Preliminary Report

The use of dual-articulation prostheses in treating femoral neck fractures – a preliminary report

Zastosowanie protez o podwójnej artykulacji w zaopatrzeniu złamań szyjki kości udowej – doniesienie wstępne

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Abstract

The authors present their own experience with the use of dual-articulation prostheses in a group of patients with femoral neck fractures. The aim of the study was to assess the possible reduction of the risk of dislocation after hip arthroplasty in a group of patients particularly prone to dislocation, that is patients with traumatic femoral neck fracture [1]. The material included 16 prostheses implanted in 2016-2017. The follow-up period ranged from 18 to 42 months. There were no dislocations in the observed group. In the opinion of the authors, arthroplasty using dual articulation is a well-advised alternative method for total "traditional" arthroplasty and hemiarthroplasty in the treatment of displaced femoral neck fractures.

Key words: hip arthroplasty, femoral neck fracture, dual-mobility acetabular cup

Streszczenie


Słowa kluczowe: protezoplastyka stawu biodrowego, złamanie szyjki kości udowej, panewka dwumobilna
Introduction

Gilles Bousquet is considered the pioneer of the use of double articulation in hip arthroplasty. When analyzing the outcomes of arthroplasties in the 1960s and 1970s, he came to the conclusion that there is a need to develop a new type of endoprosthesis. He tried to combine the best features of the prosthesis developed by prof. Charnley [2], and McKee and Farrar [3]. The Charnley prosthesis, with its small head, immersed in the polyethylene cup, ensured long-term survival thanks to the low polyethylene consumption. Unfortunately, the small head carried a significant risk of dislocations. On the other hand, large-head endoprostheses providing greater stability had shorter survival and got loose relatively early due to the wear of its components caused by a significant wear. After several unsuccessful attempts with prostheses similar to current bipolar heads, in 1977 he introduced an endoprosthesis, whose subsequent generations have been used successfully to this day. Prostheses of this type consist of a metal cemented or cementless acetabular cup in which a large polyethylene head sits on a small metal or ceramic head. Principal movement takes place between the small head and the large polyethylene head. This generates, similarly to Charnley prosthesis, low polyethylene consumption. Only in extreme positions is there movement between the large head and the endoprosthetic acetabular cup. The large head protects against dislocation of the endoprosthesis. Such prostheses combine the advantages of a small head and the associated low erosion of polyethylene and a large head associated with a low risk of dislocation.

Aim of the study

The main purpose of the work is to assess implant stability in a group of patients particularly prone to dislocations. We analyze preliminary experiences with dual articulation in patients with femoral neck fractures operated on at the Orthopedics and Trauma Department of the John Paul II Mazowieckie Voivodship Hospital in Siedlce.

Materials and methods

At the Orthopedics and Trauma Department of John Paul II Mazowieckie Voivodship Hospital in Siedlce, as of 2015 we began to use dual-mobility cups in selected cases. In our center, we use the MDM System (Modular Dual Mobility Acetabular System) by Stryker. We use the MDM system together with Trident® Acetabular System PSL (peripheral self locking) or Trident® Tritanium™ Acetabular System – both produced by Stryker. We connect these acetabular systems with cementless stems (now mainly Accolade II, previously also ABG II). The transition to the MDM system can occur at any stage of arthroplasty without the need to replace the implanted acetabulum or stem. The system does not increase the dimensions of the endoprosthesis although it increases the size of the head. In 2016-2017, we implanted 21 endoprostheses using the MDM system in our department, including 16 due to displaced femoral neck fractures. The follow-up period ranged from 18 to 42 months. A very small group of patients and a short follow-up period should be emphasized.

Results

In the analyzed group no dislocations of endoprostheses were observed. Most patients present have very good outcomes, without complaints related to the operated hip, and without problems related to movement and self-service.

Two patients died long after the surgery, with no dysfunctions related to the operated joints. One of the female patients became bed-ridden a few months after the surgery due to dementia and deep depression. Another female patient with pain and swelling of numerous joints due to rheumatoid arthritis (RA) walks with 2 crutches, and denies feeling any pain in the operated hip. One patient, with post-thrombotic syndrome due to edema of the operated limb, functions poorly. Two more patients with poor contact and difficulties with self-service do not report complaints related to the operated hip. Another patient complains of permanent pain from the L/S spine, but reports no pain from the operated hip. One patient after extensive trauma, including a dislocation of the hip joint, peroneal nerve palsy and multi-organ trauma reports constant pain and difficulty in moving. One of the female patients with periodic pains in the hip is undergoing diagnostic workup for the reported complaints.
The 2018 American Joint Replacement Registry reports that 12.9% of revisions were due to implant instability [7]. Total hip replacement, despite carrying a greater risk of dislocation, gives better functional outcomes than hemiarthroplasty [8]. Therefore, the ideal “gold standard” for this group of patients seems to be dual-mobility total arthroplasty combining the comparable functional outcomes with a lower risk of dislocations.

There is some doubt concerning the survival of this type of implant in young patients. The standard in this group is the use of ceramic-ceramic articulation.

Other clinical conditions in which we see indications for the use of a two-mobile cup are:
- patients with small-sized components comprising the endoprosthesis, for example patients with a slender physique or with dysplastic hip,
- patients in whom we can expect limited compliance with the recommendations, including patients with avascular femoral head necrosis, among whom there is a significant group of people abusing alcohol,
- patients with neurological deficits [9], paresis, Parkinson’s disease, spasticity,
- patients who, after arthroplasty, want to return to perform activities requiring a large range of hip movement: athletes, yoga practitioners, etc.,
- patients with spinal diseases, especially with extensive stabilization and limited movement in the lower spine.
- revision arthroplasties.

**Conclusion**

1. Total hip replacement using dual-mobility cups is a well-advised method of treatment in elderly patients.
2. Our experience suggests that the risk of hip dislocation in elderly patients with femoral neck fractures is reduced after dual-mobility arthroplasty.

**References**