

# Chapter 2

## Bisphosphonates

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### Case Presentation

A 38-year-old female presented to the office because of an ongoing left-sided hip pain for the past 4 months. The patient had a mild antalgic limp and walked with the help of a cane. She complained of intermittent pain radiating to the left groin and anterior medial thigh region. She stated that her symptoms were aggravated by walking and stair climbing. Her pain was relieved by sitting and resting. The patient had previously sought medical advice and was prescribed nonsteroidal anti-inflammatory medications.

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## Diagnosis/Assessment

On physical exam, range of motion of the left hip was 110° of flexion, 30° of internal rotation, and 40° of external rotation and most pain being felt in abduction and internal rotation. FABER test was positive. She had no pertinent medical history or risk factors for osteonecrosis of the femoral head (ONFH). Radiographs and MRI (Figs. 2.1 and 2.2) confirmed the presence of ONFH of the left hip. The joint space appeared to be excellent with no evidence of collapse of the articular cartilage. The patient was thought to have Ficat II ONFH of the left hip.

## Management

Surgical and nonsurgical options were discussed with the patient. One of the nonsurgical options offered to her was administration of bisphosphonate medications. She opted to



FIGURE 2.1 Osteonecrosis of the femoral head of *left* hip with good joint space and no evidence of collapse or flattening

receiving the bisphosphonate treatment. She was prescribed 70 mg of alendronate weekly. The bisphosphonates appeared to provide some degree of pain relief, and she was content with the management.

## Outcome

The ONFH unfortunately progressed, resulting in collapse of the femoral head and ensuing arthritis (Figs. 2.3 and 2.4). Thus, after 8 months of being on bisphosphonate treatment, patient underwent total hip arthroplasty.

## Literature Review

There are several studies reporting on the use of Bps for treatment of ONFH. Young-Kyun Lee et al. reported the results of their prospective, randomized, multicenter study on 110 patients with



FIGURE 2.2 *Left hip MRI showing ONFH and bone marrow edema*



FIGURE 2.3 Femoral head collapse and the crescent sign after 8 months of treatment with bisphosphonates



FIGURE 2.4 *Left* total hip arthroplasty after patient developed collapse of the femoral head and ensuing arthritis

Steinberg stage 1 or 2 nontraumatic ONFH with a necrotic area of >30% [1]. Patients in case group received 5 mg of zoledronate, intravenously per year for 2 years, and observed for a minimum of 2 years after enrollment. During 2 years follow-up, 29 femoral heads in zoledronate group and 22 in control group underwent THA. They concluded that zoledronate for Steinberg stage 1 or 2 ONFH with a medium to large necrotic area did not prevent the collapse of the femoral head or reduce the need for THA [1].

Kuo-An Lai et al. reported the results of the use of alendronate in 40 patients (54 hips) with Steinberg stage 2 and 3 with necrotic area >30% in a randomized clinical study. Patients took 70 mg alendronate per week for 25 weeks, and the minimum follow-up was 24 months. Only 2 of 29 femoral heads in the alendronate group collapsed compared to the collapse of 19 out of 25 femoral heads in the control group [2].

Agarwala et al. reported the 10-year follow-up of 40 patients (53 hips) with Ficat stages 1, 2, and 3 ONFH treated with alendronate for 3 years. THA was needed in seven hips, five of whom had stage 3 disease at the time of enrollment. Ten of the 34 hips that were in pre-collapse stage at the onset of study had collapsed during the 10-year follow-up (indicating a failure rate of 29%). They concluded that long-term outcome supported the use of alendronate as a valuable modality for treatment of ONFH, regardless of the stage of the disease [3].

Agarwala et al. presented a clinical and radiological analysis of 395 patients with Ficat stages 1, 2, and 3 ONFH who were treated with oral alendronate for 3 years with a mean follow-up of 4 years [4]. Collapse of the femoral head and arthritis ensued resulting in the need for THA in 4 of 215 (2%) of stage 1 hips, 10 of 129 (8%) hips with stage 2, and 17 of 51 (33%) hips with stage 3 disease. Their results showed an improvement in the clinical function, a reduction in the rate of collapse, and a decrease in the requirement for THA for patients who received Bps treatment. Even in patients with Ficat stage 3 ONFH, some benefit was obtained from treatment with alendronate by at least delaying the need for THA.

### Clinical Pearls and Pitfalls

- Bps may be a viable option for treatment and potentially for prevention of progression of the ONFH in symptomatic patients. The literature suggests that the type, dose, duration, and mode of administration of the Bps may influence the outcome. In addition, there may be individual variations in the response with some patients with ONFH responding to the treatment better than others.
- At our institution, we use weekly or monthly oral protocol (70 mg of alendronate per week or 150 mg ibandronate per month). We also believe it is important that patients receiving Bps should also be administered supplemental calcium and vitamin D, especially in those with inadequate dietary intake. It is important to note that calcium supplements should not be taken within 60 min of ibandronate sodium administration, as coadministration may interfere with the absorption of ibandronate sodium.
- We prefer to avoid bisphosphonates in patients with abnormalities of the esophagus which delay esophageal emptying such as stricture and achalasia, inability to stand or sit upright for at least 30 min, hypocalcemia, hypersensitivity to the product, and atrial fibrillation.

### References

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