

Hip Fracture Due to Osteomalacia Secondary to Celiac Disease

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Abstract: *Background:* Hip fracture is uncommon among younger patients but can have devastating consequences. Therefore, hip fracture caused by minimal trauma requires examinations on calcium metabolism to identify the primary cause. *Methods:* We present a clinical case of an 18-year-old male patient who suffered a subcapital fracture of the left hip due to minimal trauma while playing soccer. The patient immediately underwent surgery, which is closed reduction and internal fixation with two cancellous screws installed. Subsequently, metabolic tests showed severe vitamin D deficiency (27.1 nmol/L - normal above 75 nmol/L) and high levels of IgA anti-transglutaminase antibodies (2502.40 U/mL). Digestive biopsy confirmed the diagnosis of celiac disease, and he was treated with a gluten-free diet and calcium and vitamin D supplements. *Results:* After two years of follow-up, the patient is pain-free, with full hip mobility. There were no complications (osteosynthesis failure, avascular necrosis or pseudarthrosis) and serum levels of vitamin D, and IgA anti-transglutaminase antibodies had normalized. *Conclusion:* In young patients presenting with low energy trauma fractures, vitamin D deficiency should be considered as a possible etiology, and the reason for such osteomalacia, such as celiac disease, should be identified.

Keywords: Celiac disease; Osteomalacia; Femoral neck fractures; Spontaneous fractures

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1. Key concepts

Numerous studies have provided data on a possible lack of intestinal absorption of vitamin D in the presence of enteropathy secondary to celiac disease. Thus, the development of fractures due to deficient bone mineralization is also possible. However, the development of a hip fracture in a young patient, in which functional consequences can be devastating, has only been described as an initial manifestation of celiac disease. This paper describes a case study of a patient that underwent treatment for a subcapital hip fracture, while additional examinations were also carried out to reach a diagnosis of celiac disease as the pathology of origin. It is necessary to maintain a high clinical suspicion in a hip fracture of a young patient that did not experience a high energy mechanism injury. In this way, it will be possible to complete the examinations that will lead to the diagnosis of the initial disease to reverse its consequences and avoid future clinical manifestations.

2. Introduction

Hip fracture is common among the elderly, which is caused by low energy trauma, considering that the patient already has osteoporosis. On the other hand, this injury caused by low-energy trauma is uncommon

in young people; hip fractures in young people are usually caused by secondary to high energy mechanism, such as traffic accidents or falls from heights ^[1]. However, there are pathologies that cause a higher risk of hip stress fractures, such as chronic renal failure, high-dose corticotherapy or osteomalacia ^[2]. Osteomalacia is a disorder that causes a defect in bone mineralization secondary to vitamin D deficiency. A possible etiology of osteomalacia is celiac disease, characterized by inflammation of the intestinal mucosa, which in turn causes malabsorption of calcium and vitamin D ^[3].

The article presents a case study of a young patient with osteomalacia secondary to undiagnosed celiac disease that was presented with a subcapital hip fracture.

3. Clinical case

An 18-year-old male presented to the Emergency Department of our hospital after suffering minimal trauma while practicing sports. Upon examination, the patient was presented with pain and functional impotence in the left hip, with shortening and external rotation of the limb.

The plain radiograph shows a displaced subcapital fracture of the left hip (Garden IV). An urgent closed reduction and internal fixation was performed along with the insertion of two cannulated compression screws (**Figures 1 & 2**).

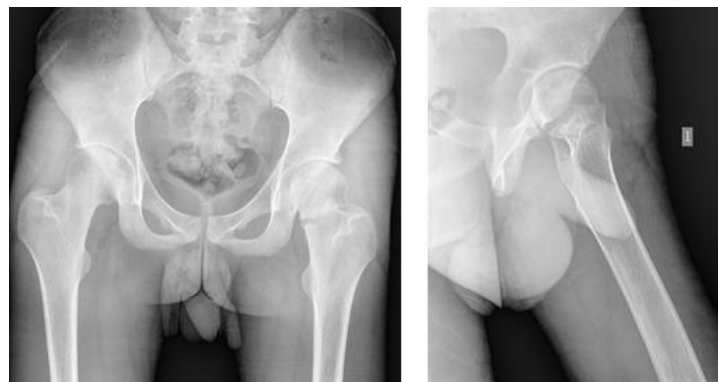


Figure 1. Simple preoperative X-ray (Left hip subcapital fracture, with valgus displacement)

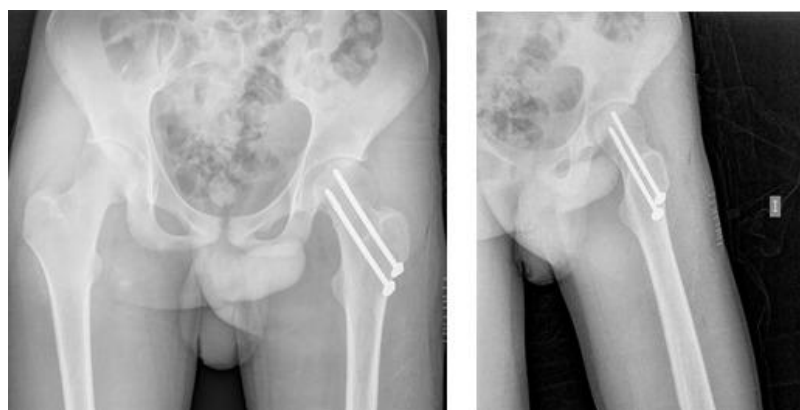


Figure 2. Simple postoperative X-ray (Osteosynthesis with 2 cannulated cancellous bone screws)

Since it was a young patient with a hip fracture following a low energy mechanism, further examinations were carried out. Laboratory studies showed a vitamin D deficiency. The serum 25 (OH) vitamin D level was 27.1 nmol/L (75–250nmol/L). Alkaline phosphatase values were 77.8 U/L (12.0–43.0 U/L), while N-MID osteocalcin presented levels of 82.8 ng/mL (5.8–39.8 ng/mL). Other parameters were normal: serum calcium (10.0 mg/dL), serum phosphorus (4.20 mg/dL) and hemoglobin (15.6 g/dL). Bone densitometry of the lumbar area indicated bone density loss (lumbar: 0.839 g/cm²; T score: -3.1; Z score: -

2.9). These findings confirmed the existence of a deficiency in bone mineralization secondary to vitamin D deficiency.

The patient experienced some gastrointestinal discomfort a year ago, which even forced him to go to the emergency department on one occasion, so he underwent screening for gastrointestinal diseases. Anti-transglutaminase IgA antibodies were high (2502.40 U/mL), so, in view of the suspicion of celiac disease, an endoscopy was performed. The endoscopy showed barely visible flattened folds with multiple fibrin-covered erosions in the second duodenal portion. The anatomopathological study of this duodenal portion showed villous atrophy with dense and diffuse lymphocytes and plasma cells infiltrate, confirming the diagnosis of celiac disease. The treatment used for the diagnosis of osteomalacia secondary to celiac disease was a gluten-free diet, along with calcium and vitamin D supplements during the first year of treatment.

4. Follow-up

The immediate postoperative period is uneventful, and the patient was advised on unloading the limb for the first six weeks. After this period, progressive partial support of the limb was allowed for the next six weeks; from the third month onwards, full weight bearing is approved. After a 2-year follow-up, the patient was pain-free, with full mobility of the coxofemoral joint. No complications such as osteosynthesis failure, avascular necrosis of the femoral head, or consolidation problems occurred.

Currently, the patient follows a strict gluten-free diet, without the need for vitamin supplements. The blood test and bone densitometry have normalized, and the patient showed no digestive or other symptoms.

5. Discussion

Hip fracture in young patients not associated with a traumatic context is uncommon and can have devastating consequences. Its diagnosis requires an exhaustive study of the loss of bone quality and its primary etiology. From the surgeon's point of view, the measures taken is not only limited to internal fixation of the hip fracture for its subsequent functional recovery, but also identifying the primary pathology and thus prevent new fractures and other non-osteoarticular manifestations.

This case study involves bone mineralization defect secondary to vitamin D malabsorption, due to celiac disease enteropathy. There are few cases in the literature that report hip fractures due to osteomalacia secondary to celiac disease. Ozgur *et al.* reported three cases of bilateral hip stress fracture successfully treated by cannulated screw osteosynthesis in their study ^[4]. Rubinstein *et al.* reported a clinical case of an elderly man with bilateral hip fracture with severe tetany ^[5].

The relationship between celiac disease and increased risk of hip fracture has previously been described in literature. For example, a cohort study including 7146 patients, relates persistent villous atrophy with an increase (Hazard ratio 1.67; 95% CI 1.05–2.66) in the risk of hip fracture ^[6]. On the other hand, García-Manzanares *et al.* found that there is a low risk of hip fracture in the presence of celiac disease, which increases to medium risk when there is villous atrophy ^[7].

However, although the increased risk of hip fracture in the presence of celiac disease has been demonstrated, routine screening for celiac disease is not recommended in the presence of a metabolic bone disease of unexplained origin, or in the absence of gastrointestinal symptoms or dermatitis herpetiformis ^[8]. Moreover, in economic terms, universal screening for celiac disease for the prevention of fractures in undiagnosed patients is not a viable alternative ^[9].

6. Conclusion

Subcapital hip fracture in young patients in the absence of a high energy mechanism is a rare occasion. When diagnosing the pathology, we have to rule out vitamin D deficiency as a possible cause, and the reason for such osteomalacia, such as celiac disease, must be identified.

Therefore, it is very important to maintain a high degree of suspicion in our daily clinical practice to diagnose this disease and avoid secondary clinical manifestations that can be catastrophic.

Disclosure statement

The authors declare no conflict of interest.

Author contributions

All authors have participated in the conceptualization, collection of information, the writing of the manuscript, and approval of its final version.

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