Corticosteroid-induced osteonecrosis of the humeral head in acute lymphocytic leukemia treated with bisphosphonates: a case report of an 11-year-old patient

Introduction
Acute lymphocytic leukemia (ALL) is the most common type of cancer in children. With the development of modern chemotherapy protocols, the cure and survival rate of children with cancer has increased significantly. On the other hand, long-term drug-related side effects are becoming increasingly apparent. Osteonecrosis (ON) can occur in up to 40% of all patients who have undergone chemotherapy. Within the scope of multifactorial pathogenesis, medication with glucocorticoids, especially dexamethasone, is considered to be a verified cause. Evidence-based therapeutic guidelines for corticosteroid-induced humeral head ON in children are not available and the range of treatment options include several operative and non-operative procedures.

Methods
We report on an 11-year-old female patient with pre-B-cell ALL who underwent chemotherapeutic treatment. Six months after the start of therapy, bilateral ON of the humeral head was diagnosed. A conservative treatment with bisphosphonates was performed.

Results
An 11-year-old female was diagnosed with a pre-B-cell-ALL. A chemotherapy according the AIEOP-BFM ALL, SR, 2009 was initiated. After 6 months she developed bilateral ON of the humeral head induced by long-term chemotherapy. Diagnostic imaging of the left shoulder showed a necrosis of the humeral head stage III (Cruess classification). (Figure 1)

The initial treatment was non-operative including pain management and intensive physiotherapy. Regular follow-up revealed the progression of the necrosis with complete collapse of the humeral head and partially preserved cartilage (Grade IV, Cruess Classification). During the consolidation phase, the patient underwent intravenous infusions with bisphosphonates every six months. Clinically both, the range of motion and the pain improved, with VAS 3/10 and a Constant Score of 63/100. Further imaging showed an almost complete remodeling of the sphericity of the humeral head with improvement of the subchondral bone density without cartilage detachment. (Figure 2)

Conclusion
ALL is the most common type of cancer in children. Sometimes side effects include corticosteroid-induced avascular ON. A possible non-operative treatment is intravenous infusions with bisphosphonates which inhibit osteoclastic bone reabsorption and appear to have beneficial effect on osteoblasts. In a murine model of glucocorticoid-induced osteoporosis, bisphosphonates prevented osteocyte and osteoblast apoptosis. Treatment with intravenous bisphosphonates however should be considered as a treatment option for immunosuppressed patients and could possibly help to avoid a surgical approach, such as arthroscopic core decompression. To our knowledge, there are no reports of successful non-operative management of corticosteroid induced humeral head ON in children.

Literature: