CASE REPORT

Bilateral femoral fractures in a 21-year-old man following a simple fall

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SUMMARY

We present a case of a 21-year-old man with hip pain to the orthopaedic team. During the initial assessment he was found to be hypercalcaemic (adjusted calcium 3.55) due to the primary hyperparathyroidism (PTH 1285), with all other screening for multiple endocrine neoplasia negative. During his time on the ward while being treated for the hypercalcaemia he had a fall resulting in bilateral femoral fractures, requiring surgical management. He underwent an emergency exploration of neck and excision of a large parathyroid adenoma, measuring 5.5 cm. He also developed renal failure as a result of nephrocalcinosis. This case highlights the importance of early detection and management of hyperparathyroidism with the aim of preventing long-term complications. This patient ultimately required a renal transplant and multiple orthopaedic procedures as a result of undiagnosed PTH and recently underwent excision of the remaining parathyroid glands.

BACKGROUND

Primary hyperparathyroidism (PTH) is a common condition that is often an incidental finding when performing 'routine bloods', which, if left untreated, can have devastating consequences. These consequences can be prevented and to a degree reversed with appropriate early investigation and management. This young man, probably had hyperparathyroidism for a long-time undetected which has resulted in these severe complications.

CASE PRESENTATION

A previously fit and well 21-year-old man presented to the orthopaedic team with right hip pain that had been going on for 3 weeks, with no previous history of trauma. He was able to bear weight but had an antalgic gait. He had a limp as a child that was self-limiting and no cause for this was identified. There was no relevant family history and he lived alone. On further questioning he was found to be very thirsty, and even at night he would routinely drink 2 L of water. He was a non-smoker and drank alcohol socially.

INVESTIGATIONS

Blood samples on admission demonstrated hypercalcaemia (corrected calcium 3.55 mmol/L), anaemia (haemoglobin 8.6 g/dL), renal impairment (urea 13.6 mmol/L, creatine 170 µmol/L) and a raised level of alkaline phosphatase (2534 U/L).

He had an ultrasound scan of his renal tract that revealed nephrocalcinosis.

Parathyroid hormone level was also raised at 1285 ng/L.

The patient underwent investigations for hyperparathyroidism in the form of a neck ultrasound scan and a sesta-mibi scan. These demonstrated the appearances in keeping with a left lower parathyroid adenoma (figure 1).

When the patient had his fall on the ward he had X-rays of his pelvis and femurs. These demonstrated a right intracapsular fracture of the neck of femur and a displaced transverse mid-shaft fracture of left femur (figures 2 and 3).

DIFFERENTIAL DIAGNOSIS

It is unusual for a patient of this age to have osteoarthritis as a cause for a painful hip without a history of injury. It is important to exclude septic arthritis as this will have disabling consequences if missed. Other arthropathies such as reactive, rheumatoid and psoriatic should be considered as well as gout and pseudogout. In the absence of a definite diagnosis, further investigations should be initiated to rule out any metabolic causes, as was demonstrated in this case where a diagnosis of PTH had been confirmed.

TREATMENT

Initial treatment for this patient was medical in the form of rehydration and pamidronate infusions.

Figure 1 Sesta-mibi scan demonstrating parathyroid adenoma.

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Figure 2 Lateral femoral X-ray demonstrating transverse displaced fracture.

The femoral fractures were managed with bilateral femoral nailing with the right also having proximal screws to the femoral head. Following this the patient then went on to have

surgical exploration of his neck and excision of a large parathyroid adenoma (5.5 cm). Calcium levels returned to normal post-operatively before becoming low, due to the development of hungry bones syndrome. He required intravenous calcium for 2 days. Unfortunately some long-term damage to his kidneys had already been established, resulting in him needing renal replacement therapy and more recently he underwent a renal transplant from a living donor. He also needed further orthopaedic procedures, culminating in a total hip replacement on the right side.

OUTCOME AND FOLLOW-UP

Owing to the delay in making this diagnosis the patient had already established long-term sequelae of primary hyperparathyroidism. He needed renal replacement therapy and has now received a renal transplant from a living donor. He has also undergone several further orthopaedic procedures including a right total hip replacement. He remains under the care of the Renal Team and has had further surgery to remove all of his parathyroid glands.

DISCUSSION

Usually, hyperparathyroidism may remain asymptomatic and is often an incidental finding on biochemical blood investigations. Symptomatic hypercalcaemia in young adults is uncommon and more commonly seen in developing countries¹ where biochemical screening is not readily available. Those patients usually present

Figure 3 Anteroposterior femoral X-ray demonstrating transverse fracture.

with the sequelae of renal and skeletal disease.² A delay in diagnosis is not uncommon in children³ with early detection being paramount in preventing complications and end organ damage, the earlier it is detected the more reversible the disease.²

The relation between weight, size and volume of parathyroid gland and the biochemical markers have been studied and conflicting results were found. Contrary to some studies, two studies have found a significant positive correlation between preoperative calcium levels and the weight of the adenomas.^{4,5} However, no correlation was found between the weight of the adenoma and the pre-operative PTH contrary to the findings discussed in one of the studies published in the 1980.⁶ Some centres measure intraoperative PTH as a way of confirming the removal of the culprit adenoma, however, this is not readily available and expensive. We used a frozen section for confirmation of parathyroid adenomas. The relation between the size of adenoma and postoperative hypocalcaemia is not yet established. Various studies have shown conflicting results and no clear answer has been demonstrated.⁷ Bone disease and kidney disease are two common complications of primary hyperparathyroidism. The relationship between the parathyroid gland and bone disease was first identified in 1925 when removal of parathyroid tumour improved patients bone condition. Reversal of bone disease in adults showed less response than in children following surgical removal of parathyroid adenomas. In a series that examined 44 patients with an average age of 56 years, the annual percent increases in lumbar and radial bone mineral density 1 year after parathyroidectomy were 12.2% and 1.4% and 11.6% and 1.6%, respectively.⁸ There is evidence that bone mineral density continue to improve for at least 1 year after surgery hence the need for calcium supplement.⁹ Our patient required orthopaedic surgery 1 year after his presentation to modify previous surgery to his right hip. In a case report of a 16-year-old patient, a 28.1% improvement in lumbar spine and 28.6% in right forearm mineral density were noticed. This patient also showed an increase in height and weight percentiles 1 year after surgery.³

A second well-recognised complication of hypercalcaemia is renal damage.¹⁰ Before the routine testing of calcium, urinary stone disease was seen in up to 50% of patients with hyperparathyroidism.¹¹ Recently the reported incidence is up to 20%¹¹ and 12.8% of patients still manifest with kidney stones following surgery.¹² Parathyroidectomy improved hypercalcaemia but the increase risk of stone formation might persist for 10 years postsurgery.¹³ As demonstrated in this case report, some patients can progress in end-stage kidney disease requiring renal replacement therapy.

Contributors All three authors produced this report while working at North Tees Hospital.

Competing interests None.

Patient consent Obtained.

Learning points

- ▶ Early detection and treatment of hyperparathyroidism can help to prevent or halt progression of complications particularly in young patients.
- ▶ Femoral fractures are unusual in the young patients in the absence of major trauma.
- ▶ Hyperparathyroidism can result in end-organ damage with detrimental effects; this patient needed a renal transplant.
- ▶ Excision of the culprit adenoma will promptly treat hypercalcaemia; however, the patient may develop hungry bones syndrome and need prolonged intravenous calcium as a result postoperatively. Therefore, it is important to be vigilant in looking for the symptoms and regularly check the calcium level postoperatively, correcting where appropriate.

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