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Management of a pathological fracture in a rare case of Gorham Stout disease of the hip with a mega prosthesis

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ABSTRACT

Gorham-Stout disease (GSD) is a rare bone disease of unknown etiology, characterized by spontaneous and progressive resorption of bones. This disease occurs most commonly in males of the age group of fewer than 40 years and has no genetic predisposition. It most commonly affects the skull, spine, pelvis and shoulder girdle. The diagnosis of GSD is established based on the combination of clinical, radiologic, and histological features, after excluding other diseases. There is no standard treatment for it so far, and the therapy depends on patient's clinical condition and may include surgery, radiotherapy, and drugs, with varying degrees of success. To the best of our knowledge such involvement of hip and its treatment by a megaprosthesis, in an elderly lady by GSD has not been reported. This case report describes an unusual presentation of the disease of the hip in an elderly female successfully treated with replacement of the deficient proximal femur by using a bipolar hip mega prosthesis of the hip (XLO, India).

1. Introduction

Gorham - Stout disease (GSD) is a rare bone disease also called as a 'vanishing bone disease'. It is characterized by proliferation of vascular and lymphatic tissue which causes massive resorption, destruction of the osseous matrix and replacement with fibrosis and angiomas.[1] Most of the cases the disease is progressive but may be self-limiting in some cases. The disease predominantly involves skull, spine, ribs, pelvis, and shoulder girdle. Clinical presentation of the disease depends on the site of involvement. The diagnosis is made by clinical, radiological, laboratory and histo-pathological findings.[2]

2. Case report

A 68-year-old lady presented with spontaneous onset of pain over her right hip with the inability to stand and walk for two months, with no history of trauma, fever or any constitutional symptoms. There was no family history of any bone and joint related problems. Local examination revealed external rotation deformity with 6 cm of true shortening of right lower limb and crepitations present over the proximal thigh. Plain radiographs of the hip showed a pathological fracture with osteolysis of the proximal femur (Fig. 1). A computed tomography (CT) confirmed the fracture of the proximal femur with massive osteolysis and multiple bony fragments (Fig. 2).All the laboratory tests and nerve conduction tests were within normal limits, including Erythrocyte Sedimentation Rate (ESR), C Reactive Protein (CRP),PTH and serum Vitamin D levels. The needle biopsy was nonconclusive and showed chronic non specific inflammation, but no malignant cells were seen. Nerve conduction studies (done to exclude any neuropathic involvement) were also normal.

The treatment was done by replacement of the deficient proximal femur by using a mega bipolar hip prosthesis of the hip (XLO, India), where the femoral stem was cemented (Fig. 3). There was some abductor left attached to the greater trochanter, which was sutured back to the megaprosthesis through the holes provided, using number 5 ethibond sutures. The leg was kept in an abduction splint for three weeks, but the patient was mobilized with the help of a walking frame after one week of the surgery. The soft tissue and bone biopsy sample from the right proximal femur was taken for histopathological examination. On histopathological examination, focal areas of replacement of bone by lobules of vascular channels were noted. These were embedded in cellular connective tissue interspersed with broken trabeculae of lamellar bone and thinned out cortex at places. Few marrow spaces show areas of dilated vascular channels filled red blood cells, there is no evidence of new bone formation (Fig. 4).These features were suggestive of the diagnosis of GSD. At one year follow up the patient

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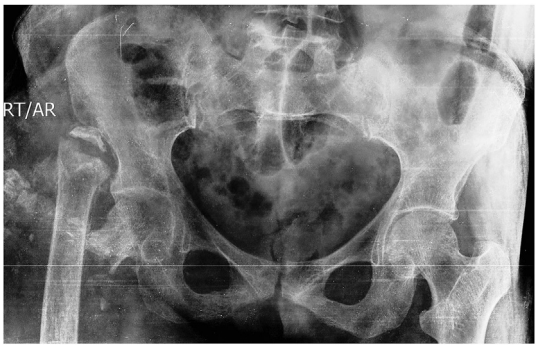

Fig. 1. Plain AP radiograph of the pelvis showing a pathological fracture of the right proximal femur, with massive osteolysis.

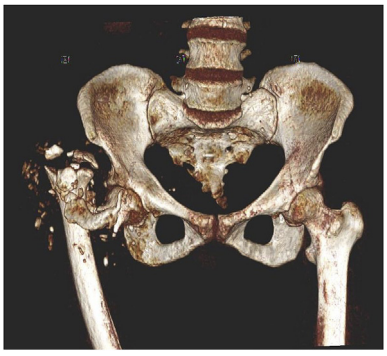

Fig. 2. Three dimensional (#D) reconstructed Comuted tromorgraphic (CT) image of the hip confirming pathological fracture of the proximal femure with massive osteolysis and destruction of the bone.

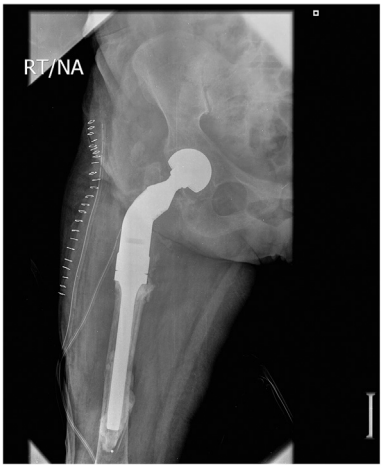

Fig. 3. Postoperative radiograph of the right hip showing megaprosthesis of the hip in situ.

had no pain in the hip with good function. The hip joint was stable clinically and radiologically (Fig. 5).

3. Discussion

The GSD is also knownby various names such as ‘vanishing bone disease’ or ‘phantom bone disease’ or ‘disappearing bone disease’ is a rare bone disease of unknown etiology. The disease wasfirst described by Jackson in 1838 who reported a case of a young man in whom the humerus was disappeared entirely over 11 years.[3] In 1955, the clinical and histopathological features were described in detail by Gorham and Stout in a review of 24 cases with analysis of the pathologic specimens

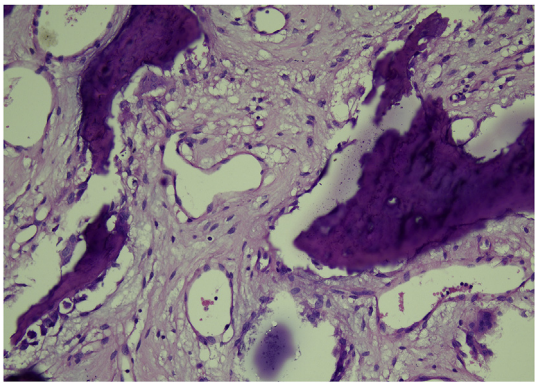

Fig. 4. Histopathological pictureshowing focal areas of replacement of bone by lobules of vascular channels.

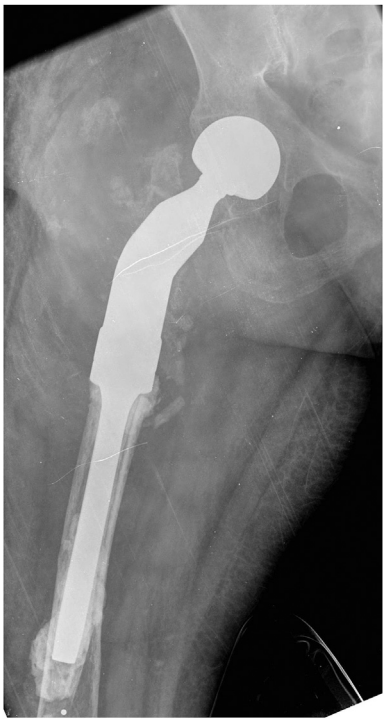

Fig. 5. Follow up radiograph of the right hip showing stable hip megaprosthesis, with no sign of loosening of the stem or cup erosion.

of 8 cases.[4] Torg et al. (1969) classified the idiopathic osteolysis in four types. Macpherson et al. (1973) added the fifth type to make it five types of idiopathic osteolysis.[5,6]GSD is type 4 idiopathic osteolysis.

Type-1: Idiopathic multicentric osteolysis with dominant transmission
Type-2: Idiopathic multicentric osteolysis with recessive transmission
Type-3: Idiopathic nonhereditary multicentric osteolysis with nephropathy
Type-4: Gorham's massive osteolysis
Type-5: Winchester syndrome

The pathophysiologic mechanism of bone in idiopathic resorption of the bones remains unclear. Various hypotheses have been put forward for the pathological mechanism of this disease like a) disturbance of the osteoblast–osteoclast balance due to hyperemia, b) increased hydrolytic enzyme activity caused by localized hypoxic acidosis, c) enhanced osteoclast activity by increased interleukin-6 levels, and d) increased

Table 1
Differential diagnosis of massive osteolysis.

S.No	Disease	Etiology	Clinical features	Diagnosis	Treatment
1.	Gorham- Stout disease (GSD)	Unknown	* No genetic predisposition *Commonly involve skull, mandible, shoulder girdle, spine, pelvis. *Children and young adults are mostly affected. * Mostly present with pathological fracture * May also present with other complications like neurological involvement, pleural and pericardial effusion.	* X-ray and CT Shows osteolytic lesion * Diagnosis is confirmed by histopathology which shows characteristic vascular and lymphatic proliferation and no reacting bone formation	*Surgical *Drugs (Bisphosphonate, Interferon 2 alpha) * Radiotherapy
2.	Hereditary osteolysis	Unknown	* Present with multicentric lesions * Commonly involve hand and feet later may be the whole skeleton *Other systems like skin, heart, eyes etc may also be affected * May present with a pathological fracture	* Estabilished by molecular genetic testing (MMP2 gene)	* Mainly supportive, * Drugs (steroid, immunosuppressants, vitamin D and calcium)
3.	Tumor	* Primary: Angioma Angiosarcoma *Metastasis: From carcinoma Breast, Cervix,Colon, Endometrium, Kidney	* Angiomas are mostly asymptomatic and symptoms depends on site Angiosarcoma mainly involve lower limb bone femur and tibia and mostly present with a pathological fracture * Metastasis are mainly present in elderly with sign of primary involvement.	*Confirmed by biopsy * In Angiomas, vascular proliferation but preservastion of cortical bone is present *Angiosarcoma shows characteristic vascular proliferasion with abundant mitotic activity and cortical bone destruction *Metastatic lesions are characterized by their primary pathology	*Treatment depends on stage: May be surgical,radiotherapy or chemotherapy
4.	Infection	* Gram positive or Gram negative bacteria (most commoniy Staphylococcus Aureus)	* Mainly involve children and young adult *Long bones are affected commonly * Present with fever, swelling, discharging sinus and occasionally pathological fracture	* Mainly by laboratory findings like increased ESR,CRP * Confirmed by blood or pus culture	* Mainly conservative (antibiotics) * Surgical like seqestrectomy and saucerization
5.	Metabolic (hyper-parathyroidism) (HPP)	* Primary (neoplasm of parathyroid gland) * Secondary (vitamin D Deficiency)	* Bone and joint pain and symptoms of other systemic involvement * Bone disease may present with a pathological fracture	* Increased PTH level or decreased vitamin D level *Increased uptake on nuclear scan	* Primary HPP: surgical *Secondary HPP: vitamin and calcium D supplementation
6.	Neuropathic involvement (Charcot's joint)	*Diabetes	*Spinal cord or Brain involvement *Abnormalities related to primary disease *Painless condition, with massive and atypical destruction of bone and joint.	*Abnormal nerve conduction studies	*No curative treatment

osteoclast precursor activity caused by humoral factors.[7,8]

The disease occurred mainly in children and adult under 40 years of age and mainly male dominant.[9]The most common site of involvement is skull, mandible, shoulder, spine, pelvis, and ribs. The long bone is only affected by it uncommonly.[10] The involvement of proximal femur in an elderly female in our case makes it extremely rare and an uncommon presentation.

Clinical presentation of this disease depends on the site of involvement — most of the cases present with pathological fracture spontaneously or by minor trauma. The involvement of the skull base and spine may also cause neurological complications. The involvement of ribs, scapula and thoracic spine may spread the disease in the chest cavity and present with pleural and pericardial effusion and causes respiratory distress or failure. These are the fatal complications of the disease.[11] In some cases, spontaneous remission may occur but with the chances of recurrence even after remission.[12] Our case presented with a spontaneous pathological fracture of the proximal femur.

The diagnosis is madeby clinical, radiological, laboratory and histopathological examination. Radiographs, CT-scan, and Magnetic Resonance Imaging (MRI) are a usefuladjunct forthe diagnosis and surgical planning, but definitive diagnosis is made by histopathology.

Haffez et al.[13] gave eight criteria for the definitive diagnosis of GSD:

- Positive biopsy with the presence of angiomatous tissue
- The absence of cellular atypia
- Minimal or no osteoblastic response or dystrophic calcifications
- Evidence of local bone progressive osseous resorption
- Nonexpansile, nonulcerative lesions
- No involvement of viscera
- Osteolytic radiographic pattern
- Negative hereditary, metabolic, neoplastic, immunologic, or infectious etiology

The diagnosis of this condition can be made after ruling out the other causes of osteolytic bone lesion like hereditary osteolysis, tumor (primary or metastasis), infection, metabolic (hyperparathyroidism) and neurpathic involvement (Charcot's joint). Table −1 shows the different clinical, diagnostic confirmation and treatment plan of this osteolytic bone lesion in different diseases.

GSD is a self-limiting disease but the bone resorbed cannot reform. There is no standard treatment of the disease. Combination of surgical, radiotherapy and drug therapy has been given depending on the site of involvement, age and the patient's condition.[14]Surgery is required to stabilize the affected part of the skeleton and to deal with the complication of the disease. The surgical procedure may be done by stabilization with bone grafting or bone cement, prosthesis and amputation.[14] Radiation therapy decreases the proliferation of endothelial cell and decreases the rate of bone resorption and hence may be beneficial if early diagnosis is made. Heyd et al.[15] reviewed radiation therapy in 44 GSD patients and found that arrest, progression, and disease remission occurred in, 50%, 22.7% and27.3% of the patients, respectively.Drug therapy like bisphosphonate, thalidomide, interferon 2alfa, bavacizumab vitamin D, calcium isgiven in a combination of surgery and radiation therapy. Bisphosphonates decrease bone resorption and also anti-angiogenic.[16]Thalidomide and interferon 2 alfa are immunomodulator and have an additional antiangiogenic effect.[17] Bavacizumab a monoclonal antibody also have antiangiogenic activity by decreasing the level of vascular endothelial growth factor.[18]

4. Conclusion

Gorham-Stout disease (GSD) is a rare bone disease of unknown etiology, characterized by spontaneous and progressive resorption of bones. We report an extremely rare case involvement of the hip and its successful treatment by a megaprosthesis, in an elderly lady.The diagnosis of GSD was established based on the combination of clinical, radiologic, and histological features, after excluding other diseases.

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Conflicts of interest

None.

References

1. Li MH, Zhang HQ, Lu YJ, et al. Successful management of gorham-stout disease in scapula and ribs: a case report and literature review. *Orthop Surg.* 2018 Aug;10(3):276–280.
2. Noman S, Faiz S, Khan SA, Sattar A. Massive osteolysis in distal shaft of humerus: a case report on vanishing bone disease. *J Coll Physicians Surg Pak.* 2018 Sep;28(9):S164–S165.
3. JacksonA JBS. Boneless arm. *Boston Med Surg J.* 1838;18:368–369.
4. Gorham LW, Stout AP. Massive osteolysis (acute spontaneous absorption of bone, phantom bone, disappearing bone): its relation to hemangiomatosis. *JBJS.* 1955 Oct 1;37(5):985–1004.
5. Torg JS, DiGeorge AM, Kirkpatrick JA, Trujillo MM. Hereditary multicentric osteolysis with recessive transmission: a new syndrome. *J Pediatr.* 1969 Aug 1;75(2):243–252.
6. Macpherson RI, Walker RD, Kowall MH. Essential osteolysis with nephropathy. *J Con Assoc Radiol.* 1973;24:98–103.
7. Devlin RD, Bone 3rd HG, Roodman GD. Interleukin-6: a potential mediator of the massive osteolysis in patients with Gorham-Stout disease. *J Clin Endocrinol Metab.* 1996 May 1;81(5):1893–1897.
8. Hirayama T, Sabokbar A, Itonaga I, Watt-Smith S, Athanasou NA. Cellular and humoral mechanisms of osteoclast formation and bone resorption in Gorham–Stout disease. *J Pathol: J Pathol Soc Great Brit Ireland.* 2001 Dec;195(5):624–630.
9. Yalniz E, Alicioglu B, Benlier E, Yilmaz1 B, Altaner S. Gorham-stout disease of the humerus. *JBR–BTR.* 2008;91:14–17.
10. Kulenkampff HA, Richter GM, Hasse WE, Adler CP. Massive pelvic osteolysis in the Gorham-Stout syndrome. *Int Orthop.* 1990;14(4):361–366.
11. Tie ML, Poland GA, Rosenow 3rd EC. Chylothorax in Gorham's syndrome. A common complication of a rare disease. *Chest.* 1994;105(1):z08–13.
12. Chattopadhyay P, Bandyopadhyay A, Das S, Kundu AJ. Gorham's disease with spontaneous recovery. *Singap Med J.* 2009;50(7).
13. Heffez L, Doku HC, Carter BL, Feeney JE. Perspectives on massive osteolysis. Report of a case and review of the literature. *Oral Surg Oral Med Oral Pathol.* 1983;55:331–343.
14. Liu SZ, Zhou X, Song A, Wang YP, Liu Y. A rare case of gorham-stout syndrome of femur treated with cement augmentation. *Chin Med J (Engl).* 2018 Jul 5;131(13):1628–1629.
15. Heyd R, Micke O, Surholt C, et al. Radiation therapy for Gorham–Stout syndrome: results of a national patterns-of-care study and literature review. *Int J Radiat Oncol Biol Phys.* 2011;81:e179–e185.
16. Sun S, Liu X, Ma B, Zhou Y, Sun H. Could localdeliver of bisphosphonates be a new therapeutic choice for Gorham–Stout syndrome? *Med Hypotheses.* 2011;76:237–238.
17. Takahashi A, Ogawa C, Kanazawa T, et al. Remission induced by interferon alfa in a patient with massive osteolysis and extension of lymph-hemangiomatosis: a severe case of Gorham–Stout syndrome. *J Pediatr Surg.* 2005;40:E47–E50.
18. Grunewald TG, Damke L, Maschan M, et al. First report of effective and feasible treatment of multifocal lymphangiomatosis (Gorham–Stout) with bevacizumab in a child. *Ann Oncol.* 2010;21:1733–1734.