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The first experience of arthroscopy in the case of aseptic necrosis of the femoral head

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Observation of patients with avascular necrosis of the femoral head formed a hypothesis about inability to eliminate the hip contracture by tunneling the femoral head on the background of drug therapy and therapeutic exercises, which causes an unsatisfactory outcomes. Therefore, the was idea to use arthroscopy for performing capsulotomy, synovectomy and removal of free cartilage and bone fragments. Objective. To evaluate efficiency of arthroscopy in patients with avascular necrosis of the femoral head. Methods. In the period from 2010 to 2018, 60 patients were observed. With the I–II stages, absence of inflammatory processes in the joint, body mass index less than 35. In the comparison group (28 patients) we made only tunneling of the femoral head, in the study group (32) at first we performed arthroscopy of the hip joint, capsulotomy, synovectomy, removal of cartilage fragments, and only then — tunneling. We analyzed the proportion of hip joint replacement that was performed in the long term follow up and the intensity of pain by visual analog scale. Results. During arthroscopy we often revealed the joint cartilage lesions — 30 %, articular labrum lesions — 5 %, synovitis — 100 %, CAM impingement — 90 %. In the study group in the first 2 weeks after surgery, the pain was severe more than in the comparison group. Then the pain rate became the same in both groups. In the control group in the period from 3 to 5 years after tunneling of the femoral head, arthroplasty was performed in 11 patients (39.3 %), in the study group for 2 to 3 years after surgery — 8 (25.0 %). Conclusions. Analysis of long-term results of tunneling of the femoral head with arthroscopy of the hip joint in patients with avascular necrosis of the femoral head showed improvement in hip function, no disease progression in 60–75 % patients in 2–3 years after surgery. Key words. Hip joint, aseptic necrosis, arthroscopy.

Спостереження за пацієнтами з асептичним некрозом головки стегнової кістки (АНГСК) сформувало гіпотезу про неможливість усунення контрактури кульшового суглоба шляхом тунелізації головки стегнової кістки на фоні медикаментозної терапії та лікувальної фізичної культури, що обумовлює незадовільний результат лікування пацієнта. Тому виникла ідея використовувати артроскопію для виконання капсулотомії, синовектомії та видалення фрагментів суглобового хряща. Мета. Оцінити ефективність застосування артроскопії в пацієнтів із АНГСК. Методи. У період із 2010 по 2018 рік простежено 60 пацієнтів із I–II стадіями АНГСК, відсутністю запальних процесів у суглобі, індексом маси тіла менш ніж 35. У групі порівняння (28 осіб) виконували лише тунелізацію головки стегнової кістки, у групі дослідження (32) проводили спочатку артроскопію кульшового суглоба, капсулотомію, синовектомію, видалення ушкоджених фрагментів хряща, а лише потім — тунелізацю. Аналізували питому вагу виконаного ендопротезування у віддаленому періоді, інтенсивність болю за візуальною аналоговою шкалою (ВАШ). Результати. Під час артроскопії часто виявляли всередині суглоба ушкодження хряща — 30 %, суглобової губи — 5 %, синовіт — 100 %, CAM-імпінджмент — 90 %. У групі дослідження в перші 2 тижні після операції больовий синдром був виражений більше, ніж у групі порівняння. Потім показник болю ставав однаковим в обох групах. У групі порівняння в період від 3 до 5 років після тунелізації головки стегнової кістки ендопротезування виконано 11 пацієнтам (39,3 %), у групі дослідження в термін від 2 до 3 років після операції — 8 (25,0 %). Висновки. Аналіз віддалених результатів тунелізації головки стегнової кістки з артроскопією кульшового суглоба в пацієнтів з АНГСК показав поліпшення функції кульшового суглоба, відсутність прогресування захворювання в 60–75 % осіб через 2–3 роки після операції.

Key words. Hip joint, aseptic necrosis, arthroscopy

Introduction

Aseptic necrosis of the femoral head (ANFH) mostly occurs in young patients (20–40 years) who lead an active lifestyle [1–4]. Usually, the etiology of this disease is unknown. The most common reason for seeing a doctor is lumbar pain, which then moves into the projection of the hip joint. Radiography in the early stages of the disease does not show any changes in bone structure, so in case of untimely diagnosis and treatment, 80 % of patients develop secondary osteoarthritis of the hip joint [5, 6]. The frequency of endoprosthetic surgeries in secondary osteoarthritis with a primary diagnosis of ANFH varies from 2 to 12 % among young patients [2, 3, 7]. Today, magnetic resonance imaging (MRI) is the «gold standard» of early diagnosis of ANFH, which can detect the first signs of the disease in the form of edema of the femoral head, proliferation of mesenchymal tissues, synovitis, chondromatous bodies, rupture of the acetabular lip. At the same time, computed tomography (CT) better detects central collapse of the femoral head [2, 4, 8].

To avoid endoprosthetics, many surgical interventions have been proposed in the initial stages of ANFH, such as decompression, percutaneous tunneling, bone grafting, osteotomy. However, some of them are traumatic and others do not always have a lasting effect [9–12].

Despite the fact that Burman first reported an arthroscopy of the hip joint on the body of the deceased in 1931, this procedure became popular in the treatment and diagnosis only in the last 10–15 years [3, 12]. Commonly accepted indications for hip arthroscopy are intra-articular (damage to the articular lip; disorders of articular cartilage, synovial membrane, round ligament; femoroacetabular impingement; free bodies; dysplasia — questionable evidence) and extra-articular («clicking» of the joint, problems with the peritrochanteric space, contractures) abnormalities.

Observation of our patients allowed us to hypothesize that tunneling, secondary to drug therapy and therapeutic exercise (TE) do not always eliminate the contracture of the hip joint in ANFH, resulting in unsatisfactory patient treatment. Therefore, we decided to supplement the tunneling of the femoral head with arthroscopy to perform capsulotomy, synovectomy and removal of cartilage fragments.

The aim of the study: to evaluate the effectiveness of arthroscopy in patients with aseptic necrosis of the femoral head.

Material and methods

The study was approved by the Commission on Bioethics of Zaporizhia State Medical University (Minutes No.7 of 26.10.2016).

In the period from 2010 to 2018, 60 patients with ANFH were under our supervision. The study group consisted of 32 individuals who underwent arthroscopy of the hip joint with tunneling of the femoral head. The comparison group included 28 patients with only femoral head tunneling. Criteria for inclusion in the study were: I–II stage ANFH (before the appearance of signs of impression fracture) by MRI and CT scans, no inflammatory processes in the joint, body mass index not more than 35. All patients were of working age from 27 to 53 years, most of them male. We took into account the presence of synovitis, impingement, damage to the articular lip according to radiography and MRI, the level of vitamin D.

Patients in the comparison group underwent tunneling of the femoral head under radioscopic control. Patients of the study group were administered hip arthroscopy, capsulotomy, synovectomy, removal of damaged cartilage fragments, followed by tunneling of the femoral head under radioscopic control.

Patients in both groups after surgery received the same therapy for a year: vitamin D 2000 IU per day, risedronate 35 mg once a week, calcium supplements, exercise therapy to restore posture, movements in the hip and lower back. The operated limb was unloaded for 6 weeks with a subsequent increase in dosing load to full up to 3 months after surgery. The results were evaluated by the proportion of hip arthroplasty after surgery. The intensity of pain was analyzed using a Visual Analogue Scale (VAS). Methods of variation statistics in «MS Excel 2010» and «Statistica, 13.0» software were used for statistical processing. Differences were estimated as statistically significant at $p < 0.05$.

Results and their discussion

During arthroscopy, frequent findings inside the joint were cartilage damage (30 %), articular lip damage (5 %), synovitis (100 %), CAM-impingement (90 %) (Fig. 1, Table).

The patients of the study group in the first 2 weeks after surgery were found to have more intense pain than patients of the comparison group. On the second day after surgery, the score on the VAS scale was (4.2 ± 1.8) points in the study group, (3.1 ± 1.1) in the comparison group. This is explained by the greater trauma of the operation in the study group due to arthroscopy of the hip joint. By the second week after surgery, this figure was the same in both groups.

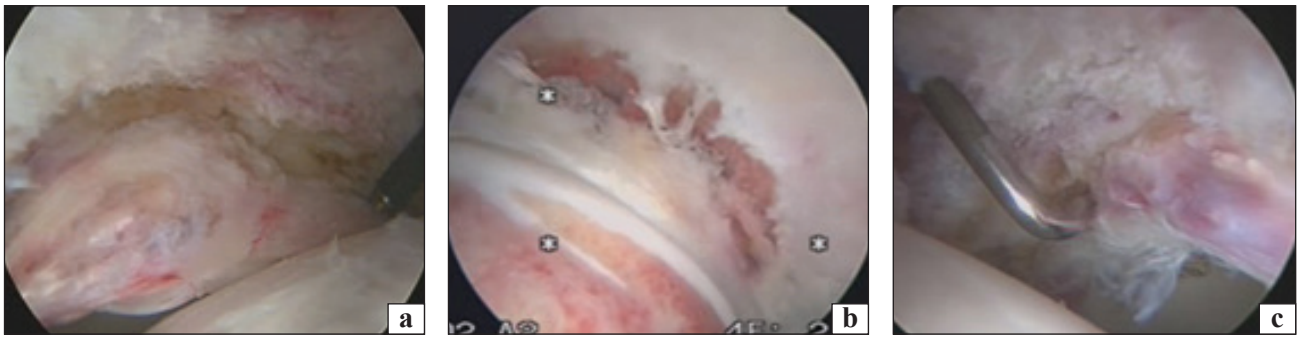

Fig. 1. Diagnostic findings during arthroscopy in patients with ANFH: a) synovitis; b) CAM-impingement (visible area of resection of the femoral head); c) damage to the articular lip

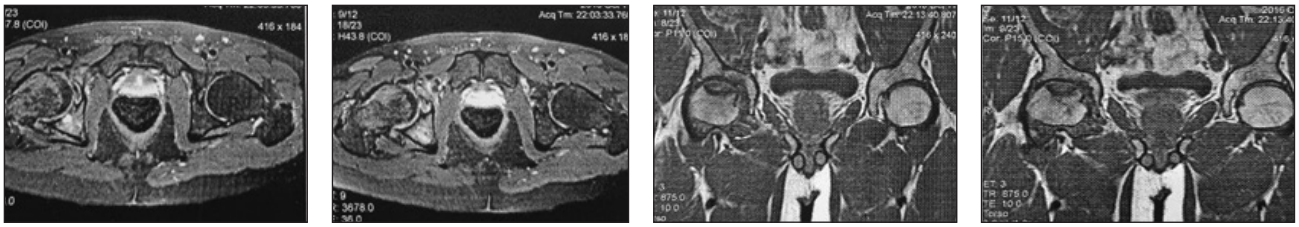

Fig. 2. A 34-year-old patient K., MRI sections at the time of admission

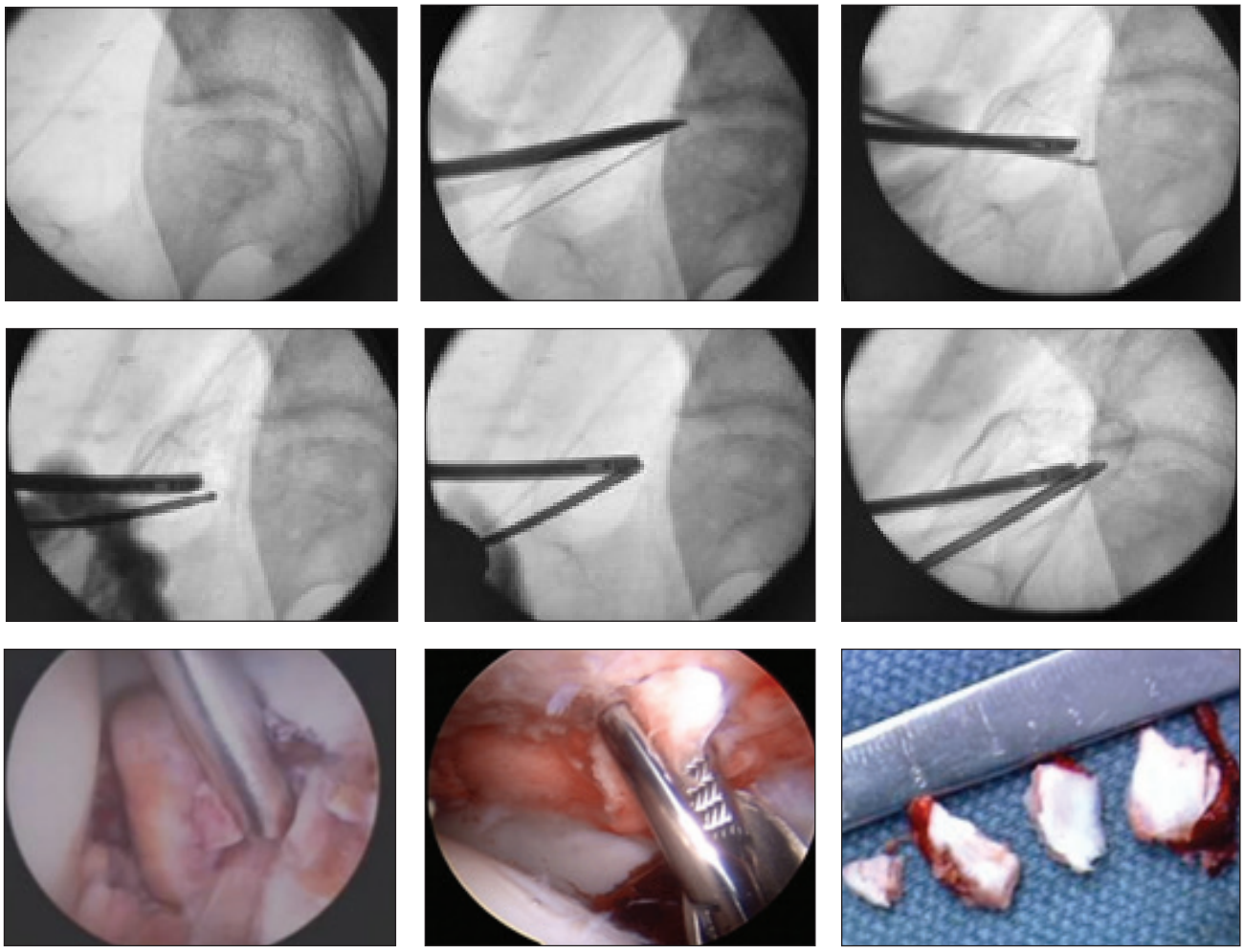

Fig. 3. A 34-year-old patient K. Stages of arthroscopy of the right hip joint with synovectomy and removal of the destroyed areas of the femoral head

Restoration of range of motion in the hip joint along with a reduction in pain was observed in patients in whom a follow-up MRI examination in 3 months after the operation showed decreased synovitis. Long-term results in the comparison group were evaluated within 3 to 5 years after tunneling of the femoral head. It was found that arthroplasty was performed in 11 patients, which amounted to 39.3 %. The follow-up period in the study group was from 2 to 3 years after surgery and the proportion of arthroplasty was 25.0 % (8 patients).

Table

Features of patients with aseptic necrosis of the femoral head

Indicator	Comparison group	Study group
Number of patients	28	32
Average age, years	36.0 ± 5.6	42.0 ± 8.5
Body mass index	27.4 ± 1.6	28.8 ± 2.3
Vitamin D deficiency	17 (60.7 %)	18 (56.3 %)
CAM-impingement	15 (53.4 %)	18 (56.3 %)
Synovitis on MRI	28 (100.0 %)	31 (96.9 %)

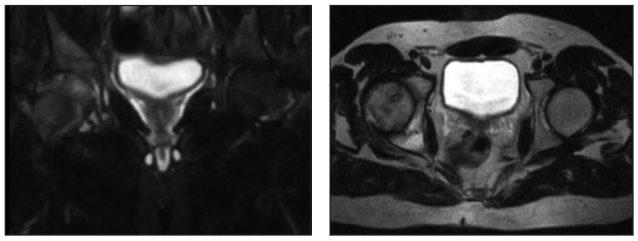

Fig. 4. Patient K., MRI in 2 years after surgery

Clinical example

A 34-year-old patient K., 34 years old came to a doctor with pain in the right hip joint. MRI revealed aseptic necrosis of the head of the right femur, stage II (Fig. 2).

Arthroscopy of the hip joint and tunneling of the femoral head were performed under regional anesthesia (Fig. 3).

At the follow-up examination 2 years after surgery, according to the results of MRI examination, the progression of the disease was not observed (Fig. 4). The function of the hip joint 2 years after surgery is shown in Fig. 5.

Thus, our observations of patients in the control group after tunneling of the femoral head showed that in cases where the contracture of the hip joint could not be eliminated, the pain persisted during movement. This negatively affected the outcome of treatment. Fig. 6 shows MRI sections of the patient in the comparison group in 9 months after tunneling of the femoral head, in which a positive treatment result is not achieved.

Regardless of the methods of treatment of ANFH, the materials of which are analyzed in this study, the amplitude of movements in the hip joint under conditions of favorable course of the disease progressively increased. We attribute this to elimination of synovitis, which reduced the tension of the joint capsule. Arthroscopic surgery allowed the correction of intraarticular changes, namely to perform synovectomy, capsulotomy, remove exfoliated bone and cartilage

Fig. 5. Patient K., functional result in 2 years after arthroscopy and tunneling

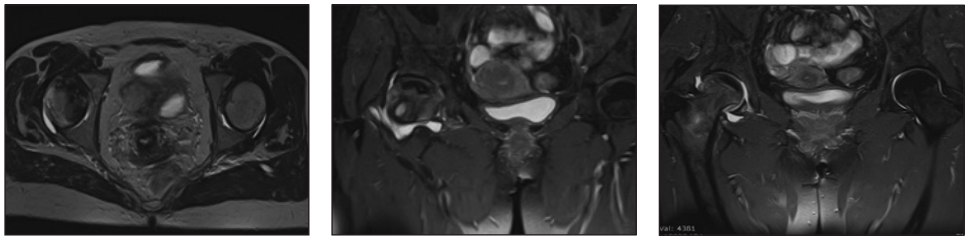

Fig. 6. MRI image in 9 months after tunneling of the femoral head. Progression of the process. Synovitis and deformity of the femoral head

fragments, correct CAM-impingement and resection of fragments of the articular lip. All these deviations inside the hip joint occurred quite often. In addition, we noted a significant compaction and increase in the thickness of the capsule of the hip joint in the projection of arthroscopic access. We did not measure the thickness of the capsule and did not assess its condition, so we cannot make an exact conclusion as to how much it has changed. In all cases, arthroscopy of the hip joint in ANFH was accompanied by capsulotomy.

Finally, performing arthroscopy of the hip joint in stages I and II of ANFH, before the development of head collapse, made it possible to accurately assess the condition of the joint, eliminate intra-articular problems associated with the disease (free bodies, damage to the hip lip and cartilage, synovitis), which favorably affected long-term results of the study and allowed to postpone endoprosthetic operation.

Conclusions

Long-term results of femoral head tunneling with hip arthroscopy in case of aseptic necrosis of the femoral head showed improvement in hip function and no disease progression in 60–75 % of patients within 2–3 years after surgery. The use of arthroscopy for the treatment of aseptic necrosis of the femoral head has improved the results of treatment of patients.

Conflict of interest. The authors declare no conflict of interest.

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THE FIRST EXPERIENCE OF ARTHROSCOPY IN THE CASE OF ASEPTIC NECROSIS OF THE FEMORAL HEAD

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