biomnis
SPECIALISED MEDICAL PATHOLOGY
Focus number 10

Osteoporosis and specialised pathology

Definition of osteoporosis

Initially: clinical and radiological definition with notion of fracture

Followed by anatomic definition (consensus conference, 1993): systemic skeletal disease characterised by low bone mass and microarchitectural deterioration of bone tissue, followed by an increase in skeletal fragility and susceptibility to fracture.

At the present time, diagnostic definition WHO, 1994): established with respect to osteodensitometry.

Different types of osteoporosis

Primary osteoporosis:

- Postmenopausal osteoporosis
- Senile osteoporosis: affects both sexes after 75 years of age.

Secondary osteoporosis:

- AMust be ruled out before diagnosing primary osteoporosis
- Hypercorticism, hyperparathyroidism, hyperthyroidism, chronic kidney failure
- Cancer, myeloma

Medical care

Patient questionnaire:

Notion of risk factors in order to assess the risk of fracture for the patient in the next 10 years. Identified risk factors include: peripheral fracture occurring "without major trauma", frequently undetected vertebral "compression" fracture, family history of osteoporotic fracture, low Bone Mineral Density; elevated bone remodelling; short stature/low body weight; long-term high-dose corticoid treatments; low sun exposure; sedentary lifestyle; hypogonadism; alcohol consumption, smoking; other diseases, etc.

Clinical profile:

- Acute vertebral pain indicating vertebral compression
- Deformation, chronic spinal pain
- Fractures
- Loss of height: measure regularly

Paraclinical examinations

Bone densitometry or dual-energy X-ray absorptiometry (DEXA)

Rule out secondary osteoporosis:

Systematic pathological testing to be performed for all patients showing osteoporosis:

1. Rule out tumoral process (myeloma, etc.): full blood count, SR, protein electrophoresis, 24-hour proteinuria.
2. Rule out phosphocalcium metabolism defect: blood calcium, blood phosphates, 24-hour calciuria.
3. Assess the kidney and liver function: creatinine + alkaline phosphatases.
4. Vitamin D assay (25OH).

In case of indication:
TSH (hyperthyroidism)
PTH (hyperparathyroidism)
24-hr cortisoluria (hypercorticism)
Testosterone (hypogonadism)

Treatments

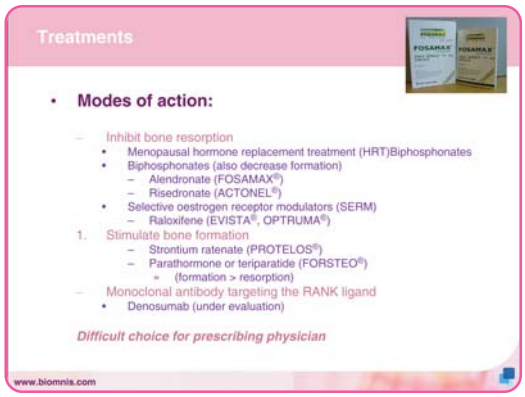
Prevention:

- Lifelong hygiene and nutritional measures: physical exercise, intake of vitamin + calcium (3 dairy products each day), campaign against smoking and alcoholism, weight and BMI.
- Systematic screening after 60 years of age.

Correcting a vitamin D deficiency:

Vitamin D deficiency occurs frequently and nutritional sources are insufficient; the recommended values are between 30 and 80 ng/ml. Vitamin D deficiency in an elderly subject worsens any osteoporosis; induces secondary hyperparathyroidism (elevated PTH, low blood calcium) and causes muscle weakness with an increased risk of fracture.

Treatments:



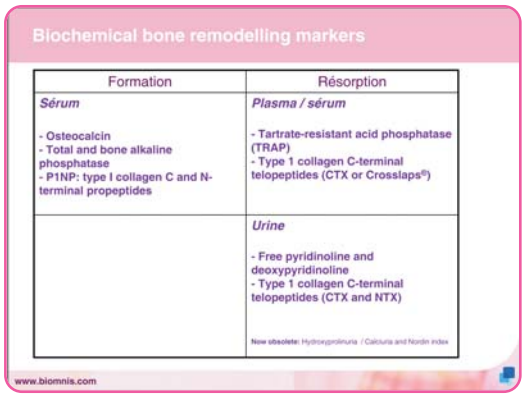
Anti-resorptive treatment monitoring methods:

These are the most frequently effective treatments, if observed:

- Clinical follow-up: height measurement, investigation if -3cm
- Densitometry at start of treatment: at the earliest, after 2 years of treatment to check the absence of bone loss and not gain
- Pathological markers at 2-3 months

Role of specialised pathology

Biochemical bone remodelling markers



Pathological marker variability

- Lower in case of automated assay and follow-up performed by a single laboratory
- Prefer assays on serum markers

Pre-analytical profile

- **Serum samples:**
  - the fasting state, before 9 a.m.
  - on serum or EDTA plasma
  - centrifuge without delay
  - freeze at –20°C within 4 hours following sampling if assay is not performed on the same day (and within 1 hour following sampling for osteocalcin)
  - option to measure serum or urine markers having undergone up to 3 freezing-thawing cycles (except for osteocalcin)
- **Urine: first urination or second urination in the morning in a fasting state, with correction of the marker with urinary creatinine**

Correct bone marker use

Prediction of postmenopausal bone loss

Rapid loss: in this case, the resorption marker is above the pre-menopausal reference values; it s a screening and not a diagnostic value.

Prediction of fracture risk if combined with BMD

To decide on preventive treatment.

Therapeutic follow-up :

In order to treat primary osteoporosis, it is necessary to measure one or more markers to obtain an initial figure to evaluate the efficacy and observance of the treatment. Monitor the efficacy of the treatment by observing the decrease in resorption markers in the first weeks followed by a plateau after 3 to 6 months of treatment but also by a delayed decrease in formation markers with a plateau reached in 6 to 12 months.

Which markers to choose from?

Resorption markers:

- Serum CTX (first line)
- Urinary CTX and NTX

Formation markers:

as a function of treatment used

- Osteocalcin
- P1NP

For therapeutic decision and follow-up:

Urinary CTX anti-resorptive treatments (bisphosphonates, SERM, THM): -45% in case of HRT, -60% in case of Alendronate 10mg/day; -70% in case of NTX
Raloxifene: -30 to 40% on resorption markers, + 20 to 30% on formation markers
Teriparatide: osteocalcin +55%; prefer increase in P1NP
Strontium ralenate: low marker variation

Always use the same marker for treatment follow-up

Conclusion

Osteoporosis has become a healthcare problem and requires better screening as the current care provided is insufficient. At-risk patients must be treated. Pathological bone remodelling markers must not be used to diagnose osteoporosis (this is only possible using osteodensitometry). Specialised pathology has a role to play in guiding clinicians, monitoring treated patents and providing remodelling markers for the therapeutic decision.