

Pathological Fractures Revealing Brown Tumors: A Case Report SCARE

Adébola Padonou^{1*}, Steve Ondoa¹, Oswald Goukodadja¹, Romaric Beheton², Angebault M. Jean Marie¹, Dave Ateba¹, Fawanou Dadjo¹, Pascal Chigblo¹, Aristote Hans-Moevi¹

¹University Clinic of Traumatology and Orthopedic Surgery, CNHU-HKM, Cotonou, Benin

²University Clinic of Odonto-Stomatology and Maxillofacial Surgery, CNHU-HKM, Cotonou, Benin

Email: *francklynx@yahoo.fr

How to cite this paper: Padonou, A., Ondoa, S., Goukodadja, H., Beheton, R., Jean Marie, A.M., Ateba, D., Dadjo, F., Chigblo, P. and Hans-Moevi, A. (2026) Pathological Fractures Revealing Brown Tumors: A Case Report SCARE. *Open Journal of Orthopedics*, 16, 524-531.

<https://doi.org/10.4236/ojo.2026.1610049>

Received: September 21, 2026

Accepted: October 19, 2026

Published: October 22, 2026

Copyright © 2026 by author(s) and Scientific Research Publishing Inc.
This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Introduction: Brown tumor is a benign clinical entity occurring as a rare skeletal manifestation of primary hyperparathyroidism. It is an unusual cause of pathological fractures. We report the case of a 37-year-old female patient who presented with pathological fractures due to brown tumors secondary to primary hyperparathyroidism. **Case presentation:** A 37-year-old housewife, with a Parker score of 9, was admitted to the emergency department for pain and complete inability to use both lower limbs following a fall from standing height. Both Clinical examinations and imaging revealed bilateral fractures of the trochanteric regions, with an X-ray appearance suggestive of a pathological lesion. Her medical history included a facial tumor that had been evolving for three years without specific management. Biochemical and hormonal investigations revealed hypercalcemia at 129 mg/L and elevated parathyroid hormone levels at 332.43 pg/mL. Cervical ultrasound revealed a right parathyroid adenoma. We concluded that these were probable brown tumors secondary to primary hyperparathyroidism. The patient underwent osteosynthesis with long gamma nails for both fracture sites and parathyroidectomy with histopathological examination, the results of which confirmed the diagnostic hypothesis. **Conclusion:** Brown tumors are benign bone lesions secondary to hyperparathyroidism. Fractures are rarely the presenting manifestation of this endocrinopathy. Management of hyperparathyroidism is the cornerstone of treatment of this pathological entity.

Keywords

Benign Tumor, Bone Lesion, Endocrinopathy

1. Introduction

Brown tumors are non-neoplastic lesions resulting from an abnormality of bone

metabolism in the setting of primary or secondary hyperparathyroidism (HPT), and rarely in chronic renal failure or tertiary hyperparathyroidism [1] [2]. The most frequent sites are the pelvis, ribs, mandible, hands, and spine, but rare cases have been reported in long bones, particularly the humerus, femur, and tibia [3]-[5]. Brown tumors may be completely asymptomatic or present with bone pain [3] [6]. Their diagnosis can sometimes be difficult because they mimic a primary malignant bone tumor or bone metastasis and may compromise functional and aesthetic outcomes [4].

With systematic measurement of serum calcium and parathyroid hormone, severe skeletal manifestations of primary HPT have become rare nowadays, and only 2% of cases are observed before the age of 30 years [6]. Standard radiographs are sufficient to demonstrate brown tumors and help exclude metastatic lytic lesions [3]. The literature reports that spontaneous regression of these lesions is possible after correction of hyperparathyroidism, with replacement of the lesions by normal bone tissue; however, recurrence is possible [3] [4] [6]. We report the case of a 37-year-old patient who presented with brown tumors mimicking bone metastases. This case report was prepared in accordance with the SCARE criteria. The patient's consent was obtained. Artificial intelligence was not used in the preparation of this article.

2. Case Presentation

A 37-year-old housewife, with a Parker score (assessing previous autonomy and ranging from a minimum of 3 to a maximum of 9) of 9, was admitted to the emergency department for pain and complete functional impairment of both lower limbs after a fall from standing height following a misstep. The history revealed a swelling of the ENT region that had been evolving for three years without specific management.

Clinical examination revealed an impaired general condition with significant weight loss, quantified at 40% over 2 years. Locally, there was an abnormal posture of both lower limbs, swelling of both hips, and pain upon palpation over the trochanteric regions. Elsewhere, facial dysmorphism was noted, with bilateral nasal obstruction, filling of the upper and lower oral vestibules by a firm mass, and multiple tooth losses. Examination of the thyroid, lungs, breasts, abdomen, and genitourinary system was unremarkable.

Pelvic radiographs (**Figure 1**) and femoral radiographs (**Figure 2**) demonstrated a left intertrochanteric fracture and a right subtrochanteric fracture, with an appearance of poorly systematized multilocular bone lysis, sclerosis, and cortical thinning. Radiographs of the other long bones showed similar but less pronounced lytic lesions. Abdominopelvic computed tomography (CT) was unremarkable. Facial CT revealed clear osteolytic lesions of the mandible and right maxilla with cortical expansion.

Laboratory tests showed moderate normochromic normocytic anemia at 8 g/dL, mild hypercalcemia at 129 mg/L (normal values between 88.0 and 105.0 mg/L), normal serum phosphate and renal function, and elevated parathyroid

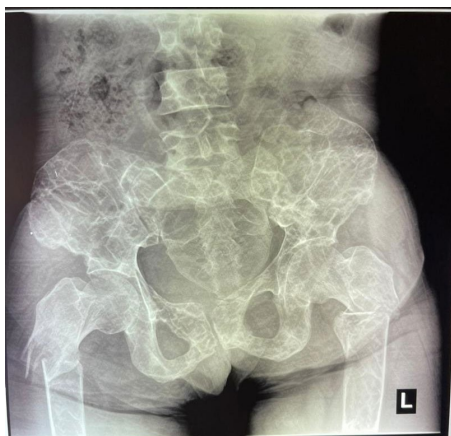


Figure 1. Pelvic radiograph.



Figure 2. Femoral radiograph.

hormone at 332.43 pg/mL (normal values between 15.0 and 65.0 mg/L), five times the normal value. Primary hyperparathyroidism was suspected, and cervical ultrasound demonstrated a right inferior parathyroid adenoma.

The patient underwent multidisciplinary management in two stages. First, osteosynthesis with long gamma nails was performed for both femurs (**Figure 3(a)** and **Figure 3(b)**), with collection of reaming material for histopathological examination, concomitantly with a biopsy of the facial mass for histopathological examination. The results of the various specimens revealed numerous multinucleated giant cells scattered within fibrous tissue and areas of bone resorption associated with harvesting facial bone and femoral reaming debris. Immunohistochemical analysis demonstrated CD68 expression in giant and macrophage cells and fibroblastic cells, confirming a giant cell tumor. However, the lack of specific

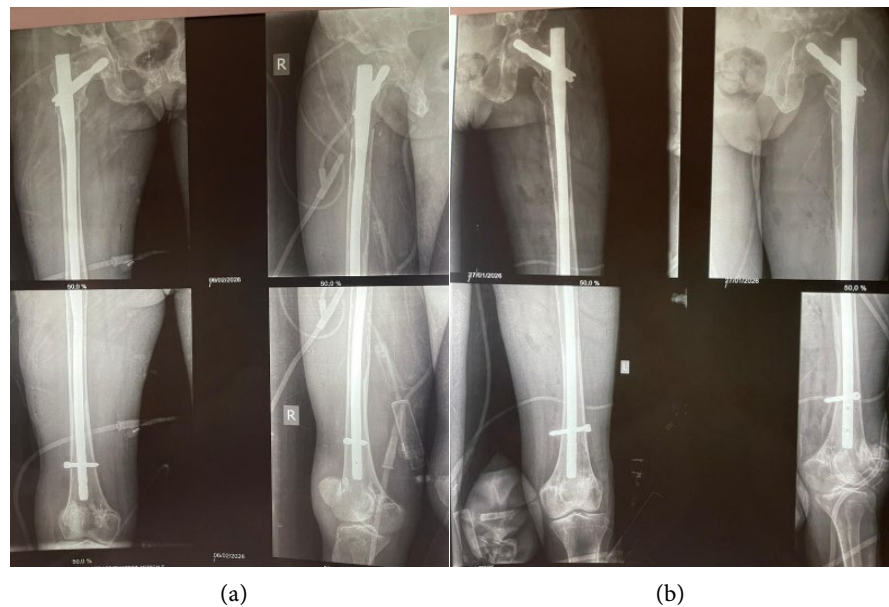


Figure 3. (a) postoperative xray of the right femu; (b) postoperative xray of the left femur.

information regarding the presence of the H3F3A G34W mutation made it impossible to distinguish the brown tumor from a giant cell tumor of bone. In the context of elevated parathyroid hormone levels combined with the histopathological findings, we concluded that this represented a brown tumor. The patient subsequently underwent parathyroidectomy with intraoperative administration of calcium. At 12 months of follow-up, the outcome was favorable, with normalization of serum calcium (88.18 mg/L) and union of the fracture sites. The chronological sequence of events is presented in **Table 1**.

Table 1. Chronological order of events.

Date/Period	Events	Details
Three years before admission	Appearance of facial swelling	Spontaneous onset in the left cheek region, progressively increasing in volume. Consultation in maxillofacial surgery where diagnostic evaluation of the swelling was considered. The patient was lost to follow-up without treatment; she reportedly preferred to seek traditional medicine.
Two hours before admission	Trauma to both hips following a domestic accident	Fall from standing height after a misstep; mechanism poorly elucidated. Pain and complete functional impairment of both lower limbs.
Day of admission	Emergency assessment	Physical examination: swelling of both hips with pain up on palpation over the trochanteric regions. Elsewhere, facial dysmorphism with bilateral nasal obstruction, filling of the upper and lower oral vestibules by a firm mass, multiple tooth losses, and impaired general condition with significant weight loss. Standard radiography: Left intertrochanteric and right sub trochanteric fractures with poorly systematized multilocular bone lysis, sclerosis, and cortical thinning.
Day 2 after trauma	Extension work-up	Abdominopelvic CT was unremarkable; facial CT demonstrated clear osteolytic lesions of the mandible and right maxilla with cortical expansion. Cervical ultrasound demonstrated a right inferior parathyroid adenoma. Laboratory tests included anemia at 8 g/dL and elevated parathyroid hormone at 332.43 pg/mL.

Continued

Day 8 after trauma	First stage of operative management	Osteosynthesis with long gamma nails of both femurs, with collection of reaming material for histopathological examination, followed by biopsy of the facial mass for histopathological examination.
3 weeks postoperatively	Histopathological results	Presence of numerous multinucleated giant cells with CD68 expression.
4 weeks postoperatively	Second stage of operative management	Parathyroidectomy performed.
12 months after trauma	Favorable outcome	Normalization of serum calcium and union of the fracture sites.

3. Discussion

Brown tumors are rare, benign, osteolytic giant-cell lesions secondary to primary, secondary, or tertiary hyperparathyroidism [7] [8]. They are caused by a benign adenoma in 75% - 85% of cases, by involvement of multiple glands, or by hyperplasia in 15% - 25% of cases [7] [8]. Female involvement appears to predominate, particularly beyond the age of 50 years [9]-[11]. In our case, the patient was considerably younger than those reported by most authors.

These tumors may be completely asymptomatic or present with bone pain. With systematic measurement of serum calcium and parathyroid hormone, severe skeletal manifestations of primary HPT have become rare nowadays [6]. The occurrence of pathological fractures in patients known to have hyperparathyroidism has been reported in 15/1000 patients [12] [13]. The presentation in our patient, namely pathological fractures of both trochanteric regions, is exceptional. It reflects delayed diagnosis of hyperparathyroidism, the cause of which in our setting is multifactorial: denial following discovery of a facial tumor, belief in supernatural explanations related to sociological realities, and medical wandering. The presence of osteolytic lesions in both femurs, the iliac bones, the lumbar vertebrae (Figure 1 and Figure 2), and the mandible and maxillary bones (Figure 4(a) and Figure 4(b)) initially pointed to bone metastases from a primary tumor. This diagnosis was reconsidered following the results of a thoraco-abdomino-pelvic CT scan, which revealed no lesions in the thyroid, breasts, kidneys, bladder, gastrointestinal tract, or ovaries. The classical sites of involvement are the facial bones, ribs, pelvis, femur, other long bones, and vertebrae [13]-[15], and most authors report unilateral fractures [16]-[18]. The particularity in our case is the bilateral involvement. Biologically, our patient presented metabolic abnormalities consistent with data in the literature, including elevated parathyroid hormone and hypercalcemia, an association highly suggestive of the diagnosis.

From a therapeutic standpoint, treatment of hyperparathyroidism is the main step in management. Regarding the bone lesions themselves, opinions differ in the literature. Some authors report complete disappearance of the lesion six months after treatment of hyperparathyroidism [19]. Other authors recommend surgical excision of the tumor to stop bone destruction [5]. Thus, fixation and the use of bone grafts may provide immediate stability while awaiting bone healing, which

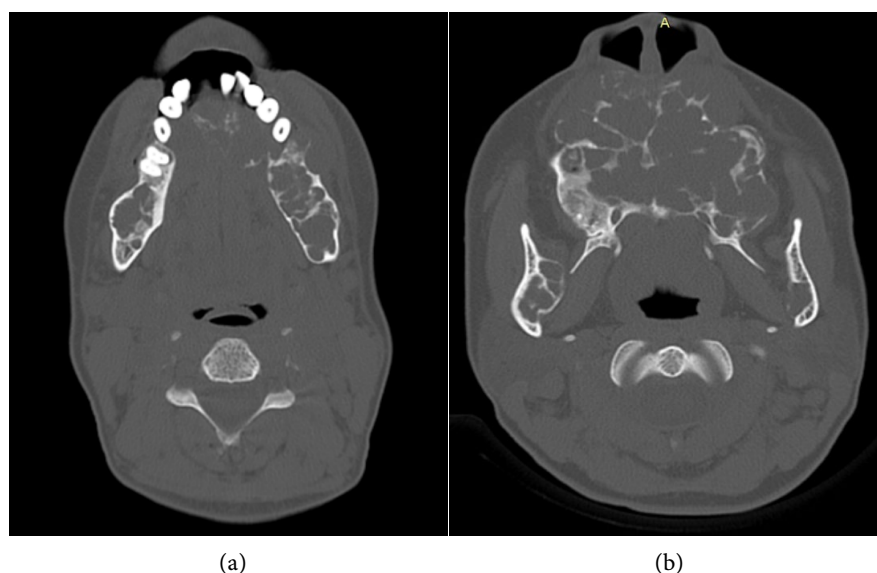


Figure 4. (a) Maxillofacial CT axial slice; (b) Maxillofacial CT axial slice.

may be delayed [19]-[21]. In our case, the presence of fractures required operative stabilization of the fracture sites. For the endocrinopathy, a radical approach with parathyroidectomy was chosen, thereby eliminating the risk of recurrence of both hyperparathyroidism and brown tumors. This therapeutic strategy proved effective in our patient, as the outcome at 12 months was favorable, with normalization of serum calcium and sufficient consolidation of the trochanteric regions, allowing weight-bearing and a gradual return to autonomy.

4. Conclusion

Brown tumors are benign lesions reflecting secondary bone involvement due to hyperparathyroidism. Although classically described, pathological fractures are rarely the presenting manifestation of this endocrinopathy. Stabilization of the fracture site and radical treatment of hyperparathyroidism constitute the cornerstone of treatment of this nosological entity.

References

- [1] Farouk, M., Haitami, S. and Ben Yahya, I. (2017) La tumeur brune due à une hyperparathyroïdie secondaire: À propos d'un cas clinique et revue de la littérature. *Médecine Buccale Chirurgie Buccale*, **23**, 61-64. <https://doi.org/10.1051/mbcb/2016061>
- [2] Artul, S., Bowirrat, A., Yassin, M. and Armaly, Z. (2013) Maxillary and Frontal Bone Simultaneously Involved in Brown Tumor Due to Secondary Hyperparathyroidism in a Hemodialysis Patient. *Case Reports in Oncological Medicine*, **2013**, Article ID: 909150. <https://doi.org/10.1155/2013/909150>
- [3] Yassine, A., Guerboub, A.A., Arsalane, A., Biyi, A., Moussaoui, S.E. and Belmejdoub, G. (2015) Un mode de découverte inhabituel d'hyperparathyroïdie primitive: Fractures multiples sur tumeurs brunes secondaires à un adénome parathyroïdien ectopique médiastinal. *Pan African Medical Journal*, **22**, Article 290.

- <https://doi.org/10.11604/pamj.2015.22.290.8274>
- [4] Aljalil, A. and Bouaity, B. (2014) Tumeur brune de la mandibule révélatrice d'une hyperparathyroïdie primaire: À propos d'un cas. *Pan African Medical Journal*, **18**, Article 200. <https://doi.org/10.11604/pamj.2014.18.200.4844>
 - [5] Marhari, H., Boufaïda, N. and El Ouahabi, H. (2017) Fracture pathologique révélant une hyperparathyroïdie primaire: À propos de 3 cas. *Annales d'Endocrinologie*, **78**, 370-371. <https://doi.org/10.1016/j.ando.2017.07.503>
 - [6] Bah, T.S., Sahbani, K., Mbongo, H.N., Oudanane, F., Lahlou, H., Marzouki, A. and Fawzi, B. (2022) Brown Tumors of the Tibia Secondary to Hyperparathyroidism. *International Journal of Academic Health and Medical Research*, **6**, 46-51.
 - [7] Cormier, C. (2012) Hyperparathyroïdie Primitive. *Revue du Rhumatisme Monographies*, **79**, 233-238. <https://doi.org/10.1016/j.monrhu.2012.07.002>
 - [8] Azeez, T.A., Awofisoye, O. and Adeyemi, O.O. (2026) Primary Hyperparathyroidism in Africa: A Systematic Review and Meta-Analysis of Clinical Manifestations. *Hormone and Metabolic Research*, **58**, 199-209. <https://doi.org/10.1055/a-2820-3666>
 - [9] Morgan, G., Ganapathi, M., Afzal, S. and Grant, A.J. (2002) Pathological Fractures in Primary Hyperparathyroidism. *Injury*, **33**, 288-291. [https://doi.org/10.1016/s0020-1383\(01\)00134-6](https://doi.org/10.1016/s0020-1383(01)00134-6)
 - [10] Melton, L.J. (2002) The Epidemiology of Primary Hyperparathyroidism in North America. *Journal of Bone and Mineral Research*, **17**, N12-N17.
 - [11] Gahier Penhoat, M., Drui, D., Ansquer, C., Mirallie, É., Maugars, Y. and Guillot, P. (2016) Apport de la TEP/-TDM au 18FDG pour la détection des tumeurs brunes dans un cas d'hyperparathyroïdie primaire. *Revue du Rhumatisme*, **83**, 386-389. <https://doi.org/10.1016/j.rhum.2016.05.013>
 - [12] Lee, J.H., Chung, S.M. and Kim, H.S. (2013) Osteitis Fibrosa Cystica Mistaken for Malignant Disease. *Clinical and Experimental Otorhinolaryngology*, **6**, Article 110. <https://doi.org/10.3342/ceo.2013.6.2.110>
 - [13] Vestergaard, P., Møllerup, C.L., Frøkjær, V.G., Christiansen, P., Blichert-Toft, M. and Mosekilde, L. (2000) Cohort Study of Risk of Fracture before and after Surgery for Primary Hyperparathyroidism. *BMJ*, **321**, 598-602. <https://doi.org/10.1136/bmj.321.7261.598>
 - [14] Khaoula, B.A., Kaouther, B.A., Ines, C., Sami, T., Zakraoui, L. and Khedher, A. (2011) An Unusual Presentation of Primary Hyperparathyroidism: Pathological Fracture. *Case Reports in Orthopedics*, **2011**, 1-3. <https://doi.org/10.1155/2011/521578>
 - [15] Karaca, M.O., Özyıldırım, M., Savran, M.D., Başarır, K. and Yıldız, H.Y. (2024) Brown Tumors: Retrospective Analysis of 26 Cases. *Archives of Orthopaedic and Trauma Surgery*, **144**, 2927-2934. <https://doi.org/10.1007/s00402-024-05372-9>
 - [16] Haouzi, M.A., Benbouzid, Y., Baidriss, Y., Kharmaz, M., Zouaidia, F. and Sfar, K. (2023) Pathological Subtrochanteric Fracture Revealing a Primary Hyperparathyroidism: A Case Report. *International Journal of Surgery Case Reports*, **106**, Article 108158. <https://doi.org/10.1016/j.ijscr.2023.108158>
 - [17] Kersch-Schindl, K., Gelles, K., Butylina, M., Crevenna, R. and Pietschmann, P. (2025) Bone Metabolism in Primary Hyperparathyroidism. *Wiener klinische Wochenschrift*, **138**, 217-224. <https://doi.org/10.1007/s00508-025-02670-z>
 - [18] Iwanowska, M., Kochman, M., Szatko, A., Zgliczyński, W. and Glinicki, P. (2024) Bone Disease in Primary Hyperparathyroidism—Changes Occurring in Bone Metabolism and New Potential Treatment Strategies. *International Journal of Molecular Sciences*, **25**, Article 11639. <https://doi.org/10.3390/ijms252111639>

- [19] Malika, F., Taali, L., Akssim, M., Reda, A., Rouadi, S., Mahtar, M., *et al.* (2013) Tumeur brune du maxillaire révélatrice d'hyperparathyroïdie primaire: À propos d'un cas et revue de la littérature. *Pan African Medical Journal*, **2**, Article 21. <https://doi.org/10.11604/pamj.2013.14.21.1359>
- [20] Mrouki, M., Jaïdane, A., Bousselmi, J., Ouertani, H., Cherif, I., Danguir, C., *et al.* (2014) Tumeur brune maxillaire révélant une hyperparathyroïdie primaire. *Annales d'Endocrinologie*, **75**, Article 351. <https://doi.org/10.1016/j.ando.2014.07.271>
- [21] Tarrass, F., Ayad, A., Benjelloun, M., Anabi, A., Ramdani, B., Benghanem, M.G., *et al.* (2006) Compression de la queue-de-cheval révélant une tumeur brune rachidienne chez un patient en hémodialyse chronique. *Revue du Rhumatisme*, **73**, 1422-1424. <https://doi.org/10.1016/j.rhum.2006.01.017>