EMBJ.ORG FOR YOUNG DOCTORS

EUROMEDITERRANEAN BIOMEDICAL JOURNAL
2020,15 (17) 74–76
(*FORMERLY: CAPSULA EBURNEA*)

Case report

DISUSE OSTEOPOROSIS AND HIP PROSTHESIS: SURGICAL IMPLICATIONS, A CASE REPORT

Elisabetta Neri [1], Antonio D'Arienzo [1], Vanna Bottai [1], Lorenzo Andreani [1], Stefano Giannotti [2], Rodolfo Capanna [1]

1. Second Orthopedic and Traumatological Clinic, University of Pisa, Pisa, Italy.
2. Department of Medicine, Surgery and Neurosciences: Section of Orthopedics and Traumatology, University of Siena, Siena, Italy.

ARTICLE INFO

Article history:
Received 26 February 2020
Revised 12 April 2020
Accepted 15 May 2020

Keywords:
disuse osteoporosis, fragility fractures, hypodynamia, hip prosthesis.

ABSTRACT

In this paper, the authors present a case of osteo-arthtritis of the hip secondary to a septic event which was surgically treated with a hip prosthesis and complicated by intraoperative fracture due to a localized disuse osteoporosis. Disuse osteoporosis is an induced rapid bone loss in human skeleton that occurs mostly after a cord injury or muscle paralysis. Hypodynamia can also be a risk factor for osteoporosis. In this case the author describe the onset of a femoral intraoperative fragility fracture in a 58 year old woman affected by an erosive septic osteoarthritis. Our case suggest that disuse osteoporosis presence should be diagnosed and treated before surgery to help prevent major surgical or post-operative complications beginning a pharmacological antiresorptive treatment before the surgery.

1. Introduction

Disuse osteoporosis is an induced rapid bone loss in human skeleton that occurs mostly after a cord injury or muscle paralysis. Hypodynamia can also be a risk factor for osteoporosis, however currently, there are only a few studies that deal with its effect on bone tissue (1-2).
Surgical joint prosthesis offers good results. Osteointegration and implant survival are better with a good preoperative quality of bone (3).
However, there are often preoperative localized or systemic osteoporotic patterns, that can represent a serious intra-operative or postoperative cause of implant failure.
Osteo-arthritis, of the lower limb especially, can lead to a hypomobility and disuse with consequent osteopenia-osteoporosis of the affected segment.
In this paper, the authors present a case of osteo-arthtritis of the hip secondary to a septic event which was surgically treated with a hip prosthesis and complicated by intraoperative fracture due to a localized disuse osteoporosis.

2. Clinical case

A 58 year old woman, affected by hypothyroidism and hypertension, 153 cm high and 68 kg in weight, with a BMI of 29, presented with severe pain and functional impotence in the left hip as a result of MSSA sepsis (Meticillin-Resistant-Staphtlococcus Aureus) and with erosive septic arthritis. Over the previous two years, the patient had had painful symptoms such as lumbar sciatica with episodes of fever, and so underwent laboratory tests and magnetic resonance of the pelvis in which abscesses in the pelvis muscles and reactive synovitis and effusion at the level of the left coxo-femoral joint were noted. MSSA sepsis was therefore diagnosed, and a prolonged antibiotic therapy with teicoplanin and ciprofloxacin was started with improvement in pain symptoms. Due to the recurrence of the algic symptomatology and functional hip limitation, CT, MRI and 99tc scintigraphy were repeated showing resolution of the abscesses but an advanced erosive arthritis of the hip with marked concentration of tracer of bone scintigraphy. A new therapy was started with daptomycin, linezolid and phosphamycin and then an incisional biopsy was performed which showed no evidence of infected material.

* *Corresponding author*: Antonio D'Arienzo, *antu84@gmail.com*
DOI: 10.3269/1970-5492.2020.15.17
 ISSN: 2279-7165 - Available on-line at www.embj.org

After orthopaedic evaluation, MRI and scintigraphy were repeated Dalbavancin was administered twice a day, to maintain a long acting antibiotic activity.

The patient then showed improvement in symptomatology with persistence of functional limitation in the left hip. After further MRI, CT and scintigraphy with labelled leukocytes revealed that no infection was present, indication was given for joint replacement with total prosthesis. Due to the presentation of functional limitation after the first sciatica episode, the patient began walking with partial weight bearing. However, worsening of the symptoms meant that she stopped weight bearing on the left limb for a period of 7 months.

The preoperative CT (Figure 1) scan showed that there was a noticeable thinning of the left femoral cortical compared to the contralateral femur associated with an important bone structure alteration. The patient had been repeatedly assessed for osteoporosis / osteopenia before the appearance of lumbar and hip pain, with execution of various computerized bone mineralometries. Densitometric values showed only an initial osteopenia with consequent prescription of antireabsorbitive therapy (risedronate) that the patient did not start. Pre-operative serum markers of bone metabolism were: calcium 9.0 mg\dL, phosohorus 3.0 mg\dL, PTH 25 ng\L, alkaline phosphatase was 66 U\L, Vit. D 20.2 µg\L and the serum protein electrophoresis were albumin 49,3% , α1 9.6% , α2 17.9% , β1 6.9% , β2 6.5% , γ 9.8%. Post-operative densitometric values showed normal values of spine and controlateral hip (t-score-0.5 and -2.4).

To replace the hip, a first implant stem and a revision cup to fill the bone gap on the acetabular side were chosen. During surgery there was an intraoperative fracture to the diaphysis of the femur treated with plate and screw osteosynthesis (Figure 2). The intervention was completed successfully and the patient began the rehabilitation program on the first post-operative day. She also started an antiresorptive therapy with risedronate, calcium and vitamin D.

Figure 1. preoperative CT image

Figure 2. Postoperative X-ray

3. Discussion

In this case the authors feel that intraoperative femoral fracture was probably due to a disuse localized osteoporotic pattern, because of the disuse caused by pain.

This is demonstrated by the imaging; in fact CT images taken 8 months before the surgery, corresponding to the start of disuse, were quite different to the images obtained at the time of the surgery. In particular, diaphyseal femoral cortex was thinner and with evident quality alteration, with a femoral cortical index of 0.5 in the right side and 0.6 in the left.

The principle limitation of the study is the absence of DEXA values before hip pathology onset, even if postoperative DEXA shows no osteoporotic T-score values of the controlateral hip and spine. This suggests that the left hip radiological osteoporosis was caused exclusively by localized disuse.

The literature also describes a relationship between disuse duration and grade of osteoporosis, and also that bone loss, when it occurs, is difficult to correct (4). The only useful treatment, when disuse osteoporosis has already arisen, should be to allow the load.

Our case also highlights that, in cases of sudden immobilization, an antiresorptive therapy should be performed as soon as possible, , especially if surgical treatment is expected; this is to prevent the onset of a disuse osteoporotic frame. Our case also confirms the rapid onset of bone loss after hypodinamia in human.

Moreover, it proposes an osteometabolic investigation, during surgical prosthesis preoperative planning, in case of important X-ray bone alteration, both systemic or distrectual, and, whenever possible, the initiation of pharmacological antiresorptive treatment.

Literature studies confirm that the use of bisphosphonates can also significantly reduce the rate of revision surgery due to aseptic loosening. (5)

Although many studies confirm the importance of bone quality in ensuring good results of hip prosthesis, bone mineral density and serum markers of bone turnover are not yet routinely investigated during pre-operative planning. (6-7)

Disuse osteoporosis is a type of secondary localized osteoporosis that should be diagnosed and treated before surgery to help prevent major surgical or post-operative complications.

References

1. Aguado E, Mabilleau G, Goyenvalle E et al. Hypodynamia Alters Bone Quality and Trabecular Microarchitecture.Calcif Tissue Int. 2017 Apr;100(4):332-340.
2. Qin YX, Xia Y, Muir J, Lin W, Rubin CT. Quantitative ultrasound imaging monitoring progressive disuse osteopenia and mechanical stimulation mitigation in calcaneus region through a 90-day bed rest human study. J Orthop Translat. 2018 Dec 24;18:48-58.
3. James S.J. , Mirza S.B. , Culliford D.J. et al. Baseline bone mineral density and bone turnover in pre-operative hip and knee arthroplasty patients. Bone joint Res 2014;3:14-19
4. Lobos S. , Cooke A., Simonett G., et al. Assessment of Bone Mineral Density at the Distal Femur and the Proximal Tibia by Dual-Energy X-ray Absorptiometry in Individuals With Spinal Cord Injury: Precision of Protocol and Relation to Injury Duration. J Clin Densitom 2018 Jul- Sep; 21(3):338-346
5. Prieto-Alhambra D, Javaid MK, Judge et al. Association between bisphosphonate use and implant survival after primary total arthroplasty of the knee or hip: population based retrospective cohort study. BMJ 2011,343:7222
6. Bottai V, Dell'Osso G, Celli F et al. Total hip replacement in osteoarthritis: the role of bone metabolism and its complications. Clin Cases Miner Bone Metab. 2015 Sep-Dec;12(3):247-50.
7. Giannotti S, et al. Clinical and surgical approach of severe bone fragility fracture: clinical case of 4 fragility fracture in patient with heavy osteoporosis. Clin Cases Miner Bone Metab. 2013

.