Osteoporosis in young male secondary to cancer treatment – Case report

**INTRODUCTION**

Children undergoing treatment for cancer – chemotherapy (CT) and/or radiotherapy (RT) – are prone to several long-term endocrine complications, which can permanently affect bone tissue, leading to a serious decrease of bone mineral density (BMD).

**CASE REPORT**

5 years-old

- Male child with irrelevant past history.

- **Right maxillary sinus rhabdomyosarcoma**

- **RT** – cervical + submaxillary (60 Gy)

- **CT** – intrathecal: Metothrexate + Prednisolone

  intravenous: Ifosfamide + Actinomycin + Vincristine

13 – 17 years-old

- **Growth Charts**

  - 13 years-old – P3, G3, TV 15 mL; BA = 11 years.
  - 17 years-old – P5, G5 e VT 25 mL; BA = 17 years.

  Normal thyroid ultrasounds.

12 years-old

- **Auxology:**
  - Height 139 cm (p10)
  - Predicted Adult Statute (PAS) 170 cm
  - Growth velocity (GV) p90;

- **Tanner P2, G2**

  Testicular volume (TV) 5 mL

- **Bone age (BA)** 9 years.

- **Initial evaluation:**
  - TSH 7.4 mU/l (0.3-4.2);
  - T3 120 ng/dl (80-200)
  - FT4 0.8 ng/dl (0.9-1.7)
  - IGF-1 102 ng/ml (<p3)

  Gonadal and adrenal axes were normal.

≥ 18 years-old

- **Growth Hormone Deficiency (GHD)**

  - According to national criteria back then, he wasn’t eligible for somatropin treatment.

**DISCUSSION**

**Developed Endocrinopathies**

- **GH Deficiency** ← RT

- **Primary Hypothyroidism** ← RT

**OSTEOPOROSIS**

- **Secondary to... ?**

- **Primary and Central Hypogonadism** ← RT + QT

  (established at the age of 21)

- **Growth Horm. Deficiency**

**METHOTREXATE** – direct bone toxicity; reversible after withdrawal.

**IFOSFAMIDE** – Damage to proximal tubules of kidneys → loss of renal phosphate; primary hypogonadism.

**GLUCOCORTICOIDs** – ↑ resorption of bone formation (direct effect on calcium metabolism; ↓ testosterone and E₂)

**HYPOGONADISM** – alters linear growth; epiphyseal maturation; acquisition and maintenance of BMD.

Our patient developed GHD secondary to radiotherapy. This contributed to impaired bone mass acquisition. Methotrexate and glucocorticoids’ adverse effects on bone are usually reversible. Peak bone mass should already been reached when partial gonadal axis insufficiency was established.

The benefits of somatropin therapy are evident in several studies. It’s required a long period for them to be observed, because the activation of osteoclasts preceds osteoblasts.

It’s important to identify the risk of endocrine complications in order to treat these patients properly.