Case Report | Journal of Orthopaedic Case Reports 2026 July:16(7):Page 320-324

The Development of Metabolic Bone Failure as the Principal Manifestation of Undiagnosed Primary Hyperparathyroidism: A Rare Instance of Bilateral Femoral Neck Fractures

Sharath Raj[1], Aduri Tharun Teja[1], V B Shrinivas[1], Aditya Shah[1], Souvik Das[1], Aditya Aggarwal[2]

Learning Point of the Article:

Undiagnosed primary hyperparathyroidism can present as metabolic bone failure leading to rare bilateral femoral neck fractures in young adults, highlighting the need for early endocrine evaluation in unexplained skeletal symptoms.

Abstract

Introduction: Primary hyperparathyroidism, though commonly diagnosed through hypercalcemic symptoms, can rarely present as advanced skeletal pathology due to delayed recognition. Metabolic bone disease, including osteitis fibrosa cystica and fragility fractures, represents a late and uncommon manifestation in the modern diagnostic era.

Case Report: We report a rare case of a 26-year-old male who presented with bilateral femoral neck fractures following 4.5 years of progressive hip pain. He had a history of parathyroid adenoma excision 2 years prior and was diagnosed with "hungry bone syndrome" postoperatively. Imaging revealed classic skeletal changes of severe metabolic bone disease, including osteolysis, spinal deformities, and multiple cystic lesions. He underwent staged bilateral total hip arthroplasty with good functional recovery over 1 year.

Conclusion: This case underscores the importance of considering primary hyperparathyroidism in young patients presenting with unexplained skeletal complaints. Early recognition and management are essential to prevent irreversible bone damage and avoid debilitating complications such as bilateral femoral neck fractures.

Keywords: Primary hyperparathyroidism, parathyroid adenoma, metabolic bone disease, bilateral femoral neck fracture, hungry bone syndrome, total hip arthroplasty.

Introduction

One of the most prevalent endocrine conditions is primary hyperparathyroidism. One Acute presentations that revolve around hypercalcemic homeostasis are typically used to establish the diagnosis [1]. In the past 20 years, indolent forms involving the bones have hardly been seen, and the characteristics that coincide with dystrophies, skeletal dysplasia, and cancers may make diagnosis more difficult [2,3]. 2–3% of all neck of femur fractures in people under 50 are femoral neck fractures [4]. High-energy trauma accounts for the majority of fractures in this age range [4,5]. In young adults, bilateral atraumatic femoral neck fractures occurring simultaneously are regarded as extremely uncommon occurrences. There were not many cases in this age range documented in the literature [6,7]. Avascular necrosis and non-union are among the consequences linked to these fractures [8,9].

Anatomical reduction, early fixation, and rehabilitation are crucial to avoid such devastating complications. We report this

Access this article online

Website: www.jocr.co.in

DOI: https://doi.org/10.13107/jocr.2026.v16.i07.7678

Author's Photo Gallery


Dr. Sharath Raj


Dr. Aduri Tharun Teja


Dr. V B Shrinivas


Dr. Aditya Shah


Dr. Souvik Das


Dr. Aditya Aggarwal

[1]Department of Orthopedic Surgery, Postgraduate Institute of Medical Education and Research, Chandigarh, India,
[2]Department of Orthopedic Surgery, Livasa Hospital, Mohali, Punjab, India.

Address of Correspondence:
Dr. Sharath Raj,
Department of Orthopedic Surgery, Postgraduate Institute of Medical Education and Research, Madhya Marg, Sector 12, Chandigarh - 160012, India.
E-mail: sharathraj.pgi@gmail.com

Submitted: 16/04/2026; Review: 15/05/2026; Accepted: June 2026; Published: July 2026

DOI: https://doi.org/10.13107/jocr.2026.v16.i07.7678

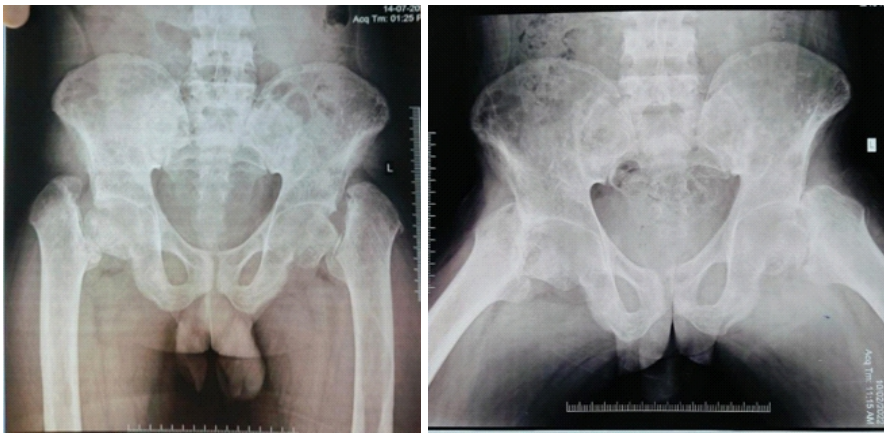

Figure 1: Hip joint (bilateral neck of femur fracture and osteoarthritis changes).

rare case of bilateral neck of femur fracture in a young adult, along with varied manifestations of metabolic bone failure, and pathognomonic of hyperparathyroidism. We also highlight the current evidence-based practices in the management of various bony manifestations.

Case Report

A 26-year-old male patient came in with a history of bilateral hip pain that had been ongoing for 4.5 years. His medical journey began with a referral from the Endocrinology department after the removal of a right inferior parathyroid adenoma (RIPA) 2 years prior. This adenoma was discovered incidentally while evaluating his generalized weakness and persistent bilateral hip pain, which had started 2 years before the surgery. When he presented, he reported that the hip pain had continued for 4.5 years. About 4.5 years ago, he had been asymptomatic until he developed hip pain, which also led to a noticeable change in his gait. Radiographic imaging showed atraumatic fractures in both hips. In addition, the patient has been experiencing intermittent abdominal pain for the past year, described as nausea and vomiting, localized to the flank without any radiation to the back. In the 2 years leading up to his referral, he reported symptoms including anorexia, weight loss, muscle mass loss, and general fatigue. His medical history includes the removal of a benign tumor beneath the left molar tooth, thought to be an epulis, 9 years ago. After the excision of RIPA in 2022, the findings are summarized in Table 1. The

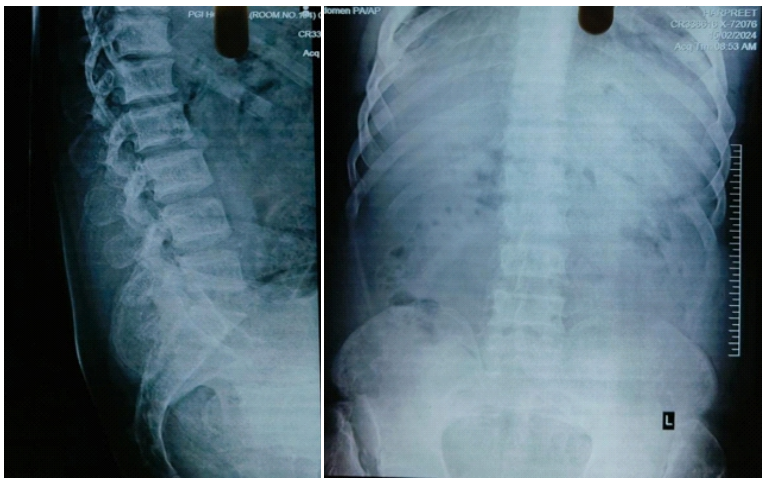

Figure 2: Spine (kyphoscoliosis in the spine with cod-fish and rugger jersey appearance).

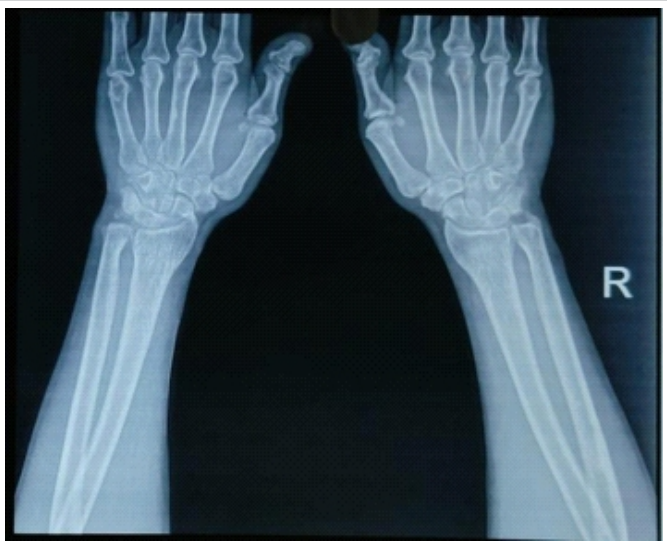

Figure 3: (Acro-osteolysis of hand).

patient was diagnosed with "hungry bone syndrome" and was treated with replacement therapy. His overall condition improved and stabilized with the administration of parenteral calcium gluconate and neutral phosphate.

On examination, the patient was found to be conscious, cooperative, and oriented, with Glasgow coma scale E4V5M6. Systemic examination findings include: Weight: 54 kg, height: 152 cm body mass index: 19 kg/m2 AS: 160 cm, US: LS 75:88 cm −0.85, and a scar mark noted. Central nervous system: E4V5M6, motor power assessed at 5/5 in both lower limbs and upper limbs bilaterally, reflexes graded at 2+ for triceps, biceps, knee, and ankle; plantar reflex is flexor. The patient has lost three molar teeth in the left jaw and exhibits lordosis with a bilateral waddling gait, along with a scar mark on the abdomen. An initial physical examination of the hips revealed a negative Patrick test, full range of motion, and mild soreness in the groin areas; the Harris Hip Score was 60 in both hips. Generalized

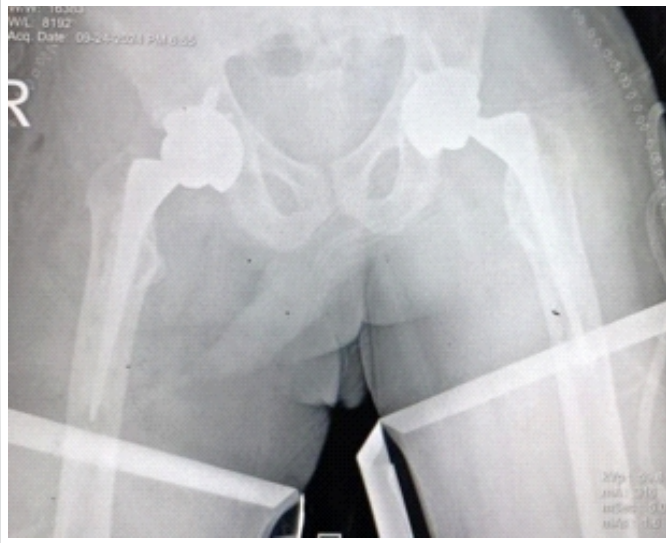

Figure 4: Post-operative X-ray.

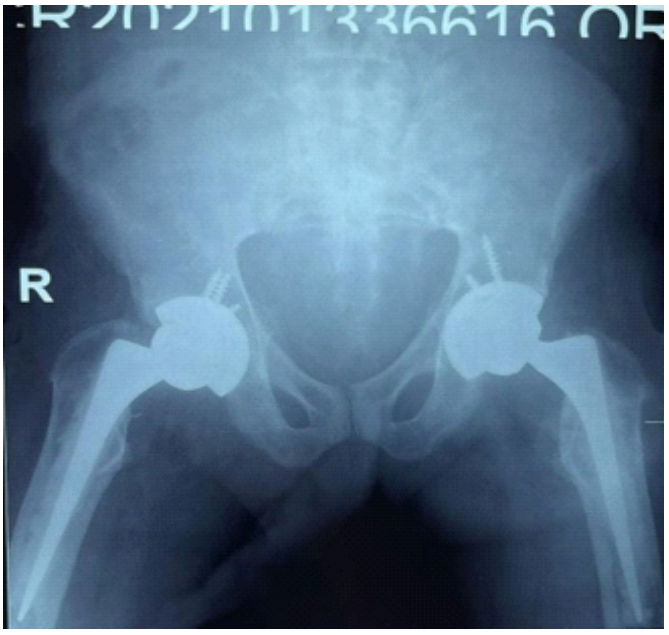

Figure 5: One-year follow-up X-ray.

muscle atrophy was noticed. The plain radiographs revealed bilateral neck of femur fracture (Both of which were graded as Type IV according to Garden's classification) with multiple small cysts in the femoral head and acetabulum, moderate joint space narrowing features suggesting of osteoarthritis (OA) and overriding of the Greater trochanter, generalised osteoporosis, multiple lytic lesions in the tibia and pelvis, along with regional changes like severe anterolateral bowing of femur (Fig. 1), Salt-and-pepper skull, kyphoscoliosis in the spine with cod-fish and rugger jersey appearance (Fig. 2) and acro-osteolysis of hand (Fig. 3). All these metabolic changes in the skeleton as identified in the imaging studies are summarized in Table 2.

The patient underwent optimization and was deemed suitable for surgical intervention a few days following admission. A total hip arthroplasty (THA) was indicated due to the presence of established OA changes. Our senior consultant (AA) decided to perform a hybrid THA, utilizing an uncemented cup and a cemented stem, in light of the observed cortico-medullary irregularities in the femur (Fig. 4). Postoperatively, the patient remained non-weight-bearing on both legs for 4 days. Subsequently, he began knee-bending exercises, practiced side sitting, and was assisted in walking with a walker under supervision. He was ultimately discharged in an improved condition. Subsequent follow-ups at 1 month, 3 months, 6 months, and 1 year revealed that the patient could walk independently and bear weight fully, exhibiting no limping and a pain-free gait. He was able to walk and run slowly, but was unable to squat. Approximately 12 months later, the patient returned for another evaluation. He was able to walk without a limp and reported no further pain. Daily activities were performed within the permissible range of motion associated with total hip replacement. An X-ray indicated a normal right hip with the implant in place after 1 year (Fig. 5). The Harris Hip Score improved to 90 both sides, and the left hip's range of motion increased to 120° of flexion. Impingement tests yielded negative results, and flexion, abduction, and external rotation were within normal limits.

Discussion

Parathyroid adenomas, especially solitary ones, are the predominant cause of primary hyperparathyroidism, with adenomatous parathyroid tissue often located in ectopic sites

Table 1: Serial laboratory investigations before and after parathyroid adenoma excision

Investigations	Before adenoma excision	POD 7	6 months
Hemoglobin	9.1	7.8	11.2
Ca++	14.53	9.35	9.23
Parathyroid hormone	>1400	7.57	22
Vitamin D3	63.3	38	32
Adrenocorticotropic hormone	1.5	1.5	1.42
Insulin-like growth factor 1	76.9	-	-
Beta cross lap	5623	552	0.5
C-Terminal telopeptide	4200		
P1NP	657		
DEXA (neck femur)	−2.7		
DEXA (radius)	−4.1		

DEXA: Dual-energy X-ray absorptiometry

Table 2: Imaging studies	
Ultrasound neck (February 11, 2022)	Well defined solid lesion of 1.4×2.1 cm, in the inferior pole of the right lobe of the thyroid. It shows internal vascularity with inferior thyroid artery coursing through it, Psv=8 cm/S P/O Ripa
Sestamibi scan (February 20, 2022)	2.1×1.4×3.5 cm hypodense soft tissue mass posteroinferior to the inferior pole of the right lobe of the thyroid gland s/o Ripa
Tc 99 Bone scan (February 23, 2022)	Scan evidence of increased osteoblastic activity in the skull, mandible, bilateral clavicle and scapula, bilateral humerus, sternum, multiple bilateral ribs, bilateral femur, and bilateral tibia. With the presence of clinical context, features are suggestive of osteitis fibrosa cystica
Histopathology/Biopsy	The section examined shows a well-encapsulated tumor surrounded by a thin fibrous capsule which is arranged in an organoid pattern, solid sheets, and cords separated by thin vascular channels. A focal microcystic pattern is also noted. The individual tumor cells are monomorphic, round to polygonal in shape, having stippled chromatin, inconspicuous nucleoli and a moderate amount of eosinophilic cytoplasm. Focal hyalinization is also seen. A scanty thin rim of normal parathyroid parenchyma is noted at the periphery. No significant atypia, mitosis, or necrosis was seen. Features are suggestive of parathyroid adenoma.

[10]. Approximately 5% of these adenomas are identified in the mediastinum, with 95% of those situated within the thymus [11]. Post-operative hypocalcemia is frequently observed in the early stages following parathyroid surgery. A specific condition known as "hungry bone syndrome" can lead to significant hypocalcemia immediately after surgery, which may prove resistant to treatment. While mild hypocalcemia can often be managed with oral calcium supplements, severe cases necessitate parenteral calcium administration. Skeletal involvement in primary hyperparathyroidism is estimated to occur in about 2% of cases [12]. Evidence supporting the notion that reduced bone density due to hyperparathyroidism correlates with a higher fracture rate is limited Wilson et al., [13]. Found no significant increase in vertebral fractures among 174 hyperparathyroid patients, whereas Peacock [14] reported a higher incidence of both vertebral and cortical fractures in this population. The occurrence of femoral neck fractures resulting from ectopic parathyroid adenomas is exceedingly rare, and prompt surgical intervention is essential to mitigate the risks of non-union and avascular necrosis [15].

Conclusion

This case highlights the severe skeletal manifestations that can result from delayed diagnosis of primary hyperparathyroidism, including bilateral femoral neck fractures in a young adult. Despite advancements in diagnostic modalities, indolent presentations involving bone metabolism continue to occur and can lead to significant morbidity if not recognized early. Comprehensive endocrine evaluation in young patients with unexplained musculoskeletal symptoms is essential. Timely surgical and orthopedic interventions, combined with metabolic correction, can lead to favorable functional outcomes even in advanced cases.

Clinical Message

In young patients presenting with unexplained bone pain or fragility fractures, especially in the absence of trauma, clinicians should consider underlying metabolic bone disorders such as primary hyperparathyroidism. Early diagnosis and multidisciplinary management are crucial to prevent severe skeletal complications and optimize patient outcomes.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

References

1. Madkhali T, Alhefdhi A, Chen H, Elfenbein D. Primary hyperparathyroidism. Ulus Cerrahi Derg 2016;32:58-66.

2. Muthukrishnan J, Harikumar KV, Sangeeta J, Singh MK, Modi K. Nerve, muscle or bone disease? Look before you leap. Singapore Med J 2009;50:e293-4.

3. Ullah E, Ahmad M, Ali SA, Redhu N. Primary hyperparathyroidism having multiple Brown tumors mimicking malignancy. Indian J Endocrinol Metab 2012;16:1040-2.

4. Robinson CM, Court-Brown CM, McQueen MM, Christie J. Hip fractures in adults younger than 50 years of age. Epidemiology and results. Clin Orthop Relat Res 1995;312:238-46.

5. Askin SR, Bryan RS. Femoral neck fractures in young adults. Clin Orthop Related Res 1976;114:259-64.

6. Haronian E, Silver JW, Mesa J. Simultaneous bilateral femoral neck fracture and greater tuberosity shoulder fracture resulting from seizure. Orthopedics 2002;25:757-8.

7. Shah HM, Grover A, Gadi D. Bilateral neck femur fracture following a generalized seizure - a rare case report. Arch Bone Joint Surg 2014;2:255-7.

8. Stockton DJ, O'Hara LM, O'Hara NN, Lefaivre KA, O'Brien PJ, Slobogean GP. High rate of reoperation and conversion to total hip arthroplasty after internal fixation of young femoral neck fractures: A population-based study of 796 patients. Acta Orthop 2019;90:21-5.

9. Slobogean GP, Sprague SA, Scott T, Bhandari M. Complications following young femoral neck fractures. Injury 2015;46:484-91.

10. Palmer JA, Brown WA, Kerr WH, Rosen IB, Walters NA. The surgical aspects of hyperparathyroidism. Arch Surg 1975;110:1004-7.

11. Geelhoed GW, Krudy AG, Doppman JL. Long-term follow-up of patients with hyperparathyroidism treated by transcatheter staining with contrast agent. Surgery 1983;94:849-62.

12. Silverberg SJ, Shane E, DeLaCruz L. Skeletal disease in primary hyperparathyroidism. J Bone Miner Res 1989;4:283-91.

13. Wilson RJ, Rao DS, Ellis B, Kleerekoper M, Parfitt AM. Mild asymptomatic primary hyperparathyroidism is not a risk factor for vertebral fractures. Ann Intern Med 1988;109:959-62.

14. Peacock M. Interpretation of bone loss determinations as they relate to fracture: Implications for asymptomatic primary parathyroidism. J Bone Miner Res 1991;6:S77-82.

15. Brown JT, Abrami G. Transcervical femoral fracture. A review of 195 patients treated by sliding nail-plate fixation. J Bone Joint Surg Br 1964;46:648-63.

Conflict of Interest: Nil
Source of Support: Nil

Consent: The authors confirm that informed consent was obtained from the patient for publication of this article

How to Cite this Article

Raj S, Teja AT, Shrinivas VB, Shah A, Das S, Aggarwal A. The Development of Metabolic Bone Failure as the Principal Manifestation of Undiagnosed Primary Hyperparathyroidism: A Rare Instance of Bilateral Femoral Neck Fractures. Journal of Orthopaedic Case Reports 2026 July;16(07): 320-324.