

## Experience of Rottinger approach in hip replacement

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### Abstract

**Background:** An important aspect in modern hip arthroplasty plays operative technique, namely the use of minimally invasive techniques and low-traumatic manipulation. Since the beginning of the development of minimally invasive technologies in orthopedics and increasing demands on the part of patients in the postoperative period there appeared a fast growing need to develop new minimally invasive approaches to achieve the objectives as opposed to the existing traditional techniques.

**Material and methods:** The analysis of 47 patients operated on traditional access (Harding) – control group (20 patients with osteoarthritis, 27 with a fracture of the femoral neck) and 42 patients undergoing surgery for Rottinger approach – the main group (20 – coxarthrosis, 22 – fracture of the femoral neck). A survey of patients and evaluation of Harris Hip Score were made.

**Results:** For evaluation of Harris Hip Score the following parameters were taken: the painful feelings when bearing load on the operated limb, the ability to walk different distances (unlimited, 30 minutes, 15 minutes, only indoors, impossible), the opportunity to wear socks or shoes, use stairs with no assistance, ability to perform daily activities and work, the need to use aids, limping, the ability to use public transport, sitting, operated joint mobility (in degrees). Grading for the Harris Hip Score: <70 – poor, 71-79 – fair, 80-89 – good, >90 – excellent. The overall result for the Harris Hip Score using Rottinger approach was 89.1 points, corresponding evaluation “good”, and Harding method – 72.8 (“fair”). 6 weeks after surgery score for Rottinger approach was 95.3 points (“excellent”), Harding method – 82.4 points (“good”).

**Conclusions:** Cosmetic effect by Rottinger approach length of incision is 8-10cm, without myotomy and violation of the fascia lata integrity, better visualization of the acetabulum, but worse is the proximal femur, the need for specialized tools. This operating technique provides a shorter period of hospitalization, reduces the need for rehabilitation and support aids, reduces the risk of complications from prolonged immobilization, and reduces the risk of dislocation by 4.15%.

**Key words:** hip replacement, mini-invasive Rottinger approach.

### Introduction

According to the WHO expert group in 2012, 1 million 500 thousand hip joint arthroplasty are performed in the world. The number of operations over the last 5 years has increased in Europe by 80%, which is 175 thousand per year in only one Germany [1, 2, 4, 7]. World statistics shows that the average annual needs of hip replacement arthroplasty is 500 – 1000 injured patients per 1 million people, but considering the population of Ukraine in our country annually arthroplasty is required by 25-40 thousand sick and injured. Unfortunately, annually in Ukraine 10 times less operations are performed than the estimated number of joints replacement needed [5, 6]. Problem of hip replacement today is very relevant in connection with the need to perform this surgery for the elderly citizens because of femoral neck fractures, osteoarthritis and many other reasons. An important aspect in modern hip arthroplasty plays operative technique, namely the use of minimally invasive techniques and low-traumatic manipulation. Since the beginning of the development of minimally invasive technologies in orthopedics and increasing demands on the part of patients in the postoperative period there appeared a fast growing need to develop new minimally invasive approaches to achieve the objectives as opposed to the existing traditional techniques. Among the various surgical approaches in HJR best results are yielded by Rottinger approach. This method provides anatomical access to muscles without myotomy and violation of the fascia lata integrity. Anatomically performed access with-

out or with minimal damage to anatomical structures ensures faster mobilization and shorter rehabilitation time compared to traditional techniques [8]. After HJR average duration of stay-in-bed days by traditional access lasts 7-14 days compared with mini-invasive access – 3-7 days [9].

**Purpose of the study:** To analyze the advantages and disadvantages of mini-invasive method of Rottinger approach with total hip replacement in retrospective study of patients.

### Material and methods

The study was conducted at the orthopedic department of the 8th city clinical hospital in Lviv. The analysis of 47 patients operated on traditional access (Harding) – control group (20 patients with osteoarthritis, 27 with a fracture of the femoral neck) and 42 patients undergoing surgery for Rottinger approach – the main group (20 – coxarthrosis, 22 – fracture of the femoral neck). The average age of patients is 65 years (50-95 years). A survey of patients and evaluation of Harris Hip Score were made.

Table 1

The distribution of patients by disease, which resulted in need of hip replacement

	Osteoarthritis	Fracture of the femoral neck	Total number
Harding access	20	27	47
Rottinger approach	20	22	42

Surgery was performed in a position on the side with moving of ipsilateral part of the lower extremity. Auxiliary table bearing lower extremity limb position eases the processing of acetabulum. The surgeon should be located near the ventral part of the patient. The incision is performed from the top of the ventral part of the big spit and about two centimeters dorsal to the front-upper iliac spine. The average length of the section is 8-10 cm. After dissection of the fascia lata finger splits the gap between m. tensor fascia lata and m. gluteus medius at the height of the tops of the big spit, then cut is performed in the cranial direction. Lower limb is abducted and held in a bent position. Capsule is formed by two installed extra-capsular elevators type Homan. Lower limb is installed in external rotation for better visualization of the joint capsule. Neck resection is performed in two places to avoid dislocation of the femoral head. The first cut is made near the acetabulum with maximal external rotation. Next neck osteotomy is made distal according to the preoperative planning. The lower limb is held in the position of external rotation, 90 degree flexed knee, parallel to the table surface. Additionally, lower limb is displayed by assistant in adduction and hyperextension. Elevators installed around the top of big spit and opposite to the front wall of the acetabulum give a good look on acetabulum. Restrictions of visualization of the big spit are resolved by resection of the dorso-lateral part of a joint capsule. With specially curved chisel (right or left) channel in the spongy of the proximal part of the big spit is formed considering antetorsion. For rimermentation of the femoral canal using rasps is preferable with right or left handle. An important factor in the formation of the femoral canal is to prevent varus installation of the riemer. Endoprosthesis implantation is performed according to the manufacturer's recommendations. Mobilization can be made in the day of surgery or in the first day after surgery. From the beginning full axle load is allowed.

**Results**

Analysis of the arthroplasty by Rottinger approach effectiveness compared to the traditional method included the intraoperative and postoperative criteria. Comparative characteristics are given in the postoperative period and after 2 months.

**Table 2**

**Comparative characteristics of surgical approaches in acute intra- and postoperative periods**

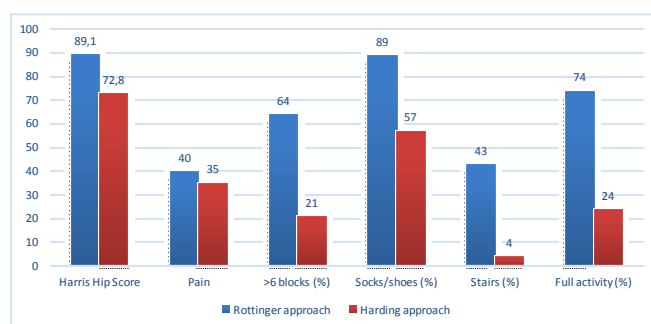
Criteria	Harding access	Rottinger approach
Operating comfort for the surgeon	At least 2 assistants are needed	1 assistant is enough
Blood loss	250-1000 ml	150-400 ml
Analgesics in the postoperative period	2 narcotic and 1 non-narcotic analgesics	1 non-narcotic analgesic

**Table 3**

**Evaluation of postoperative period using two methods**

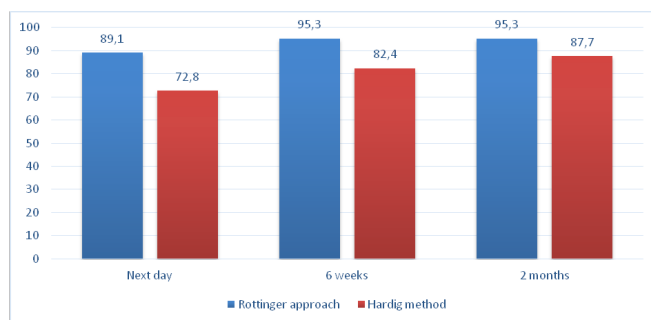
	Harding access	Rottinger approach
Pain	+++	+-
Mobility	Partial	Full
Patient's verticalization on the next day	60%	85%
The axle load on the 2nd day after surgery	Rarely possible full load	Often possible full load
The need to use aids	More than two months after discharge	In rare cases
The number of stay-in-bed days	7-14	3-7
The risk of recurrent dislocation	5,1%	0,95%

\*Aids: crutches, four-legged walker.



**Fig. 1. Comparison of the measurement of Harris Hip Score in the early postoperative period (in points).**

For evaluation of Harris Hip Score the following parameters were taken: the painful feelings when bearing load on the operated limb, the ability to walk different distances (unlimited, 30 minutes, 15 minutes, only indoors, impossible), the opportunity to wear socks or shoes, use stairs with no assistance, ability to perform daily activities and work, the need to use aids, limping, the ability to use public transport, sitting, operated joint mobility (in degrees). Grading for the Harris Hip Score: <70 – poor, 71-79 – fair, 80-89 – good, >90 – excellent. The overall result for the Harris Hip Score using Rottinger approach was 89.1 points, corresponding evaluation “good”, the Harding method – 72.8 (“fair”) (fig.1).



**Fig. 2. Data on Harris Hip Score (in points) in different postoperative periods.**

When comparing the investigated approaches dynamics on Harris Hip Score results is significantly different in the early postoperative period. 6 weeks after surgery score for Rottinger approach was 95.3 points («excellent»), Harding method – 82.4 points (“good”). Evaluation results of late postoperative period came close to the best results of using Rottinger approach (fig. 2).

### Conclusions

1. Cosmetic effect by Rottinger approach length of incision is 8-10cm, without myotomy and violation of the fascia lata integrity, better visualization of the acetabulum, but worse is the proximal femur, the need for specialized tools.
2. This operating technique provides a shorter period of hospitalization, reduces the need for rehabilitation and support aids, reduces the risk of complications from prolonged immobilization, and reduces the risk of dislocation by 4.15%.
3. According to Harris hip score best results were observed after Rottinger approach in the early postoperative period (first 6 weeks), further functional outcome and pain drew to one level.

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