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Problem of surgical priority choice at combined pathology of lumbar spine and hip joint (literature review)

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Pathological processes that affect the hip joint and the lumbar spine often coexist, leading to a significant loss of quality of life. Therefore, the problem of surgical treatment of degenerative diseases of the lumbar spine with conditions of hip joint arthritis is actual. Objective. To analyze the available scientific information regarding the priority of choosing a surgical intervention under the conditions of a combined pathology of the lumbar spine and hip joint. Methods. The research material was an analysis of relevant literature in specialized sources over the past 10 years. Results. The opinion of specialists about the possibility of direct influence of instability and sagittal spine balance on the functional orientation of acetabulum and, therefore, on the risk of impingement and dislocation of the hip joint was found. Conversely, flexion contraction in the hip joint can affect the sagittal balance of the spine and cause back pain. The indication for priority surgical treatment of the spine, in addition to acute or rapidly progressive neurological deficits, is the loss of sagittal balance, in particular, lumbar lordosis with subsequent changes in the sagittal profile. When, under the conditions of the hip joint arthritis, the pelvic tilt and the lordosis of the lumbar spine increase combined with the stenosis, spinal surgery is preferred. The combination of lumbar stenosis with hip joint arthritis may be a factor in increasing the risk of neurological deficits after hip arthroplasty. However, some authors in the case of combined pathology in any case recommend performing total joint arthroplasty in the first place because of its obvious excellent results, others did not find the best variant of the sequence of intervention based on the assessment of quality of life. Conclusions. Despite the long history of the study, the practical issues of treatment of the combined pathology of the lumbar spine and hip joint, the choice of optimal treatment tactics remain debatable and require further study.

Патологічні процеси, які уражують кульшовий суглоб і поперековий відділ хребта, часто співіснують, призводячи до значної втрати якості життя. Тому актуальною є проблема хірургічного лікування дегенеративних захворювань поперекового відділу хребта за умов коксартрозу. Мета. Проаналізувати наявну наукову інформацію з приводу пріоритетності вибору хірургічного втручання за умов поєднання патології поперекового відділу хребта і кульшового суглоба. Методи. Матеріалом дослідження послужив аналіз релевантної літератури в спеціалізованих джерелах за останні 10 років. Результати. Відмічено думку фахівців про можливість безпосереднього впливу нестабільності та сагітального балансу хребта на функціональну орієнтацію кульшової западини й, отже, на ризик імпінджменту та вивиху кульшового суглоба. І навпаки, згинальна контрактура стегна за умов коксартрозу може впливати на сагітальний баланс хребта і спричинювати біль у спині. Показанням для пріоритетного хірургічного лікування хребта, крім виникнення гострого чи швидко прогресованого неврологічного дефіциту, є втрата сагітального балансу, зокрема, поперекового лордозу з подальшою зміною сагітального профілю. Коли за умов коксартрозу збільшується нахил таза та посилюється лордоз поперекового відділу хребта на фоні стенозу перевагу віддають спінальній хірургії. Поєднання поперекового стенозу з коксартрозом може бути чинником підвищення ризику неврологічного дефіциту після ендопротезування кульшового суглоба. Проте деякі автори у випадку поєднаної патології в будь-якому разі рекомендують насамперед виконувати тотальне ендопротезування суглобів через його очевидні відмінні результати, інші — не виявили найкращого варіанта послідовності втручання на підставі оцінювання якості життя. Висновки. Незважаючи на тривалу історію вивчення, практичні питання лікування поєднаної патології поперекового відділу хребта і кульшового суглоба, вибору оптимальної лікувальної тактики залишаються дискусійними та потребують подальшого вивчення. Ключові слова. Коксартроз, дегенеративні захворювання хребта, хірургічне лікування.

Key words. Hip joint arthritis, degenerative spine disease, surgical treatment

Introduction

Abnormal processes affecting hip joint and lumbar spine coexist in most cases, causing a significant loss of quality of life. This comorbidity has been well covered in the literature since 1983. Since then, the links of pathogenesis, presentation, and the results of treatment of patients with this disorder have been the subject of numerous discussions.

The problem of surgical treatment of degenerative diseases of the lumbar spine under the conditions of coxarthrosis [1–3] is becoming increasingly relevant, which is confirmed by a significant number of scientific studies [5–8]. With the development of a new generation of implants and materials used in the surgical treatment of diseases of the spine and joints, as well as the introduction of highly informative imaging research methods and effective methods of anesthetic support, the indications for operative treatment of this category of patients have significantly expanded [9, 10]. Most authors note the predominance of multilevel lesions, requiring decompression interventions [11], most often with the need for stabilization and reconstruction of the spinal motor segment on the one hand or endoprosthesis on the other [12, 13].

The issues of the interrelationship of spondylolysis on the lumbar spine and acceleration of degeneration of the hip joint or formation of dislocations after primary arthroplasty, the influence of the number of spondylized spinal motor segments on the spinal-pelvic balance and the priority of surgical intervention remain debatable.

Contradictions in opinions on these issues can probably be explained by the lack of a unified system for evaluating the results of treatment, its diverse tactics, and the lack of data on the pathogenic mechanisms of the mutual influence of these pathological conditions. These factors determined the choice of the topic of the presented research.

The purpose of the study: to analyze the available scientific information regarding the priority of choosing a surgical intervention under the conditions of combined impairment of the lumbar spine and hip joint.

Material and methods

The material of the study was an assessment of relevant literature in specialized sources over the past 10 years.

Results and their discussion

Planned hip joint replacement is currently one of the most successful operations in orthopedics and

is called the operation of the 20th century [13, 14]. Patient evaluation of the consequences of endoprosthetic repair shows excellent results. More than 120,000 primary arthroplasty surgeries are performed annually in the United States, costing more than \$ 2.5 billion. Because most of these procedures are performed in people aged 65 and older, their number is expected to increase as the population ages. The results of surgical treatment of patients with degenerative spine disorders have also improved significantly in the past few years [15], but they cannot match the success rate of endoprosthetic repair.

Among the scientific community, the possibility of a direct influence of instability and sagittal balance of the spine on the functional orientation of the acetabulum and, therefore, on the risk of impingement and dislocation of the hip joint is discussed [16, 17]. Conversely, hip flexion contracture under conditions of coxarthrosis can affect the sagittal balance of the spine and cause back pain [18]. If at the same time there are relative indications for surgery both on the spine and on one or both hip joints (endoprosthetic repair), the question arises: which surgical intervention should be performed first? Often this is a difficult decision which must be made individually for each patient. What is the evidence? What arguments speak in favor of prioritizing surgical treatment of the spine before endoprosthetic repair or vice versa? Such questions appear quite often in the literature today.

In addition to the development of an acute or rapidly progressive neurological deficiency, essential prerequisites for priority surgical treatment of the spine before endoprosthetic repair are the loss of sagittal balance (flatback) [19]. This can potentially increase the risk of anterior impingement with dorsal dislocation when, for example, the patient assumes a forward-leaning sitting position, when putting on socks, or getting up from a deep chair or couch.

The loss of lumbar lordosis followed by a change in the sagittal profile is typical for degenerative processes of the spine. The compensatory tilt of the pelvis directly affects the functional orientation of the acetabulum. This can lead to painful dorsal pressure on the hip joint. Overstretching of the hip extensors, which are necessary for compensatory pelvic retroversion, can further exacerbate hip symptoms. With this interaction of the spine and the joint, the development of symptoms is caused not by disorders in the hip joint, but by a changed sagittal balance of the spine. In this case, the treatment should first of all eliminate the impairment of the spine.

Data from clinical observation of patients show that coxarthrosis also leads to limitation of mobility and, in severe cases, to a decrease in extension (hip flexor contracture) [20]. This, in turn, causes an increase in the tilt of the pelvis. Since the pelvis directly affects the state of the lumbar spine, there is an increase in lordosis in forward tilt of the pelvis [20]. In this case, non-physiological hyperlordosis plays the role of a compensatory mechanism for maintaining sagittal balance. The muscles of the back are overstrained due to the constant increase in tension, and the arcuate joints are subjected to a greater load. Both can cause the development and strengthening of problems with the lumbar spine. In the case of previously existing lumbar spinal stenosis, the patient's condition worsens due to an increase in lordosis. Since this disorder leads to the narrowing of the intervertebral foramina, the previously diagnosed radicular symptoms may intensify. In this case, priority is also given to spinal surgery.

M. J. McNamara et al. [21] recommended total joint endoprosthetic repair in comorbidity in any case primarily because of the obvious excellent results of endoprosthetic repair. Other researchers hold the same opinion. For example, a very compelling fact was revealed by W. R. Bohl and A. D. Steffee [22]. In their opinion, the increase in walking endurance provided by endoprosthetic repair of the hip joint may show the most pathognomonic symptom of stenosis—neurogenic lameness in patients unable to walk adequately before total endoprosthetic repair. In this case, the authors recommend surgical intervention on the lower back as a second step.

T. C. Yin et al. [23] provided information obtained from the Taiwan National Health Insurance Research Database (NHIRD). Patients (1,824) were divided into groups: I (103 persons) — surgery of the hip joint and spine was performed simultaneously during one stay in the hospital; II (431) — the operation on the hip joint was performed before the operation on the spine; III — (1,290) operation on the spine was followed by endoprosthetic repair. Group III patients were divided into two subgroups: spine surgery was performed by an orthopedic surgeon ($n = 679$) or a neurosurgeon ($n = 522$). The study showed that orthopedic surgeons more often investigated the impairment of the hip joint with the help of radiography (52.6 vs. 38.1 %, $p < 0.001$) and diagnosed more cases of its disease (43.6 vs. 28.9 %, $p < 0.001$) than neurosurgeons. In general, in the observation groups, the best variant of the intervention sequence based on the assessment of the quality of life after surgery was not found.

It was determined that lumbar stenosis combined with coxarthrosis may be a factor in increasing the risk of neurological deficiencies after endoprosthetic repair of the hip [24, 25]. In particular, 21 patients with lumbar spinal stenosis developed compression radiculopathy after total endoprosthetic repair of the hip joint [26]. This means that root symptoms in the presence of this disorder require less effort for root compression, which causes clinical manifestations. On the basis of these facts, the authors came to the conclusion that it is necessary to take into account the influence of the lumbar spine on nerve or root damage that occurred after hip joint surgery. In addition, experts note that objective neurological symptoms after total endoprosthetic repair of the hip joint occur more often than postoperative infection. N. Watanabe et al. [27] found 0.88 % cases of femoral nerve neuropathy after primary total endoprosthetic repair. To identify risk factors for this complication, the authors analyzed the following parameters: age, gender, preoperative diagnosis, surgical position, height, weight, body mass index, surgeon experience, type of components, method of anesthesia, lengthening of the leg during surgery, and the duration of surgery. They concluded that short stature and a shorter distance between the femoral nerve and the anterior border of the acetabulum are risk factors for femoral neuropathy. The authors did not comment on concomitant lumbar spinal stenosis or other degenerative disorders.

M. J. McNamara et al. [21] reported on 14 patients who developed vertebral neurologic deficiencies after total endoprosthetic repair of the hip joint. Only 5 of them had combined symptoms of coxarthrosis and spinal stenosis in history. 9 subjects developed radicular pain after total joint replacement. The average time to the development of this pain after endoprosthetic repair was 9.3 months. All these patients had combined spine and hip impairment. Decompression surgery on the spine was performed in 9 patients after endoprosthetic repair. Interestingly, 8 of them were rated between «good» and «excellent» according to the Oswestry questionnaire.

Although progressive neurological deficiency or cauda equina syndrome in combination with lumbar spinal stenosis are indications for urgent surgical intervention, some scientists [22] suggest that non-progressive neurological deficiency in the presence of pain syndrome should not be a reason for surgery. However, researchers insist that patients with asymptomatic lumbar spinal stenosis undergoing endoprosthetic repair are at increased risk of neurological complications. It is also indicated that patients

with degenerative diseases of the spine in the early period after endoprosthetic repair of the hip joint or arthroscopic intervention have less favorable results in terms of back pain, improvement of walking, although in a more remote period there is a significant progress of symptoms.

The combination of degenerative changes in the hip joints and the spine in the elderly is a particular problem. Surgical treatment of such patients, often with comorbid diseases, is associated with possible complications in both the hip joint and the spine. T. Claben et al. [13] published successful results of endoprosthetic repair of the hip joint in this age group, but pointed out possible complications in elderly patients. In this connection, the question arises in which groups of patients the incidence of complications after endoprosthetic repair of the hip joint is higher and what exactly needs to be taken into account. It should be noted that, in general, the incidence of complications after spine surgery is higher than after interventions on the hip joint.

Based on their own experience of decompression for lumbar stenosis, the researchers identified the following prognostic factors for poor postoperative outcomes: questionable radiographic confirmation of stenosis, female gender, failed previous surgery, and presence of spondylolisthesis. Fixation performed after decompression significantly increased the frequency of positive results of surgery for lumbar spinal stenosis [28–30]. This applies only to patients with spinal stenosis without accompanying coxarthrosis.

There are authors who deny the existence of a relationship between gender and the results of surgical treatment of patients with combined impairments of the spine and hip joint [31–35]. At the same time, there is an opposite opinion [36, 37]: the authors associate the worst results of surgical treatment in men with disorders of the cardiovascular system and harmful habits.

Conclusions

Despite the long history of study, practical issues of treatment of combined impairments of the lumbar spine and hip joint, the choice of optimal treatment tactics remain debatable and require further study.

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

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PROBLEM OF SURGICAL PRIORITY CHOICE AT COMBINED PATHOLOGY OF LUMBAR SPINE AND HIP JOINT (LITERATURE REVIEW)

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