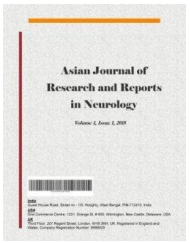

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Aseptic Necrosis of the Femoral and Humeral Heads in a Patient who has Received a Course of Cell Therapy

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Authors' contributions

This work was carried out in collaboration between all authors. All authors provided clinical guidance for the patient. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Aims: The article is devoted to the problem of complications of pulse therapy and long-term use of corticosteroids in patients with multiple sclerosis.
Presentation of Case: There was described a case of aseptic necrosis of the femoral and humeral heads in a patient suffering from multiple sclerosis after a course of cell therapy.
Discussion & Conclusion: This case is interesting not only because the patient got aseptic necrosis of the femoral as well as humeral heads but also due to possible role of stem cell therapy applied after intensive course of corticosteroids.

Keywords: Aseptic necrosis; multiole sclerosis; femoral bone; humeral bone; stem cell therapy.

1. INTRODUCTION

High-dose corticosteroids are widely used to treat acute relapses in patients suffering from multiple sclerosis [1-3]. Attempts to use pulse-therapy with methylprednisolone in the treatment of a secondary progressive multiple sclerosis are known [4]. Intravenous methylprednisolone pulse

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therapy (IVMP) inhibits the inflammatory cytokine cascade, dampens T cell activation, facilitates apoptosis of activated immune cells, reduces extravasation of immune cells to the CNS, and decreases expression of class II histocompatibility antigens on antigen-presenting cells [1].

Pulse therapy is the administration of ultra-high doses of glucocorticoids for a short period. Methylprednisolone is the most commonly used medication, which in the form of sodium succinate is administered in a dose of 1-2 g intravenously in 30-60 minutes once a day for 3-5 days. The maximum concentration of the drug in the blood develops after 1 hour, followed by a decrease in 6-7 hours. Methylprednisolone accumulates in various tissues, and more in the inflammatory than normal (including in the brain), as well as in red blood cells. Given the characteristics of the distribution, minimal mineralocorticoid action, a weaker, compared with prednisone, effects on the gastrointestinal tract and the central nervous system, methylprednisolone is considered the drug of choice during pulse therapy [4].

Osteonecrosis (aseptic necrosis) of the tubular bone heads is one of the most severe complications of multiple sclerosis (MS) pulse therapy. It is known that every third case of non-traumatic osteonecrosis is associated with prolonged use of corticosteroids, and, in turn, from 3-20% of patients receiving high doses of glucocorticoids are at risk of developing aseptic necrosis [5-7].

Currently, there is no clear understanding of what doses and what duration of therapy lead to osteonecrosis, however, compared with other nosoforms, the incidence of osteonecrosis of the heads of the tubular bones in MS remains low [5,7,8-12]. So, Sahraian M.A. et al. (2012) for 5 years of observation at the University Hospital of Tehran revealed only 5 cases of osteonecrosis after pulse therapy with methylprednisolone in a dose of 5 to 15 g per course [8]. Another study showed that in patients with MS, the frequency of osteonecrosis after pulse therapy is 15.5% [9]. Italian researchers consider the occurrence of osteonecrosis as a result of the influence of several factors: increased blood clotting, impaired lipid metabolism and fatty embolism of small-caliber vessels, increased peripheral vascular resistance, and activation of osteocytes apoptosis.

To date, Ukraine has no statistics on the prevalence of osteonecrosis in patients with multiple sclerosis. At the same time, the number of patients with multiple sclerosis has increased in recent years [13], which may, under the conditions of limited use of disease modifying therapy lead to an increase in the number of cases of osteonecrosis after pulse therapy.

2. PRESENTATION OF CASE

This publication is devoted to the clinical case of aseptic necrosis of the heads of the humeral and femoral bones in patient B., born in 1982, who received repeated courses of pulse therapy with methylprednisolone in preparation for cell therapy in one of Moscow's clinics (Russia).

The patient has suffered from MS since 2003, when, after a stressful situation in the conditions of the maritime transition, there was a dysfunction of the pelvic organs, manifestations of central prosoparesis, lower paraparesis. The flow is steadily progressive with temporary spontaneous disturbance. According to MRI of the brain without contrast, in 2003, MS was diagnosed and courses of nootropic therapy were conducted. In 2007–2008, there was a restriction of movements due to weakness in the legs (EDSS 5.0–6.0); in 2010, decrease in motor activity was noted (EDSS 6.0–6.5). Further deterioration occurred in 2011, the patient spent a long time in bed, sitting wheelchair, walking for short distances (EDSS 7.0). In 2012, she was examined and consulted at the National Medical and Surgical Center n.a. NI Pirogov (Moscow, Russia). She also passed a course of high-dosage immunosuppressive therapy (pulse therapy with solumedrol - 6000 mg per course) with the support of autologous hematopoietic cells, a course of robotic kinesitherapy. For a long time, she received consolidation therapy with mitoxantrone and ondasetron as a support therapy. In the spring of 2014, after a regular course of kinesitherapy, pain occurred in the shoulder and hip joints. In May 2015, the diagnosis of aseptic necrosis of the heads of the humerus and femur was diagnosed. The patient received vazoprostan, denozumab (prolia), calcium supplements, vitamin D3 but her condition was not improved.

In October 2018, the patient passed the re-examination. At the time of the survey she complained of pain in the hip and shoulder joints, had restrictions on walking, numbness of the left leg, reduced visual acuity. Blood pressure was

135/80 mm Hg on the right hand, 130/80 mm Hg on the left hand. HR - 82 beats per minute.

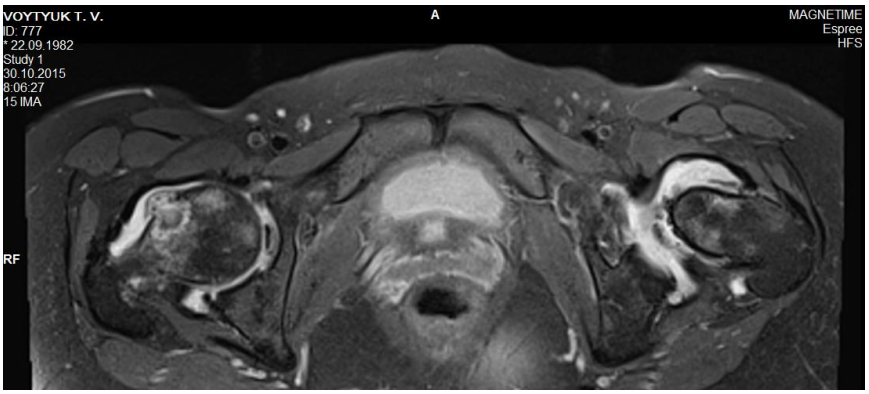
On examination, the palpebral fissures were equal, the pupils were equal, photoreactions were alive, ophthalmodynamics was in full range, the adjusting nystagmus was present when looking to the right, weakness of convergence from two sides, more to the left. Muscle strength was reduced, more to the left (4 points). Tendon and periosteal reflexes in hands were raised without a clear difference of the parties. Positive reflexes of Jacobson-Laske, Zhukovsky and Wenderovich were positive in both sides, more pronounced on the left. Knee reflexes were reduced without a clear difference of sides, the Achilles reflex on the right was missing, on the left it was reduced.

Gait was severely impaired, she had paraparesis, more manifested on the left. Active and passive movements in the shoulder and hip joints were limited - flexion in the shoulder 60-70°, right abduction - 80°, left - 60°. Pathological reflexes of Babinsky, Pussep, Rossolimo were positive on both sides.

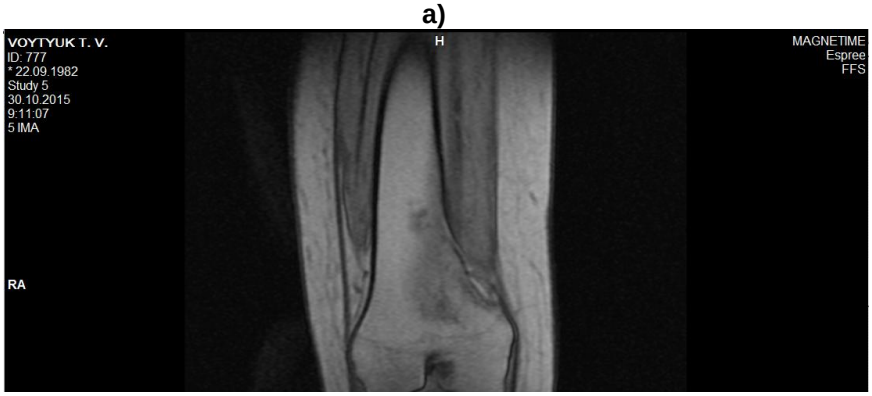
Coordinator tests were performed uncertainly from 2 sides, with intention tremor. Decrease in sensitivity on the left in the Th9-Th10 innervation zone was found. There were signs of constant incontinence. Meningeal signs were negative, no fasciculations were detected. The patient was emotionally labile, asthenized, the phenomenon of acrohyperhidrosis was determined.

The MRI signs of pronounced avascular necrosis of the femoral heads, the deformation of the left femoral head, an excess amount of fluid in the joints, more to the left were determined (Fig. 1). In addition, signs of avascular necrosis of the lateral femoral condyles on both sides were identified. MRI signs of avascular necrosis of the heads of both humerus bones and fluid in the joint cavity were identified also.

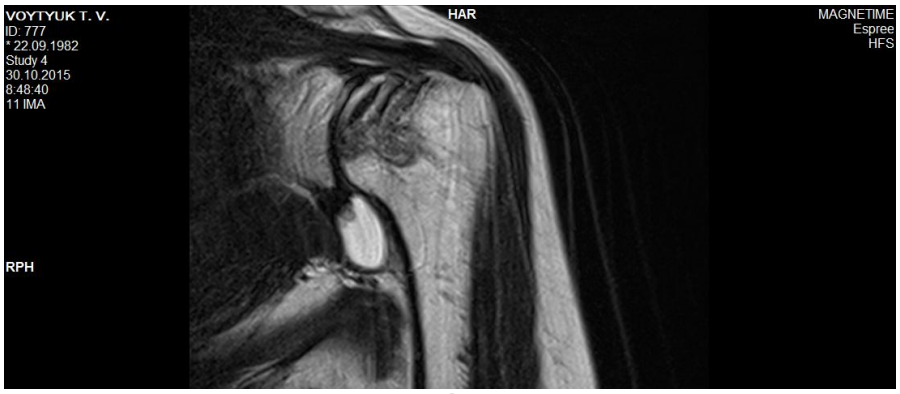
Multiple demyelination foci were defined in the brain, non-accumulating contrast, in the white matter of both hemispheres, in the legs of the brain, in the pons, in the medulla, in the corpus callosum, in the cerebellar hemispheres, in the cranial spinal cord, with a nominal diameter of 0.3 cm up to 2.8 cm, periventricular drain character. Cyst-like extensions of subarachnoid spaces in all areas of the brain, moderate expansion of the ventricular system, expansion of cerebellar sulci were determined. Cleavage of the posterior parts of the transparent septum was identified.



a)



b)*



c)

Fig. 1. Manifestations of aseptic necrosis (a - heads of the femurs, b - lateral condyles of the femurs, c - heads of the humerus)

3. DISCUSSION

Considering the pronounced dysfunction and the absence of regress of symptoms, the patient was recommended surgery for prosthetic hip joints, however, in the current socio-economic conditions of Ukraine, this intervention could not be performed - waiting in line for a free prosthetic may take years. At the same time, the delay significantly worsens the prognosis and may lead to a further aggravation of the clinical picture.

This case is interesting not only because the patient got aseptic necrosis of the femoral as well as humeral heads but also due to possible role of stem cell therapy applied after intensive course of corticosteroids. There are no publications of such cases in the literature. However stem cell therapy was recommended for treatment of avascular necrosis by some authors [11,12]. Because both high-dosage immunosuppressive therapy and other agents influencing cellular immunity are used as a preparation to stem-cells therapy than the consolidation therapy with mitoxantrone is applied. However mitoxantrone itself could be a contributing factor in medication-related osteonecrosis [14]. Also we still do not have any data about the role of implanted stem cells in developing avascular necrosis.

4. CONCLUSION

Avascular osteonecrosis remains rare complication of high dose therapy with corticosteroids. Presented case shows outcomes of several intensive courses of pulse-therapy provided for patient with severe MS. It seems that we should avoid stem cell therapy with preparatory high-dosage course of corticosteroids in the same year with the previous relapse. Further investigations could help to clarify if such approach is safe and efficient.

CONSENT

It is not applicable.

ETHICAL APPROVAL

The manuscript was approved by an Institutional Ethical Committee of the Center of Reconstructive & Renovative Medicine of Odessa National Medical University.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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