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TOTAL HIP ARTHROPLASTY - COMPARISON OF TRADITIONAL AND MINIMALLY INVASIVE APPROACHES - LITERATURE REVIEW

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ABSTRACT

Background. Total hip arthroplasty is one of the most frequently performer procedures by orthopaedic surgeons, choosing the right approach is an important component of the result of the operation. Minimally invasive approaches have an increasing share in orthopedic surgery and their use is becoming more and more common, but they have some limitations and therefore classical methods are still used.
AIM. The aim of the review is to discuss and compare classical methods and minimally invasive methods, taking into account the advantages and limitations of the methods, the incidence of complications and the final result of treatment.
Methods and Materials. A descriptive literature review was conducted using the PubMed and Google Scholar search engines in order to compare surgical approaches to hip arthroplasty.
Results. Classic accesses allow better access to the operating field, but this is associated with high tissue trauma, which prolongs recovery in a short time after surgery. Complications are rare, but the method used determines the frequency of their occurrence. On the other hand, minimally invasive methods are associated with much less tissue traumatization, which results in faster recovery compared to classic methods, However, you have to take into account the limited operating field, which may be associated with a limitation of their use in obese people or in the case of revision surgeries.
Conclusions. The choice of surgical approach in THA should be individual for each patient and should take into account the patient's anatomy, comorbidities and the surgeon's experience. Literature data indicate that minimally invasive accesses are characterized by a lower rate of complications, faster recovery and allow for faster hospital exit, but in long-term follow-up after surgery, the differences between MIA and classic approaches are statistically insignificant.

KEYWORDS

Minimal Invasive Approach, Total Hip Arthroplasty, Conventional Approach, Complications

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Introduction

Total Hip Arthroplasty (THA) is currently one of the basic procedures performed by orthopaedic surgeons [1][2], used primarily in the treatment of advanced degenerative changes, but also used in the treatment of fractures, femoral head necrosis, inflammatory joint diseases and selected consequences of hip joint developmental diseases. The basic goal of THA is to relieve pain, improve joint function, restore the length of the limb, which is associated with enabling the patient to return to mobility. According to the data of the Polish Registry of Endoprostheses, 63,907 such surgeries were performed in Poland in 2025 [3], and it is expected that as a result of the aging of the population, the demand for this procedure will grow[4]. Research shows that this is an operation whose effects can bring long-term, good results - on average, 85% of endoprostheses function for 20 years [5]. Hip arthroplasty can generally be performed using traditional and minimally invasive approaches (MIAs). The aim of this literature review was to discuss and compare minimally invasive (MI) and classical approaches (CAs) and to compare CAs and MIAs with each other.

Methods

The literature review was conducted using the PubMed browser and Google Scholar, searching for articles published in English up to May 2026. When searching the databases, the following passwords were used:: total hip arthroplasty, total hip replacement, conventional approach, minimally invasive surgery, minimally invasive approach, direct anterior approach, anterolateral approach, direct lateral approach, Hardinge approach, posterior approach, posterolateral approach, direct superior approach, SuperPATH, complications, dislocation, blood loss, transfusion, length of stay, functional outcome, gait analysis oraz revision arthroplasty.

Operational approaches descriptions

Classic approaches

The most commonly used classical approaches to THA are the posterior approach (according to Langenbeck in Moore's modification), the lateral approach (according to Hardinge) and the anterior-lateral approach (according to Watson-Jones). These accesses differ in the direction of preparation, the extent of muscle fibre damage and the impact on the subsequent functioning of the joint.

The posterior access in Moore's modification is a curved incision, 12-16 cm long, running distal in the projection of the lateral surface of the femoral shaft, passing proximal over the greater trochanter of the femur towards the posterior superior iliac spine. Then, after the iliotibial band and the broad fascia, as well as the dissection of the gluteus gluteus muscle fibers, the pear-shaped muscle becomes visible, as well as other muscles belonging to the group of so-called "short external rotators". In this surgical access, these muscles are cut, close to their attachment to the greater trochanter, which, after exposing the abdomen, provides access to the hip capsule.

Lateral access (Hardinge) is obtained by making a simple incision 12-20 cm long, in the axis of the femoral shaft, passing through the greater trochanter of the femur. Then, after incision of the iliotibial band and the broad fascia, the gluteus middle and extensive lateral muscles are visible. The fibers of the gluteus medius muscle should be separated no more than 5 cm proximal from the apex of the greater trochanterus (this action ensures the protection of the superior gluteal nerve). Next, the resulting line should be extended distally, by separating the fibers of the lateral vassis muscle.. Exposing the muscle "lobe" upwards, consisting of the anterior part of the gluteus muscle medius, the lower tendon of the gluteus muscle and the anterior part of the lateral expanse muscle, provides access to the joint capsule.

Minimally invasive approaches

Among the most commonly used MIAs are:

Minimally invasive anterolateral access (Watson-Jones). Cut, slightly curved forward towards the hip crest nodule. Reaching the broad fascia, it is incised along the femur, extending the incision proximal along the posterior edge of the broad fascia tensor muscle, which is pulled forward, revealing the gluteus medius muscle (which should be tilted backwards), as well as the lateral ampus muscle, which is cut off from its attachment on the greater trochanter.

Direct Anterior Approach (DAA) - The incision begins in the area of the anterior upper iliac spine, extending to about 10 cm towards the lateral epicondyle of the femur. The fascia is incised along the fascia tensor muscle, the fibres of which are then separated along their course. At this stage, the cutaneous nerve of the lateral thigh must be identified and protected. Revealing the separated fibers, as well as the nearby muscles – the tailor's and straight thighs.

Direct Superior Approach (DSA). The incision begins in the posterior, upper edge of the greater trochanter, extending proximal to 6 to 10 cm in a line inclined to about 45-60 degrees from the axis of the femoral shaft. Then, after the gluteus maxima muscle is visible, its fibers are separated along their course. This access does not affect the iliotibial band. In the dilated gap between the gluteus muscle, the middle and small muscles are visible tendons of the pear-shaped muscle and the inner veil. The tendon of the pear-shaped muscle should be cut close to the femoral attachment, and the resulting muscle stump should be temporarily secured with a suture, pulling it back and sewing it to the subcutaneous tissue, this is secured by the nearby sciatic nerve. Supercapsular Percutaneously Assisted Total Hip – Super Path. The incision begins at the top of the greater trochanter of the femur, extending proximal to 6-8 cm. Next, the gluteus gluteus muscle fibers are separated, according to the direction of its fibers. The gluteus muscles are tilted forward and the hamstring of the pear-shaped muscle is tilted backwards, without cutting any of these muscles.

Compare approaches

Minimal invasive surgery (MIS) is not only a smaller incision of the skin, which is associated with a better cosmetic effect after surgery, but above all, less traumatization of soft tissues [6], but there are data that contradict this [7]. The most important factor influencing the proper functioning of the joint is the correct spatial orientation of the prosthesis components along with the restoration of the correct femoral and acetabular offset, which, as indicated by the results of research [8][9][10], can be achieved with good results with the use of the MIA. The functional results of the hip joint after MIS compared to classical methods are similar [11]. Although studies show that patients operated with the use of minimally invasive approach have better gait performance results in the early postoperative period[12][13], these differences blur over time and no

statistically significant differences between classical and MI methods are observed [14]. In addition to appropriate access, it is important to take into account the factors that may affect the outcome of the operation, i.e. to the greatest extent the patient's comorbidities such as obesity, neurological diseases, skin diseases or hip dysplasia, and one should not forget about the limitations of the surgeon [15]. Blood loss using the Hardinge approach has been shown to be higher and the need for blood transfusions is more common compared to the DSA [16], Similar results were obtained when comparing other approaches [17], which may be associated with a reduction in hospitalization time [18], especially in older people undergoing MIS [19]. Also, the dislocation rate was higher when using classical approaches [20], but the revision was comparable in both cases [21]. A comparative meta-analysis [22] of traditional posterior-lateral accesses and MI shows no statistical differences in the incidence of complications (dislocations, nerve damage, infection, deep vein thrombosis, fractures of the proximal end of the femur). Studies show that MIAs can be used by learning surgeons with comparable results as if the surgery were performed by an experienced surgeon, but this takes more time [23], while the percentage of complications among learning surgeons can be reduced through the supervision of an experienced surgeon [24]. MIAs due to less tissue trauma contribute to less pain after surgery [25][26], a beneficial effect was also achieved in patients burdened with obesity [27], and this factor affects faster recovery of patients after surgery [28][29]. Haynes et al. [30] described in their study that obesity is associated with a fourfold increased chance of complications after THA. Older age of patients and the burden of obesity may be a negative prognostic factor of MIA THA [31], and the patient's condition before surgery strongly correlates with the clinical effect. Another important factor that should be considered is osteoporosis, according to a study by Chee et al. [32] It follows that within two years of surgery, regardless of the approach we choose, there is a statistically significantly higher risk of medical, surgical and general complications, as well as revision surgeries, compared to patients who did not undergo surgery. McLaughlin [33] points out that THA should not be withheld in obese patients for fear of less satisfactory surgical outcomes, as there were no statistically significant differences in clinical and radiological outcomes and in the frequency of revisions compared to non-obese subjects. MIS may also be considered in these patients, and achieve comparable results as with classical methods with an equally low odensis of complications [34]. MIA is not used in audit operations, but based on a meta-analysis by Clesham et al. it follows that MIA can be used in the case of revision operations for any reason, obtaining similar results as with classical methods [35]. Rottinger's approach, which is also MIA, is distinguished by a lower percentage of complications,, less need for crutches and faster rehabilitation compared to the rear access [36]. The posterolateral piriformis-sparing approach compared to DAA [37] has a shorter learning curve and requires shorter surgery, but DAA in this case is distinguished by better accessibility and faster recovery of the hip joint. In a comparative meta-analysis of MIAL and LT accesses, it was shown that statistically significantly higher blood loss was observed in MIAL, however, the results on the Harris scale for the hip joint were significantly higher in patients undergoing MIAL compared to LT, therefore, due to better clinical outcomes after the use of MIL, the authors of the meta-analysis encourage the use of this approach [38]. In DAA, there is a risk of damage to the cutaneous nerve of the lateral thigh, [39] however, damage to this nerve did not adversely affect the Harris Scale score. Comparing the DAA and DAL approaches, it is not possible to clearly determine which of these approaches is more beneficial for the patient, so the authors of this analysis [40] recommend that the surgeon should know both methods and, depending on the patient's needs, choose the more advantageous one. In DAA, one of the most common complications is infection and increased skeletal resorption, and at the same time, Trendelenburg gait is more common [41]. In a large meta-analysis comparing MIA,, significant differences were statistically shown only during hospitalization, which was the shortest when using the SuperPath method [42]. Due to the insufficient amount of data prevailing in favor of any approach, it is recommended that the surgeon use the method in which he feels most confident [43]. Therefore, in complex cases, including, but not limited to, severe dysplasia, post-traumatic deformity, significant limb axis disorder or revision surgeries, Classic or extended access may be safer than striving to minimize the notch [44].

Conclusions

MIAs are the future of orthopaedic surgery, but classic approaches are still necessary because they ensure the safe conduct of complex and revision surgeries. MIAs have different benefit-benefit and limitation profiles, so they should not be treated as a homogeneous group [44]. Taking this fact into account, minimally invasive methods should be taken into account in future studies, because on the basis of these studies, it can be concluded that the use of MIA is beneficial for patients in whom we anticipate a lower percentage of complications in the early postoperative period, especially in terms of pain, blood loss, and faster recovery with earlier hospital leaving [45], although there are results that do not prove the advantage of MIA over classical methods [46]. At the same time, studies show that MIA, due to less tissue trauma, can indeed affect early better postoperative outcomes compared to classical methods: the results contribute to relieving the patients' budget due to shorter hospital stays [47], but it is not possible to clearly determine the best approach [48]. The final choice of approach should take into account the patient's anatomy, BMI, bone quality, comorbidities, complexity of the operation, and surgeon's experience [49]. To this end, further research should be carried out that will be able to answer the questions of which MI methods are indicated for a particular patient, how this affects the patient's quality of life and what potential complications they will face in the long term.

Conflict of Interest: Authors declare none conflict of interest.

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