



## Single stage bilateral total hip arthroplasty – 10 years of experience

### Bilateralna totalna artroplastika kukova u jednom aktu – desetogodišnje iskustvo

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#### Abstract

**Background/Aim.** Coxarthrosis is a chronic degenerative joint disorder which occurs in approximately 4% of population, and bilateral occurrence is estimated at 42%. Patients with bilateral coxarthrosis can undergo bilateral hip replacement in one or two stage procedure. Aim of this article was to present our experience in simultaneous bilateral hip arthroplasty, and to recommend it in patients with adequate indications. **Methods.** We processed data for 113 patients of both genders, operated at the Clinic for Orthopedic Surgery and Traumatology of the Military Medical Academy in Belgrade, Serbia from 2005 until 2015 where single stage bilateral hip arthroplasty was performed. Identical operative technique was applied in all patients as well as standard antibiotic and thromboprophylactic treatment. Follow-up period was 30 days postoperatively. **Results.** Mean age of patients was  $56 \pm 10.2$  years, whereby 45 (39.8%) of them were males and 68 (60.2%) females. Primary coxarthrosis was etiologic factor for the majority of patients, 69 (61.1%).

Postoperative hospitalization duration was 10.3 days on average (range from 3 to 34 days). We noticed the following complications: one luxation of the endoprosthesis, one deep infection and one thrombosis of the leg. There was no mortality. Majority of operated patients were grouped as the American Society of Anesthesiologists (ASA) scores 1-3. Mean blood transfusion was 1,275 mL (range from 300 to 2,830 mL). **Conclusion.** One stage bilateral hip arthroplasty can be performed routinely and safely in facilities with possibility for interdisciplinary approach and adequate selection of patients. Data from our study which indicate significantly increased need for blood substitution, emphasize the need to introduce contemporary perioperative blood loss management principles. The rate of complications observed in our study was within rates published in the literature concerning hip arthroplasty.

**Key words:** arthroplasty, replacement, hip; surgical procedures, operative; comorbidity; postoperative complications; serbia.

#### Apstrakt

**Uvod/ Cilj.** Koksartroza je hronično degenerativno oboljenje koje se javlja kod oko 4% populacije, a procenjuje se da oko 42% bolesnika ima bilateralno oboljenje. Bolesnicima sa bilateralnom koksartrozom može se učiniti artroplastika oba kuka u jednom ili dva akta. Cilj ovog rada bio je prezentacija našeg iskustva sa izvođenjem simultane bilateralne artroplastike kukova i preporuka za izvođenje procedure kod bolesnika sa adekvatnom indikacijom. **Metode.** Obradili smo podatke za 113 bolesnika oba pola koji su operisani na Klinici za ortopedsku hirurgiju i traumatologiju Vojnomedicinske akademije u Beogradu, Srbija, u periodu od 2005. do 2015. godine, a kojima je učinjena artroplastika oba kuka u jednom aktu. Kod svih bolesnika je primenjena identična operativna tehnika uz identičnu standardnu antibiotsku i tromboprolifaktičku terapiju. Postoperativno praćenje bole-

snika je iznosilo 30 dana. **Rezultati.** Prosečna starost bolesnika bila je  $56 \pm 10.2$  godina; muškog pola je bilo 45 (39,8%), a ženskog pola 68 (60,2%) bolesnika. Primarna koksartroza je bila etiološki faktor kod većine bolesnika, njih 69 (61,1%). Prosečna dužina hospitalizacije postoperativno bila je 10,3 dana (od 3 do 34 dana). Zabeležili smo sledeće komplikacije: jedna luksacija endoproteze, jedna duboka infekcija i jedna tromboza vena noge. Nije bilo smrtnih slučajeva. Najveći broj operisanih bolesnika pripadao je grupama *American Society of Anesthesiologists* (ASA) skoring sistema 1-3. Prosečna količina transfuzionisane krvi iznosila je 1 275 mL (od 300 do 2 830 mL). **Zaključak.** Bilateralna artroplastika kukova u jednom aktu može se izvoditi rutinski i bezbedno u ustanovama koje omogućavaju multidisciplinarni pristup i adekvatnu selekciju bolesnika. Podaci iz naše studije ukazuju na povećanu potrebu za supstitucijom krvi što naglašava potrebu za uvođenjem savremenih principa pe-

rioperativne kontrole gubitka krvi. Učestalost komplikacija za-beleženih u ovoj studiji je u okviru stepena učestalosti sa-opštenih u literaturi koja se bavi artroplastikama kukova.

**Ključne reči:**  
**artroplastika kuka; hirurgija, operativne procedre;**  
**komorbiditet; postoperativne komplikacije; srbija.**

## Introduction

Total hip arthroplasty represents replacement of damaged articular surfaces of the femoral head and acetabulum with the artificial one. The most common indication for hip replacement is arthrosis. Coxarthrosis is a chronic, degenerative disease with prevalence of 4% in general population, while 42% of patients have bilateral disease<sup>1</sup>. Initial stadium are treated conservatively by physiotherapy procedures, and with the advance of the disease total hip arthroplasty becomes the treatment of choice.

Patients with bilateral coxarthrosis can be operated in a single stage procedure with implantation of hip endoprosthesis bilaterally, or in two stage procedure, when second hip is operated after some time. Published literature shows perplexity considering safety of the single stage procedure. The procedure supporters claim that there is no significant difference regarding perioperative complications after simultaneous bilateral procedure comparing to the two stage procedure<sup>2-5</sup>. Opponents of this method report higher rate of systemic complications, thromboembolic complications, cardiopulmonary complications, infections, more frequent revision surgery, higher need for blood transfusion and higher mortality rate<sup>6-11</sup>. Likewise, there is no consensus regarding selection of patients neither an absolute indication for performing simultaneous bilateral total hip arthroplasty. Some authors performed simultaneous bilateral procedure on patients without significant comorbidity<sup>2,12</sup>.

Trying to establish objective criteria for selection, using score systems have started. Nowadays, most frequently used is the American Society of Anesthesiologists (ASA) score. Recommendations vary a lot: some authors advise performing procedure in patients classified as ASA score 1 or 2<sup>5,13,14</sup>, while others performed surgery in patients belonging from ASA scores 1-4<sup>4</sup>. There is a consensus that simultaneous bilateral procedure leads to the reduction of cost and hospital stay<sup>11,13,15</sup>. Also, there is agreement that performing single stage bilateral procedure contributes to significantly better outcome of patients with bilateral coxarthrosis. In one study authors report that complete functional recovery occurs only after bilateral hip replacement, and the functional scores on operated hip in unilateral surgery are lower than after replacing second hip, and conclude that optimal result is obtained after second hip replacement<sup>16</sup>. Some authors consider that simultaneous bilateral total hip arthroplasty has an advantage, compared to the two stage procedure, because both operated sides are equally painful, and thus evenly used during rehabilitation, which results in avoiding the undesirable spare use of the operated hip<sup>7</sup>.

Our study aimed at presenting our experience with bilateral hip arthroplasty and making recommendations regarding the choice of patients.

## Methods

At the Clinic for Orthopedic Surgery and Traumatology of the Military Medical Academy (MMA) in Belgrade, Serbia 113 simultaneous bilateral hip arthroplasties were performed between 2005 and 2015. The selection criteria were: the patients' wish to operate both hips in one act, as well as the estimation of a surgeon and the approval of internist and anesthesiologist consultants for performing such procedure. Data are extracted from protocols of the Clinic for Orthopedic Surgery and Traumatology of the MMA and protocols of the Department for Hospital Infection Control. Identical antibiotic and thromboprophylactic protocols were administered to all patients. The type of anesthesia was indicated by anesthesiologists, therefore 110 (97.3%) patients received general anesthesia and 3 (2.7%) spinal anesthesia. Patients were positioned in lateral decubitus, posterolateral approach was used with excision of the posterior capsule, while rotator muscle reconstruction was not performed. There were no wound drains. All implanted endoprostheses were cementless, press fit technique was applied, additional screw fixation of acetabulum was performed according to the surgeons' estimation. After finishing implantation of the first hip, a patient was rotated and the second hip was replaced. The same set of sterile instruments was used for both sides. Members of the operative team changed their sterile dressings and gloves for the second operation. On the first postoperative day patient was verticalized with crutches and full weight bearing.

## Results

Mean age of the patients was  $56 \pm 10.2$  years (28-79 years). Forty five (39.8%) patients were males and 68 (60.2%) females. Noticed comorbidities are shown in Table 1.

**Table 1**

Recorded comorbidities	
Comorbidities	Patients, n (%)
Arterial hypertension	55 (48.7)
Cardiomyopathy	8 (7.1)
Angina pectoris	3 (2.7)
Diabetes mellitus	8 (7.1)
Hypothyreosis	1 (0.9)
Hyperthyreosis	2 (1.8)
Varices cruris	5 (4.4)
Brain ischemic disease	1 (0.9)
Rheumatoid arthritis	6 (5.3)
Morbus. Bechterew	4 (3.5)

On the basis of comorbidity patients were classified in the ASA scoring system groups. The mean ASA score was 2.1. The distribution of patients in the ASA scoring groups is shown in Table 2.

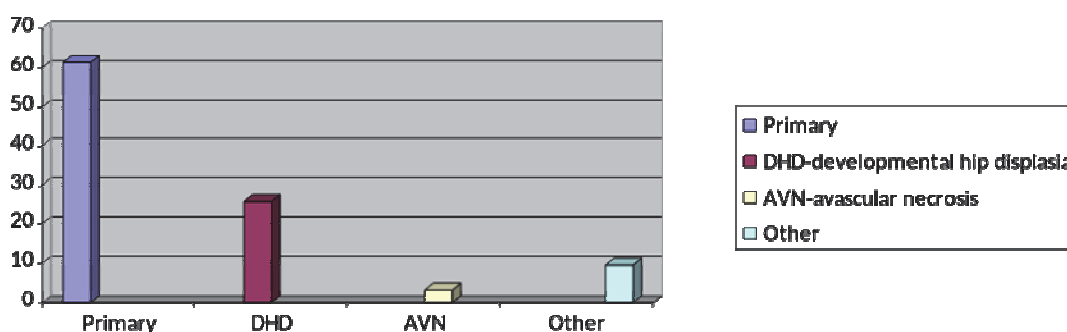
**Table 2**  
**Distribution of patients in the ASA scoring system groups**

ASA score	Patients, n (%)
1	16 (14.2)
2	70 (61.9)
3	26 (23)
4	1 (0.9)
Total	113 (100)

#### ASA - American Society of Anesthesiologists

Mean body mass index (BMI) was  $26.3 \pm 3.2 \text{ kg/m}^2$  ( $17\text{--}37 \text{ kg/m}^2$ ). Primary coxarthrosis was etiologic factor in the majority of patients – 69 (61.1%), (Figure 1).

Mean postoperative hospitalization stay was  $10.2 \pm 4.8$  days (3–34 days). By following hematologic status and clinical parameters of anemia, blood substitution was indicated.



**Fig. 1 – Etiology of coxarthrosis.**

#### Discussion

The first bilateral hip arthroplasty in a single procedure was described in 1967<sup>17</sup>, and Jaffe and Charnley<sup>18</sup> (1971) have published an article analyzing their experience with this procedure. Authors concluded that there was an increased risk for complications performing simultaneous procedure with the advantages of shorter hospital stay, single anesthesia and single rehabilitation period. Subsequently, several authors reported their results of bilateral hip arthroplasty in a single procedure without consensus for patients selection criteria and perioperative safety compared to the unilateral procedure.

Comorbidity is the most important factor considering a possibility for the simultaneous bilateral procedure. Some authors use general terms such as: patients should be without significant comorbidities<sup>2,12</sup>, patients should be in good overall health<sup>8,19</sup>, or they endeavor to perform the procedure on healthy and younger patients<sup>20</sup>.

In available literature, authors who used scoring systems for standardizing selection of patients uniformly use the ASA score, but the viewpoint of groups of ASA scores that should be candidates for safely performing these procedure are controversial: some recommend performing procedure in the ASA 1 and 2 groups<sup>5,13,14</sup>, others operated on pa-

Mean amount of transfusion was  $1,275.64 \pm 567.626 \text{ mL}$  and 97.3% of patients were transfused.

There was one deep wound infection, *Pseudomonas spp.* were isolated in the culture. This complication was managed by surgical debridement and antibiotic therapy according to antibiogram. One patient acquired luxation of one hip postoperatively. After attempting manual reposition, radiography was performed and migration of acetabular part of endoprosthesis was detected. This complication was managed by acetabular part revision surgery. Postoperatively, one patient had clinical signs of leg thrombosis, consulted vascular surgeon indicated Doppler ultrasound and laboratory examination. As the thrombosis was confirmed, therapy was successfully continued with low molecular weight heparin. One patient suffered dyspnea postoperatively, pulmonologist was consulted, and bilateral pneumonia was established as diagnosis. Symptoms resigned after applying antibiotics and supportive therapy as indicated by the consultant.

tients with the ASA scores 1-4<sup>4</sup>, while some of authors claim that the procedure is safe for performing in patients graded as the ASA scores 1 and 2, and probably the ASA scores 3 and 4<sup>21</sup>. In our study the majority of patients were with the ASA score 2, but operation was also successfully performed on patients with the ASA score 3 [26 (23%) patients], and even one patient (0.97%) with the ASA score 4.

Analysis of our patients confirmed findings of authors that claimed not to find increased percentage of complications while performing bilateral simultaneous procedure comparing to the unilateral one. Our complication rates were within rates cited in the literature<sup>22</sup>. Symptomatic forms of thromboembolic complications in total hip arthroplasty with thromboprophylactic therapy have a rate around 1.3%<sup>22</sup>. We detected 1 (0.88%) complication of this type that was managed successfully without consequences. Despite the trend towards raising comorbidity in hip arthroplasties during years, reported mortality rates are gradually decreasing. Reported mortality rates vary from 0.3% to 0.6%<sup>23</sup>; our series showed no mortality during 30-day postoperative follow-up.

Infection is one of the most devastating complications of total joint arthroplasty. Advances in surgical technique, implants improvements, managing of comorbidity known to contribute to infections lead to significant reduction of repor-

ted infection rates in total hip arthroplasty. Currently reported rates of infection in joint arthroplasties range 0.7–2.3%<sup>24</sup>, with significantly higher surgical site infection rate in knee arthroplasties compared to hip arthroplasties<sup>25</sup>. We recorded one infection in 113 operated patients (0.88%), having rate within that reported in the literature.

Endoprosthesis dislocation is the third most frequently reported complication. Majority of dislocations (70%) happen within the first 6 weeks after the surgery. It is considered that early dislocations have better outcome compared to the late ones (more than 3 months after surgery). Inadequate endoprosthesis components orientation is considered as a major cause for an early dislocation, while in late dislocations there are multiple etiologic factors<sup>26,27</sup>. We recorded one (0.88%) dislocation caused by inadequate acetabular component fixation and consequent migration with unfavorable orientation.

Elective orthopedic surgery, especially arthroplastic procedures are related to blood loss and the need for transfusion. Allogenic transfusions carry risks: trend towards infection<sup>28</sup>, immunomodulation, and pathogen transmission<sup>29</sup>. Various techniques were developed to reduce the possibility of these complications and the need for transfusion: autologous blood pre-donation, intraoperative blood cell salvage, erythropoietin, tranexamic acid, and normovolemic hemodi-

lution<sup>30</sup>. Reported rates for allogenic transfusion of red blood cells are 21–70%<sup>31,32</sup>. In our series of 113 patients, 110 of them received transfusion, mean volume 1,275 mL. Average number of transfusions was 3. It is considerably higher value compared to the contemporary trends in blood substitution in elective orthopedic surgery. Explanation for this could be in the absence of routine use of tranexamic acid and clear protocols for blood substitution, so it is necessary to raise work quality in this area in the future.

### Conclusion

Based on our ten-year experience we consider simultaneous bilateral total hip arthroplasty in selected patients a safe procedure that does not carry higher risks of perioperative complications compared to the two stage procedure. Multidisciplinary approach is advisable in patient selection, and procedure should be conducted in facilities which enable this approach. Analysis of our results supports the conclusion that the ASA scores 1, 2 and 3 patients are good candidates for safe procedure, while we have no sufficient data for the ASA 4. One of the most important findings of our study is the need to introduce contemporary perioperative blood management protocol as a routine.

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