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## Original article

## Functional recovery after muscle sparing total hip arthroplasty in comparison to classic lateral approach – A three years follow-up study

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## ABSTRACT

**Background:** The muscle sparing total hip arthroplasty had generated a distinguishable interest, in both the patients and the surgeons, but its benefits are still often questioned. The main idea of this study was to compare the functional clinical outcome of the patients operated by the anterolateral approach with a muscle-sparing technique (modified Watson–Jones approach), and the patients operated by modified direct lateral approach without the muscle-sparing technique (Bauer/Hardinge approach).

**Methods:** The patients (N = 130) were divided into two groups: 68 in a standard method group (STAND) and 62 patients in a muscle sparing surgery group (MSS). The hip flexibility, mobility, the strength of the hip abduction, the pain scale, Harris hip scores, the duration of the hospital stay and the overall satisfaction were measured seven days, three months, one year and three years (in 80 patients) after the surgery. There were no differences in any of the parameters between the groups prior to the procedure.

**Results:** The statistically significant differences in first three follow-ups (up to one year) were determined between the groups in passive and active hip flexion ability but the hip abduction strength, which is a crucial parameter for functional recovery, and 50 m walk test remained better in MSS group even after three years. Patients, who underwent MSS suffered also less pain, stayed in hospital shorter and were more satisfied with the operation outcome.

**Conclusions:** The functional recovery in patients treated with muscle sparing method was faster than in patients operated with conventional lateral approach. Based on the results, we could recommend anterolateral muscle sparing approach for a total hip replacement for its faster and fuller functional recovery.

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## 1. Introduction

The total hip arthroplasty (THA) is supposed to be the best procedure among the wide spectrum of the joint arthroplasties and it is one of the most beneficial orthopedic surgeries for the patients [1].

As the design of the implants and biological materials has improved during the last decades, it resulted in much better clinical outcomes. The more recent step forward was the development of the less invasive surgical techniques which was expected to result in even more positive effects for the patient. The main advantage of

the minimally invasive surgery should be a shorter functional recovery, mostly due to the lesser muscle damage, so the proper name would be muscle sparing surgery (MSS). The importance of the fast rehabilitation after the total hip replacement is crucial for all who intend to return expeditiously to their normal life activities and especially is important for the community, as the younger patients might return faster to their working places. For those reasons, the muscle sparing total hip arthroplasty gained popularity during the past decade around the world, but in some aspects it still remained controversial. The most important reason for that controversy is a limited working field and visibility of the surgery region, which increases the risk of post-surgical complications compared to the traditional methods [2]. The variability and inconsistency in results of the studies confirming or rejecting the advantages of MSS depended to a large extent on the type of MSS approach that was performed [3–8]. Though, the basic problem

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that confuses the vast majority of readers is the inconsistency in confusing the minimally invasive surgery with muscle sparing techniques. In discussion section of this paper more about what in our opinion the real minimally invasive better say muscle sparing approach is, will be argued.

Somehow, one of the most popular hip approaches in Europe is a direct lateral or transgluteal approach (Bauer/Hardinge) and in our hospital it is being used in hundreds of total hip arthroplasties every year. Also, in the last decade we started to perform anterolateral MSS approach (ALMSS) and now this technique is also used in roundly a hundred surgeries per year. Though, the lateral hip conventional approach and MSS anterolateral are very common in orthopedic surgery practice all over Europe, it is interesting that there are no more studies which compare clinical, functional and radiological outcomes between these two established methods. Several studies did compare the outcomes between the conventional lateral and anterolateral MSS approaches and, in our opinion, a little surprisingly is, that none of these studies give considerable advantages to anterolateral MSS approach [9–14].

According to the above, the aim of the study was to compare the functional clinical outcome of the patients operated by the anterolateral MSS approach (a muscle-sparing technique - modified Watson–Jones approach), and the patients operated by direct lateral approach without the muscle-sparing technique (conventional – Bauer/Hardinge approach).

## 2. Materials and methods

The sample comprised, 68 patients (25M and 43F) in a standard method group (STAND) and 62 (25M and 37F) in muscle sparing technique group (MSS) at one year follow up and 81 after three years 41 (13M and 28F) in a standard method group and 40 (16M and 24F). An informed consent document was signed by the patients upon admission, mentioning the type of surgery to be performed, and its possible major complications and they were informed about the follow up appointments and the fact that the data will be published only as average values and with no names in a paper. The Ethics Committee of the Faculty of Kinesiology (blinded version), University of Zagreb and the Professional Board of the University Orthopaedic Clinic in Lovran, Croatia approved the study. The sample that finally entered the study after random assignment into two groups was 130 patients. The stratified randomization method (followed by a simple randomization after all subjects have been identified and assigned into blocks) was used to achieve balance among groups in terms of age and gender. The patients suffering from severe forms of congenital dislocations of the hip and revision THA were excluded. The indications for surgery and inclusion were: primary osteoarthritis, secondary osteoarthritis, aseptic necrosis of the femoral head, and post-traumatic arthritis. Before any further analysis we wanted to establish if the two groups, the standard (classic) method group (STAND) and the muscle sparing technique group (MSS), differed prior to the procedure according to the age or body mass index (BMI). No initial differences were found among groups and that enabled us to proceed with the study (Table 1).

### 2.1. Surgical technique

The groups were operated either by the transgluteal (Bauer/Hardinge) or the ALMSS approach. To all patients (68 patients designated as standard method group and 62 patients designated as MSS group) were implanted the endoprosthesis of the same cementless hip design. With the conventional technique, the total hip arthroplasties were performed via classical lateral approach (Bauer/Hardinge). In MSS technique, the total hip arthroplasties

**Table 1**

Student-t test for independent samples showing no initial differences between the groups.

	BMI	AGE
STAND (Mean ± SD)	27.96 ± 4.30	64.97 ± 11.11
MSS (Mean ± SD)	28.4 ± 4.10	64.82 ± 7.97
t-value	-0.652	0.087
F-ratio	1.103	1.941
p value	0.515	0.931

were performed via anterolateral surgical approach. Anterolateral muscle sparing surgery is basically a modification of the classical Watson–Jones surgical procedure by utilization of only cranial part of Watson–Jones approach (the interval between the gluteus medius and tensor fasciae latae). The skin incision of up to 10 cm is sometimes necessary for an obese patient. All surgeries were performed by two experienced hip surgeons and in both procedures, STAND and MSS, the surgery was performed in a lateral position of the patients.

### 2.2. Follow-up

The patients were actively encouraged to follow the protocols. All of the patients had the same instructions and underwent the same postoperative recovery and rehabilitation program.

The follow up data were collected preoperatively, and postoperatively on four visits (seven days post-OP, three months post-OP and one year post-OP and with a smaller sample three years after). The parameters that were followed were:

- the range of motion (active and passive flexion and abduction) measured by goniometers
- visual analog pain scale (VAS)- 0 indicating no pain and 10 indication the worst pain)
- the usage of the toilet: the item comprised of a question offering three possible answers (using it with ease, using it with difficulties, unable to use it without other person helping me) which were appointed the numeric value afterward
- 50 m distance walking ability: the test was performed on a level ground and the outcome measure were seconds needed to cover the distance
- walking the stairs the item comprised of a question offering three possible answers (using it with ease, using it with difficulties, unable to use it without other person helping me) which were appointed the numeric value afterwards
- the hip abductor muscles strength measured with the dynamometer
- calculated Harris Hip Score (HHS)
- the length of the hospital stay in days

All tests were carried out by two observers. One always measured the strength, range of motion and the 50 m walk test while the other collected patients questionnaire data, meaning the VAS scale position and the answers to the questions related to the mobility. There might be some limitations of the study as the intraobserver ICC was not calculated but the measuring equipment that was used was standard and the measuring procedures performed as advised by the manufacturers.

### 2.3. Postoperative protocol

The emphasis was on immediate isometric exercises of M. Quadriceps, M. Gluteus maximus and hamstrings, rapid foot pumps and deep breathing exercises to minimize thromboembolic and

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