnormal calcification. She had calcification affecting the earlobes which was shown on biopsy to be heterotopic ossification. Treatment with calcitriol and phosphate was instituted for the next 11 months. She then began to have pain in the right ankle and shoulders where x-ray revealed soft tissue calcification. Laboratory studies demonstrated improvement of the rickets but also demonstrated hypercalciuria and a decreased creatinine clearance. The calcitriol and phosphate were discontinued with resolution of the soft tissue calcifications but reactivation of the rickets. The clinical status of the patient remains precariously balanced between treatment of the rickets, which produces the abnormal calcification, and the withdrawal of vitamin D and phosphate, which permits resolution of the calcification but reactivation of the metabolic bone disease.

Hypercalcemia and Generalized Osteopenia with a Myelodysplastic Syndrome

Dr. Yoshimoto and his colleagues, Drs. Ono, Fukase, Chiba, Tsunenari, Ogawa, Tsutsumi, Nakata, Kishi, Fujita, Ushida, and Katsura, of Kobe University, Japan, described a 65-year-old man who presented with weakness, pain, lower extremity edema, nausea, fatigue, and thirst. He was found to have severe hypercalcemia (18.5 mg/dL) in the presence of mild renal dysfunction and a normal serum phosphate level. The serum magnesium level was slightly decreased, and the alkaline phosphatase was quite elevated. Leukocytosis of 11,000 cells/mm³ was noted. The patient was treated with saline infusions, prednisolone, and calcitonin. He had an improvement of his hypercalcemia and renal function over the next two weeks. He was noted to have generalized loss of bone mass in a number of areas. Bone biopsy showed a fibrous change with hypervascularity and increased bone formation and resorption without tumorous invasion. Additional studies found no evidence for Paget disease, primary hyperparathyroidism, or other non-hematologic disorders. Bone marrow aspiration revealed abnormal myeloblasts, megakaryocytes, and megaloblasts, and there

was increased activity of natural killer cells among peripheral lymphocytes. The authors suggested that humoral factors generated by stem cells may be the cause of this syndrome.

Abnormal Bone Density Following Treatment for Childhood Acute Lymphoblastic Leukemia

Drs. Gilsanz, Ortega, Gibbens, Carlson, and Boechat of the Childrens Hospital of Los Angeles and the University of California at Los Angeles described a series of 25 survivors of treatment for acute lymphoblastic leukemia. As a group, these patients, whose bone density was measured by quantitative computed tomography, had lower trabecular, integral, and cortical vertebral bone densities than control children who underwent computed tomography because of trauma. Although all patients had been treated with methotrexate and prednisone, the low bone density was noted only in children who had also received prophylactic central nervous system radiation. Five of the nine children who received 2,400 rads to the central nervous system had vertebral densities more than two standard deviations below the normal range.

Parenteral Fluoride Therapy in a Patient with Chronic Malabsorption Markedly Increases Spinal Bone Density

Drs. Tutud-Hans, Ament, Baylink, and Pettis of Loma Linda, California, described a 60-year-old woman with osteopenia associated with malabsorption and chronic steroid therapy who was treated with intravenous fluoride. This was undertaken because individuals with gastrointestinal disease may not tolerate oral fluoride therapy well. This patient had received total parenteral nutrition (TPN) via Broviac catheter, and 5 mg/day of intravenous sodium fluoride was added to the TPN solution. She also received calcium supplements and monthly injections of estradiol. Serum fluoride levels were adjusted until they were stable at about 15.7 mM. After one year, the patient was found to have a 100% increase in trabecular vertebral density by quantitated computed tomography. Subsequently, the fluoride dose was decreased to 8 mg intravenously every other month. This study suggested that intravenous fluoride therapy could be useful in patients on TPN.

Evidence for Diminished Rates of Mineralization and Bone Formation in Normal Blacks

Drs. Weinstein, Weintin, and Bell of the Medical College of Georgia and Medical University of South Carolina presented evidence for diminished rates of mineralization and bone formation in normal blacks. In this histomorphometric study, double tetracycline labeled transilial bone biopsies were carried out in six blacks and nine whites. The mean cortical bone width and

porosity, cancellous bone area, trabecular width and spacing, wall width, osteoid area, osteoid perimeter, osteoid seam width, and osteoblastic, osteoclastic, and reversal perimeters were not significantly different between the two groups. However, the mineralizing perimeter, mineral appositional rate, and bone formation rate were all significantly lower in the blacks compared to the whites. In addition, there was a negative correlation between mean wall width and mineral appositional and bone for-

mation rates in the blacks, but not in the whites. It was suggested that a reduction in the rate of skeletal remodeling may contribute to the greater bone mass and lower incidence of fractures in black adults.

Reference

1. Agnusdei D, Civitelli R, Camporeale A, Gennari C. Paget bone disease and heredity: A case report. *Henry Ford Hosp Med J* 1988;36:150-2.