CLINICAL CASE

ACROMEGALY - RELATED OSTEOPOROSIS

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ABSTRACT

Secondary osteoporosis includes modern causes as obesity or type 2 diabetes mellitus, but also acromegaly. The main skeletal anomalies are represented by vertebral fractures which are more often of less clinical severity, but in association with Growth Hormone (GH) excess and time of hyper-secretion exposure, even persistent when pituitary disease is controlled. Dual-Energy X-Ray Absorptiometry (DXA) which is the golden standard of osteoporosis diagnosis might not be helpful and might not reflect the co-presence of osteoporotic fractures. We introduce a case of acromegaly in an adult non-hypogonadic acromegalic man which was accidentally diagnosed during somatotropinoma evaluation. In present case, the patient had a vertebral fracture a low BMD according to osteoporosis criteria despite male sex and lack of central hypogonadism or of diabetes mellitus.

KEYWORDS: *Growth Hormone, osteoporosis, acromegaly*

INTRODUCTION

Secondary osteoporosis includes modern causes as obesity or type 2 diabetes mellitus [1]. Relatively recent data confirmed that among endocrine aetiologies acromegaly may also be considered [2-4]. Other pituitary disorders associating high risk of fragility fractures are Cushing's disease, prolactionoma, and central hypogonadism [2]. Damage of both bone quality and quantity are seen in acromegaly [2,3].

The main skeletal anomalies are represented by vertebral fractures which are more often of less clinical severity, but in association with Growth Hormone (GH) excess and time of hyper-secretion exposure, even persistent when pituitary disease is controlled [4]. More than one third of patients have prevalent vertebral fractures [4]. Vertebral fractures might not be predicted in every case based on clinical aspects of the somatotropinoma [5,6]. One study published in 2016 showed on 40 acromegaly patients with a median age of 57 years that subjects with morphometric vertebral fractures had statistical significant lower bone volume/trabecular volume ratio and higher cortical pores versus acromegalic patients without prevalent fractures using high-resolution-cone beam computed tomography [5].

Some additional mechanisms are also incriminated in bone deterioration like co-existence of central hypogonadism due to pituitary macroadenoma, of secondary diabetes mellitus, and of central adrenal insufficiency with potential excessive glucocorticoids

replacements [2,4].

Dual-Energy X-Ray Absorptiometry (DXA) which is the golden standard of osteoporosis diagnosis might not be helpful and might not reflect the co-presence of osteoporotic fractures [4]. For instance, a patient with a vertebral fracture may have normal BMD (Bone Mineral Density) at central DXA [4-6]. But some reports showed a correlation between hip DXA results and vertebral fractures during follow-up. Moreover, bone turnover markers may be contributors to bone loss in active phase of acromegaly showing a tendency to normalization when the disease control is achieved [4]. Others anomalies of calcium metabolism are hypovitaminosis D and potential co-secretion of PTH (Parathyroid Hormone) as seen in syndromic aspects which involve primary hyperparathyroidism and acromegaly [7].

We introduce a case of acromegaly in an adult non-hypogonadic acromegalic man which was accidentally diagnosed during somatotropinoma evaluation.

CASE PRESENTATION

This is a 59-year old male, coming from non-endemic area, who presented intermittent arrhythmia and further on he was referred for an endocrine assessment. (Figure 1) Acromegaly was confirmed based on 24-hours GH mean of 4.5 ng/mL, a GH nadir of 2.2 ng/mL during oral glucose tolerance test with 75 grams of glucose, and an increased IGF1 (Insulin-like Growth Factor) of 3 times above normal limit were found. He associates no pituitary insufficiency, neither diabetes mellitus. Low 25-hydroxyvitamin D levels are detected (of 10 ng/mL, with normal levels above30 ng/mL). As complications of acromegaly we mention multiple thyroid nodules of maximum 1 centimetre (cm) on the right lobe (and normal thyroid function). Pituitary computed tomography identified a tumour of 1.27 by 1.09 cm. Transsphenoidal hypophysectomy was done and soon after gamma knife therapy. For 2 years the disease was mostly controlled based on normal GH during inhibition tests and 24-h mean but a small increase of IGF1 was persistent thus therapy with analogue somatostatins (Octreotide LAR 20 mg per month) was started and achieved complete disease control. A pituitary remnant of 0.5 by 0.7 by 0.9 cm was identified at pituitary imagery. (Figure 2)

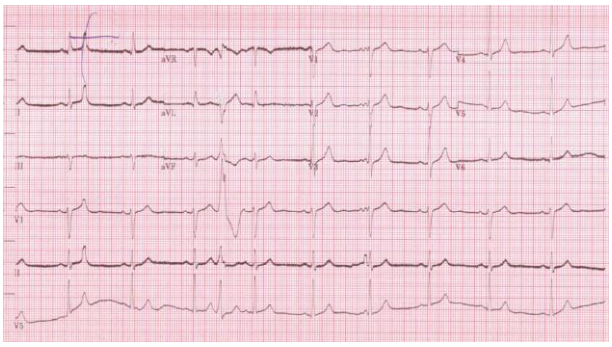

Figure 1 - Electroardiogram of a 59-year old male with acromegaly due to a pituitary tumour of 1.27 cm (maximum diameter)

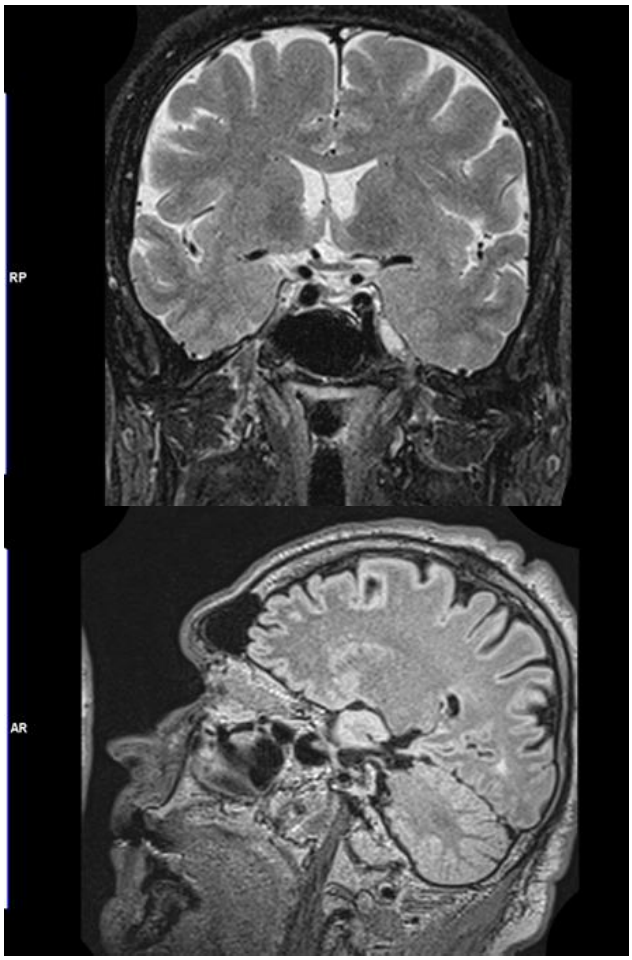

Figure 2. Pituitary magnetic resonance imagery one year after the diagnosis of acromegaly was done and pituitary surgery was practiced. A tumour is identified of 0.5 by 0.7 by 0.9 cm

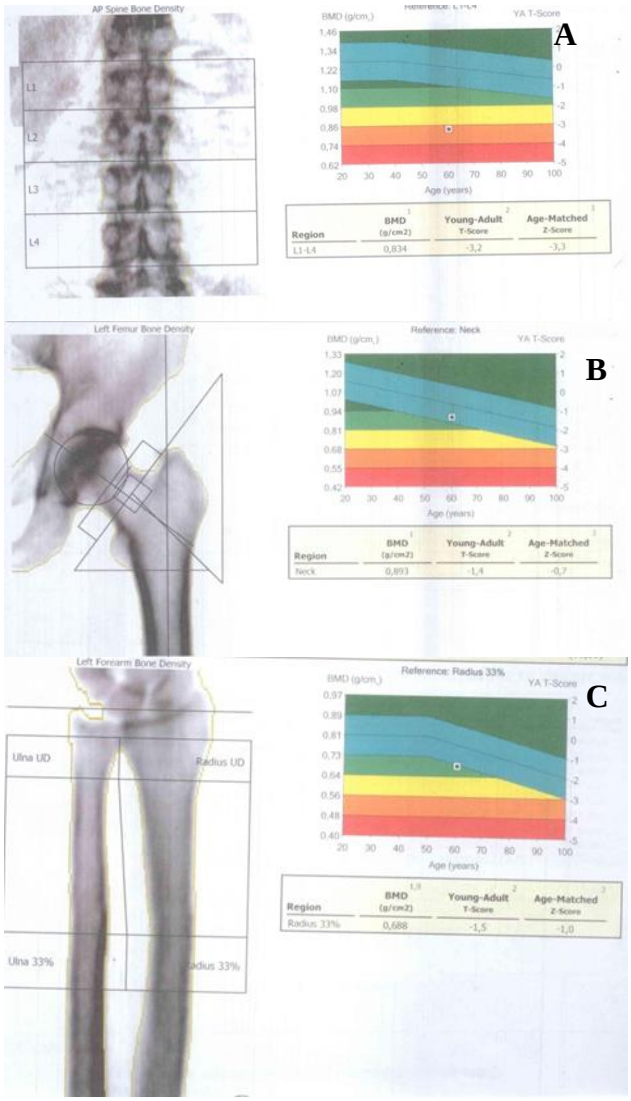

Figure 3 - Central DXA confirms osteoporosis based on minimum T-score of -3.2 SD. A. Lumbar spine. B. Femoral neck. C. Third distal radius of non-dominant arm

During follow-up, the bone metabolism was also evaluated. A part from vitamin D replacement, the patient was offered intravenous bisphosphonates (zolendronic acid 5 mg per year) for osteoporosis. The diagnosis was established using central DXA. (Figure 3) Normal bone turnover markers as total alkaline phosphatase were found (a value of 64 U/L, with normal limits between 40 and 150 U/L), and normal serum calcium and phosphate as well as PTH (of 43.28 ng/mL, normal values between 15 and 65 ng/mL). Profile X-Ray identified a vertebral fracture at sixth thoracic vertebra. (Figure 4) Life time follow-up is necessary.

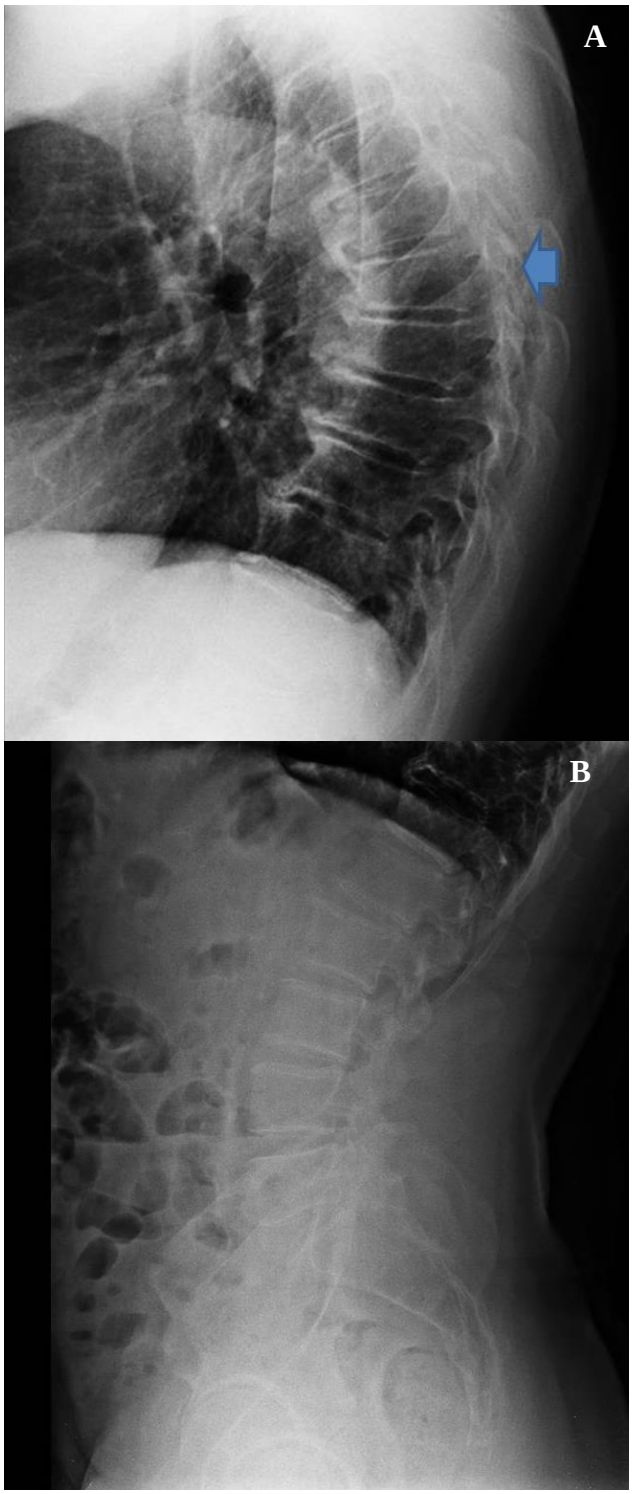

Figure 4. Profile X-Ray of the thoracic (A) and lumbar (B) spine in an acromegalic male. Vertebral fracture is pointed by the arrow

DISCUSSIONS

Despite the anabolic effects of GH and secondary increase of bone formation markers, overall acromegaly osteopathy represents an important co-morbidity which is correlated with disease control. (4,6). Screening profile X-Ray

of the spine is necessary at thoracic and lumbar sites. (4,6) In present case, the patient had a vertebral fracture a low BMD according to osteoporosis criteria despite male sex and lack of central hypogonadism or of diabetes mellitus.

CONCLUSION

Osteoporosis, especially severe type associated with vertebral fractures, represents a complication of acromegaly and associated co-morbidities which require serial evaluation and long-term follow-up.

Abbreviations

cm = centimetre
DXA = Dual-Energy X-Ray Absorptiometry
GH = Growth Hormone
IGF1 = Insulin-like Growth Factor
PTHrP = Parathyroid Hormon

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