



To Study the Efficiency of Modern Visual Methods for Hip Joint Injuries (Literature Review)

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Abstract: A steady increase in the number of victims of this category has been noted since the middle of the 20th century and is due to the development of technological production, the emergence of high-speed transport, as well as other high-energy traumatic factors. According to a number of authors, acetabular fractures most often occur as a result of road accidents - about 89% of the victims, as well as falls from a height - almost 12%.

Keywords: acetabulum, endoprosthesis replacement, complications, injuries.

Numerous studies have shown that the proportion of pelvic fractures is 1.7-10% of all fractures [2], of which 42-71% of injuries occur as a result of road traffic accidents [4]. The second most common source of injury leading to such injuries is work-related injury (11-25% [4]), while other causes are identified in 4% of cases.

In recent decades, there has been an increase in the absolute and relative number of pelvic and acetabular fractures in the structure of injuries, that is, both the total number of fractures (relative number) and the proportion of acetabular fractures (absolute number) are increasing [5]. Among the victims are dominated by men who are of working age up to 73%. [7].

According to O.Sh. Buachidze (2003), diagnostic errors occur in 12.6% of patients and most often in patients with multiple injuries.

The incidence of acetabular fractures has been steadily increasing in recent years due to an increase in the number of severe injuries, including multiple and associated injuries [3]. With a relatively low proportion of pelvic fractures among all skeletal fractures, the presence of a pelvic injury in the victim, and in particular an acetabular fracture, significantly complicates treatment and worsens the prognosis [6]. The previously used conservative treatment method, in addition to the impossibility of early mobilization of the patient, often does not completely eliminate the displacement of fragments, which in 40-60% of cases leads to unfavorable results [9]. The rapidly developing coxarthrosis in this case dictates the need for such expensive and time-consuming treatment methods as hip arthroplasty [7]. In this regard, indications for surgical treatment of injuries of the acetabulum are increasingly being put forward. This is also due to the introduction and development of such high-tech diagnostic methods as computed tomography (CT). Its implementation greatly facilitates the definition of treatment tactics and planning of surgical treatment [7].

E.Yu. Valiev, A. Tilyakov studied the process of treating patients in scientific research. The results of treatment of patients with injuries of the acetabulum from 6 months to 1 year were studied. The evaluation of the results of treatment of patients was carried out in two directions: anatomical and functional. The anatomical result was assessed on the basis of control radiographs and computed tomography. Functional results in the long-term period were evaluated on the basis of complaints,

clinical data, range of motion in a healthy and injured joint. Good anatomical results were considered to be the complete elimination of displacements of the bone fragments of the acetabulum with the restoration of the congruence of the articular surfaces. Good functional results were considered a complete restoration of the functionality of the pelvic ring and hip joints. Satisfactory anatomical results were considered incomplete elimination of displacements with good adaptation of bone fragments. Satisfactory functional results were considered for pain that occurs during prolonged physical exertion, limitation of extreme movements in the hip joint, the presence of pelvic deformities that do not significantly affect the support function, with limitation of movements in the joint up to 25-30% with a slight gait defect. Unsatisfactory results were assessed when a pronounced pain syndrome persisted, including at rest, with limitation of movements in the hip joint by more than 30%, impaired support function and the occurrence of secondary degenerative-dystrophic diseases - coxarthrosis, aseptic necrosis of the femoral head, etc. (5)

Analyzing the available specialized modern literature, we could not find a single rating scale that could be used only to assess the results of the treatment of acetabular injuries [3]. Apparently, this is due to the fact that many experts do not focus on separating the acetabulum into a separate segment, but refer to it as a part of the pelvis, although according to the AO classification, the cavity is segment number 62 [16]. This approach cannot be considered rational, since the priority functions of the pelvic ring and the acetabulum (support and movement) differ [Lazarev AF. Shchetkin VA 2016]. Of the existing rating scales and systems (15), most provide either an assessment after arthroplasty, or an assessment in comparison before and after reconstructive surgeries [Belov AN, Shchepetov ON 2015]. Therefore, in our opinion, the greatest interest is not the fact of joint replacement itself, but data on post-traumatic changes in the joints in patients in subsequent years, which lead to total joint replacement. It is this group of patients that can most clearly characterize the results of treatment in the long-term period [1].

In understanding the causes of the development of such complications of trauma as coxarthrosis and aseptic necrosis of the femoral head (AFNF), judging by the numerous literature data, the opinions of scientists are contradictory. Some believe that after an impeccable reposition (less than 1 mm of residual displacement), the long-term results are much better than after a bad one (5 mm or more). And if post-traumatic arthrosis occurs, then this happens much later, and it progresses more slowly than after a bad reposition. Others point out that this is a situation in which the accuracy of joint reposition does not seem to correlate with the outcome, which is determined by the severity of the injury: the degree of destruction of the anatomical structures and decompensation of the blood supply to the joint. But, anyway, the frequency of unsatisfactory results remains high. Patients with post-traumatic coxarthrosis account for 17 to 80%, with ANFH due to dislocation up to 10-26%. At the outpatient stage, post-traumatic changes in the hip joint are detected in 60-90% of patients, and a third of them need arthroplasty [8].

Injuries to the acetabulum account for 7 to 25% of all pelvic fractures [11] and in most cases are the result of a high-energy injury and a component of polytrauma [12]. In recent decades, there has been an increase in the number of patients with injuries to the acetabulum as a result of road traffic accidents [9]. The consequences of severe pelvic injuries significantly reduce the quality of life and often cause disability [14]. Treatment of patients with traumatic injuries of the acetabulum is a complex orthopedic task. Due to the significant traumatic force characteristic of this type of injury, correction of life-threatening conditions requiring emergency intervention (traumatic shock, damage to internal organs, bleeding) is carried out [9]. There is no consensus on the choice of the time of surgical intervention, the method of reposition, the type of osteosynthesis and surgical access [13]. Transosseous and open osteosynthesis, as well as their combinations, are actively used [3], in some cases it is possible to perform hip arthroplasty in the late post-traumatic period [10]. Even adequately performed osteosynthesis does not always achieve the desired result.

Treatment of acetabular fractures, which account for up to 30% of all pelvic injuries, is one of the most difficult problems of modern traumatology [1]. And its cornerstone remains the choice of a method that combines gentle treatment of soft tissue structures and accurate reconstruction of bone lesions. It is this approach that most favorably affects long-term results [11].

Speaking about the methods of treatment of fractures of the hip joint, it should be noted that, despite the large number of works on this issue published by our orthopedists who worked in the countries of the former USSR [13], a scientifically based approach was formed by Western specialists, who in 50-60- e gg. the last century laid its foundation [Borrelli J. Jr., Goldfarb C, Ricci W. 2012]. However, all schools available there have completely abandoned extrafocal osteosynthesis for injuries of the pelvis and especially the acetabulum as the main one, following the mentality and principles of the quality of life of the citizens of these regions. As a result, the treatment of acetabular injuries has become a preparatory step for arthroplasty [Engsborg J.R., Steger-May K, Anglen J. O, 2009].

Modern surgical technologies in the treatment of patients with acetabular fractures

The relevance of the diagnosis and treatment of fractures of the pelvis and acetabulum (AC) is due to three main factors - an increase in road traffic injuries, an increase in the number and severity of this type of injury, persistent complications, and dissatisfaction with the results after surgical treatment [7]. No less relevant in recent years has become the problem of acetabular fractures (AC) in elderly patients. For example, D. Butterwick et al. (2015) note that geriatric patients are the fastest growing subgroup of patients with VC fractures, while the frequency of its fractures in patients older than sixty years has increased by 2.4 times over the past quarter of a century [17]. Numerous publications provide data on a significant increase in the number of fractures of the pelvic bones and VV [7]. The age of patients with pelvic fractures and VV varied from 19 to 90 years and averaged 51.5 years [8.].

Despite the improvement of surgical methods of treatment, patients with injuries of the acetabulum are still mainly treated with skeletal traction. This is due to the presence of severe concomitant injuries and shock in the victims, the technical complexity of open reduction and bone osteosynthesis, and the limited possibilities of hardware treatment. Due to the variety of types of acetabular fractures, data on the choice of the method of surgical treatment are very contradictory. The issue of access to the hip joint depending on the type of fracture has not been resolved. At the same time, timely restoration of the anatomy of the hip joint is essential for further functional prognosis. Therefore, we prefer the surgical elimination of the displacement of fragments with the achievement of congruence of the articular surfaces.

In their practice, Mauo K. (1987), Goulet J. (1994), Perry D. (1997) widely used cortical screws 3.5 mm, reconstructive plates 3.5-4.0 mm, 1/3 tubular plates. The advantages of using reconstructive plates in acetabular surgery are: 1) the possibility of using 3.5 mm cortical screws; 2) there are notches along the entire length, which allow the plate to be bent in three planes (however, it is recommended to avoid bending in one of the directions more than 15°); 3) the low rigidity of the plate further decreases with bending; 4) oval holes make it possible to compress fragments with correctly inserted screws; 5) 4.0mm hole size allows sponge screws to be used; 6) screws can be inserted at an angle of 25° to the longitudinal axis and 7° to the transverse one; 7) the ability to choose a plate with the required number of holes (from 5 to 22) and a suitable length (from 58 mm to 262 mm); 8) the thickness of the plate is 2.8 mm, the width is 10 mm, the size of the gap with the hole is 12 mm. Reconstructive plates can be used in most cases in the absence of severe osteoporosis and the presence of a bone mass to insert fixing screws [11].

Posterior access is performed in case of isolated damage to the posterior wall, column, transverse or T-shaped fracture [3].

The repositioning of a transverse acetabular fracture is similar to the posterior column repair technique. However, in this case, the task of the surgeon is to reconstruct the posterior column and eliminate the displacement, rotation of the fragments of the anterior column. To eliminate displacement, Tile M. (2003), Bartlett C. (2000) use a two-screw technique with a repositioning clamp, repositioning pelvic forceps, and a repositioning maneuver with a fixation plate. As stabilizing structures, a 3.5 mm reconstructive plate is used, installed on the retroacetabular surface of the acetabulum, and lag screws [9].

The indications for choosing the Kocher-Langenbeck approach with osteotomy of the greater trochanter are high transverse and T-shaped fractures in order to gain greater access to the roof and

anterior column of the acetabulum. In this case, the anterior column can be stabilized by retrograde insertion of screws, visual control of the roof of the acetabulum is possible from the side of the ilium and intra-articularly through the dissected joint capsule [3].

The anterior ilioinguinal approach was developed by Letournel E. in the early 60s of the last century [14] to repair damage to the anterior wall, column, and pelvis located distal to the pectineal eminence. Through three operating windows (lateral, middle, medial), access to the internal iliac fossa, the anterior surface of the iliac-sacral joint, the tetrahedral surface, the posterior column, the superior branch of the pubic bone, and the symphysis is possible. Reposition of fragments of the acetabulum begins from the periphery to the articular surface of the acetabulum and ends with provisional stabilization.

Thus, acetabular fractures are a complex injury to the hip joint, in most cases they are characterized by a combined nature of the injury, a high percentage of disability. Conservative techniques do not allow achieving anatomical reposition of fragments of the acetabulum, and traditional surgical treatment is characterized by significant intraoperative trauma, the complexity of the rehabilitation period, and a high risk of complications. However, the heterogeneity of intra-articular injuries, the variety of fracture forms does not allow stabilizing and reconstructive operations to be abandoned at the modern level.

Primary total arthroplasty in patients with fractures of the acetabulum.

According to Mears D. (2010), Johnson E. (2014), always, especially in young victims, surgeons should take all possible measures to save the damaged hip joint [9].

Based on the results of the initial examination of patients with an unfavorable prognosis of surgical treatment, Mears D. (1999) suggests alternative methods [8]. One of the directions is the primary conservative treatment until the fusion of the VV fracture and subsequent hip arthroplasty [14]. Despite the fact that such a tactic avoids complications associated with open reposition and internal fixation, Romness D. (1990), Boardman K. (1978), note a significant number of unsatisfactory results of arthroplasty due to delayed fracture consolidation, defect, deformations of explosives [5].

Another direction can be chosen by a limited open reposition in order to eliminate gross deformity of the EV and restore the stability of the pelvic ring [3]. In most of these observations, the immediate results of treatment are usually unsatisfactory and require hip arthroplasty. Weber M. (2008), Berry D. (2009), Rogan I. (2009), Pritchett J. (2011), Tikhilov P. (2005), reporting on the technique of arthroplasty, noted the significant complexity of the operation after an open reposition and internal fixation associated with the presence of heterotopic ossifications, scar tissues, metal structures, a high risk of infectious complications, an increase in the frequency of complications compared with arthroplasty of degenerative arthrosis [5].

Comparative characteristics of total hip arthroplasty in various types of post-traumatic arthrosis

The greatest difficulties in hip arthroplasty occurred in patients with type IV post-traumatic arthrosis. In patients of this group, the period after injury before implantation of the endoprosthesis was the shortest -31 ± 25 months. (from 5 to 63 months), and the victims are younger compared to other groups - 35 ± 12 years (from 24 to 46 years). Arthroplasty differed in duration (178.7 ± 20.1 min.) and significant blood loss (1075 ± 170.7 ml). The functional results of treatment according to W. Harris (1969) were regarded as good, but they were lower in rating than in other patients with post-traumatic arthrosis - 83 ± 12 points.

Total arthroplasty for type II post-traumatic arthrosis was performed after 50 ± 77 months. after fracture of the VV (from 7 to 300 months). The average age of patients is 41 ± 13 years (from 25 to 64 years). The duration of the operation (186.7 ± 56.5 min.), blood loss (1009 ± 367.2 ml.) depended on the need for bone grafting, removal of metal structures, and the presence of postoperative scars. Despite significant technical difficulties, all patients received a good treatment result according to W. Harris (1969) - 84 ± 25 points.

Preservation of the shape of the correct hemisphere of the explosive in case of post-traumatic arthrosis of type I did not guarantee the victim from the development of degenerative-dystrophic processes in HJ. In this group of patients, total hip arthroplasty was performed 64 ± 66 months (from 14 to 185 months) after injury. The patients of this group were younger and older -49 ± 10 years (from 34 to 63 years), therefore, intraoperative blood loss (995.7 ± 379.6 ml.), operation time (173.5 ± 73.9 min.) did not affect the results of treatment. According to the W. Harris scale (2009), they were rated as excellent - 90 ± 9.3 points.

Severe VV deformity in type III post-traumatic arthrosis turned out to be the most favorable for predicting long-term results of treatment. Total arthroplasty in this group of patients was performed after 137 ± 136 months. after damage to explosives (from 3 to 354 months). The central displacement of fragments of the EV, the deformation of the "deep" EV did not prevent the implantation of the endoprosthesis components, which was accompanied by a decrease in blood loss during the operation (600 ± 340.3 ml.), the duration of the intervention (177.8 ± 44.6 min.). The Harris (2009) hip function score was high, 92 ± 4.9 points.

Conclusion. Thus, total hip arthroplasty is an effective method of treating patients with post-traumatic arthrosis. However, deformation, defects of the EV, deficiency of autologous bone material, the presence of postoperative scars, metal structures make it possible to classify such surgical interventions as primary complex ones, in which the risk of instability of the endoprosthesis components, infectious, thromboembolic complications remains high.

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