



## Surgical treatment of secondary hip osteoarthritis using cementless total hip endoprosthesis with Fitmore<sup>®</sup> Hip Stem – a case report

Sekundarna osteoartroza kuka lečena ugradnjom totalne bescementne endoproteze sa Fitmore<sup>®</sup> stemom – prikaz bolesnika

Ivan Golubović\*, Zoran Baščarević†, Predrag Stojiljković\*, Zoran Radovanović‡, Ivana Golubović‡, Milan Radojković‡, Dušan Djordjević§, Aleksandar Mitić‡, Svetlana Milijić‡, Zoran Golubović\*

Clinical Center Niš, \*Clinic for Orthopaedic Surgery and Traumatology, Niš, Serbia; †Institute of Orthopaedic Surgery “Banjica”, Belgrade, Serbia; University of Niš, ‡Faculty of Medicine, Niš, Serbia; §Military Hospital, Niš, Serbia

### Abstract

**Introduction.** Hip dysplasia with subluxation represents insufficient coverage of the femur's head placed in the dysplastic acetabulum. This lack of coverage ranges from barely noticeable to condition where half of femur head is uncovered by acetabulum. The caput-collum-diaphyseal angle of the proximal femur and anteversion angle of collum are increased, Wiberg's angle is less than 15° and Ménard-Shenton line is interrupted. Hip joint degeneration occurs very early. When radiological signs of hip joint degenerative changes are discovered in elderly they are associated with pain, limited movements and leg shortening. **Case report.** We present a 53-year old female treated conservatively in childhood because of hip diylplasia with subluxation. After pregnancy, right hip pain emerged. Clinical and radiological examinations revealed hip subluxation with the signs of degenerative osteoarthritis. Initial treatment was conservative and included drugs and balneo-physical procedures. Since pain and movement impairment progressed and became constant, a hip replacement using cementless total endoprosthesis with Fitmore<sup>®</sup> Hip Stem was done. In the pre-operative preparation, anteroposterior x-ray of the hip (with third of the proximal femur) was made. This X-ray enabled precise planning of implantation endoprosthesis component. The early postoperative course was uneventful with very good therapeutic effect. Following successful physical rehabilitation, the patient returned to work and full life activity. **Conclusion.** Implantation of the cementless endoprosthesis with Fitmore<sup>®</sup> Hip Stem in the treatment of secondary hip osteoarthritis is a good choice in the treatment of young patients with good bone quality. Future clinical and radiological follow-up and comparative studies are needed to show the advantages of this type of stem compared to the classical cementless long stem.

### Keywords:

osteoarthritis, hip; hip prosthesis; orthopedic procedures; treatment outcome.

### Apstrakt

**Uvod.** Razvojni poremećaj kuka sa subluksacijom predstavlja nedovoljnu pokrivenost glave butne kosti koja se nalazi u displastičnom acetabulumu. Nepokrivenost glave butne kosti acetabulumom može biti jedva primetna do nepokrivenosti jedne polovine glave. Postoji povećanje kolodijafizarnog ugla i ugla anteverzije, Wiberov ugao je manji od 15 stepeni, Shenton-Menardov luk je prekinut. Vrlo rano dolazi do degenerativnih promena u zglobovima kuka što je praćeno bolovima, ograničenjem pokreta u kuku i skraćanjem noge. **Prikaz bolesnika.** U radu je prikazana bolesnica stara 53 godine, koja je kao dete lečena neoperativno zbog razvojnog poremećaja kuka. Nakon trudnoće i porođaja javili su se bolovi u desnom zglobovima kuka. Urađen je klinički i radiološki pregled pri čemu je dijagnostikovana subluksacija desnog zgloba kuka sa znacima degenerativne osteoartroze. Lečenje je započeto neoperativno, medikamentoznom terapijom i balneo-fizikalnim procedurama. Nakon konzervativnog lečenja zbog stalnih bolova i ograničenja pokreta u kuku, odlučeno je da se lečenje nastavi ugradnjom endoproteze zgloba kuka. U preoperativnoj pripremi urađen je antero-posteriorni rendgenski snimak kuka sa gornjom trećinom butne kosti, koji omogućava precizno planiranje ugradnje komponenti endoproteze. Ugrađena je bescementna endoproteza zgloba kuka sa Fitmore<sup>®</sup> stemom. Rani postoperativni tok protekao je uredno. Dobijen je dobar klinički rezultat lečenja. Nakon sprovedene rehabilitacije bolesnica se vratila svojim radnim i životnim aktivnostima. **Zaključak.** Primena bescementne endoproteze zgloba kuka sa Fitmore stemom u lečenju sekundarne osteoartroze kuka, predstavlja dobar izbor u lečenju mlađih bolesnika sa dobrim kvalitetom koštanog tkiva. Buduća klinička i radiološka praćenja primene ove vrste stema uz komparativne studije, su neophodna da bi se pokazale njegove prednosti u odnosu na klasični bescementni dugi stem.

### Ključne reči:

kuk, osteoartritis; kuk, proteza; ortopedske procedure; lečenje, ishod.

## Introduction

Hip subluxation is characterized by insufficient coverage of femur's head placed in the dysplastic acetabulum. This lack of coverage ranges from barely noticeable to condition where half of femur's head is uncovered by acetabulum. In advanced cases, anteversion angle of collum and caput-collum-diaphyseal (CCD) angle are usually altered<sup>1</sup>. Hip subluxation may occur very early in life, even shortly after birth, when bone changes are minimal. However, it is much more common as a residue after conservative or early surgical treatment and often diagnosed after 15 years of life<sup>2</sup>. It is very commonly diagnosed between 15 and 30 year of life due to the occurrence of hip pain. When radiological signs of hip joint degenerative changes (osteoarthritis) are discovered in elderly they are associated with pain and limited movements<sup>3</sup>.

We present a 53-year old female with advanced right femur's head subluxation and developed clinical and radiological signs of right hip osteoarthritis. Hip replacement using the cementless total endoprosthesis with Fitmore® Hip Stem was done. The postoperative follow-up period was 24 months.

## Case report

A 53-year old female was admitted to the Orthopedics and Traumatology Clinic, Clinical Center Niš, for constant right hip pain and movement restrictions. Pain occurred after delivery in 1991. As a child, she was treated conservatively because of hip dysplasia (no medical records about the method of treatment). Clinical and radiological examination revealed right hip subluxation with the signs of osteoarthritis. The initial treatment included physical medicine procedures and antirheumatic medications which resulted in transient

improvement of symptoms. On multiple occasions, she was hospitalized in the Institute "Niška banja" and treated with balneophysical procedures and antirheumatic agents. Nevertheless, in 2013 she contacted an orthopaedist for constant pain and limited movements in her right hip refractory to antirheumatic drugs. A plain right hip radiograph revealed subluxated femur's head with marked osteoarthritic changes that included narrowed and missing joint space, marginal osteophytes and bone cysts in femur head and acetabulum (Figure 1). Following conservative therapy that included drugs and balneophysical procedures, the patient was suggested surgical treatment due to constant and progressive hip pain and movement restriction, which she accepted.

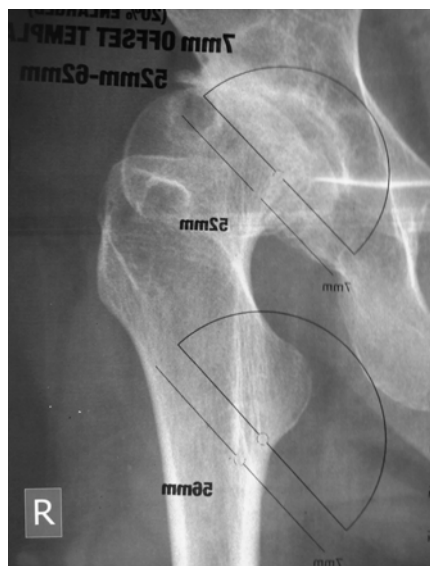
It is important to take preoperative planning with particular precision before implantation of the cementless total endoprosthesis with Fitmore® Hip Stem in order to reduce the intraoperative and postoperative complications to a minimum. For preoperative planning, it is essential to have a good anteroposterior and lateral view of the hip which includes the proximal third of the femur. Preoperative planning provides the size and position of the acetabular component and femoral stem. Correct positioning of the acetabular and femoral components is declared to ensure optimal fixation of endoprosthesis components and restore hip biomechanics.

The cup templates were placed on the X-ray with the acetabular component in approximately 40 to 45 degrees of inclination. Several sizes were assessed to determine which acetabular component will provide the optimal fit with maximum coverage (Figure 2)<sup>4</sup>.

In the stem template, the three stem families were displayed with different sizes. The correct family was chosen primarily based on the correct offset. To choose the correct stem family, position the overview template of the family that seemed most appropriate into the medullary canal was



**Fig. 1 – Right hip radiograph presenting subluxated femur head with marked osteoarthritic changes (narrowed and almost completely missing joint space, marginal osteophytes and bone cysts in femur head and acetabulum).**



**Fig. 2 – Preoperative planning of the acetabular component.**

done so that the reference line of the femoral axis was parallel to the femur and that the medial contour of the prosthesis was aligned with the medial cortex (Figure 3)<sup>4</sup>.

Following preoperative preparation, hip replacement using cementless total endoprosthesis with Fitmore<sup>®</sup> Hip Stem was done in spinal anaesthesia. The early postoperative course was uneventful. The patient was mobilized using underarm crutches with non weight bearing on operated leg. The postoperative radiograph showed placed right hip total cementless endoprosthesis with Fitmore<sup>®</sup> Hip Stem. Installed endoprosthesis components were in a good position (Figures 3 and 4).

After removing the stitches patient was referred to the Institute "Niška banja" for further rehabilitation. The physical therapy was continued. Full weight bearing on operated leg was allowed six weeks after the surgery. Full recovery was achieved and she returned to work and life activities four months after the operation.

Twenty-four months after the surgery she was moving without any aid with the confident, painless and stable walk. The excellent functional result (93 points) according to Harris hip score<sup>5</sup> was achieved. Follow-up radiograph showed the good integration of implanted total cementless right hip endoprosthesis with Fitmore<sup>®</sup> Hip Stem (Figure 5).

Migrating subluxation is most often a consequence of early conservative treatment or postoperative therapy. Here acetabulum is dysplastic, extended and with steep roof. Femur head is round, often oval and, due to the influence of strong biomechanical force, permanently tends to migrate laterally. One third to one half of femur head is uncovered, the hip joint is irregular and a medial acetabular wall is thickened (callous). CCD angle and anteversion angle are increased, Wiberg's (CE–Center-Edge) angle is less than 15° and Ménard-Shenton line is interrupted. Hip joint degenerative changes occur very early and are accompanied with pain and limited movements<sup>3</sup>.

Disease progression leads to further decrease of movement range so that walking is gradually becoming more and more difficult and painful. In the advanced stage of the disease, movements in the hip joint are very restricted and leg shortening occurs so that a patient soon needs mobility aid and starts using crutches. While hip osteoarthritis treatment in the initial stage of the disease is conservative, the operative hip replacement is indicated in the advanced stage.

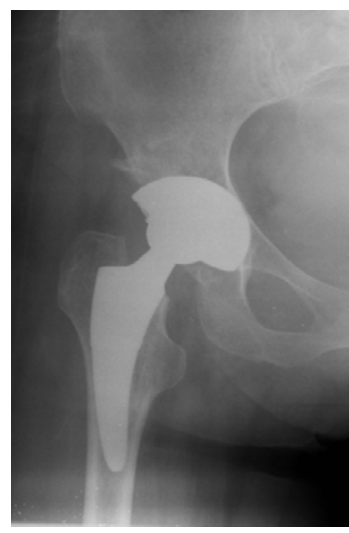
Total hip arthroplasty is a good solution for most patients with advanced, symptomatic osteoarthritis due to developmental dysplasia of the hip with subluxation. In many ca-



**Fig. 3 – Preoperative planning of the femoral component.**



**Fig. 4 – Right hip radiograph immediately after hip arthroplasty with total cementless endoprosthesis with Fitmore<sup>®</sup> Hip Stem.**



**Fig. 5 – Right hip radiograph twenty-four months after the surgery.**

## Discussion

Based on clinical and radiological presentation, hip subluxations are divided on true (real) and migrating<sup>2</sup>. True subluxation is characterized by moderate acetabulum dysplasia without significant changes on the femur in regard to CCD and anteversion angle alterations. Most commonly this type of subluxation is discovered in older age when hip joint degenerative changes are developed and clinically presented as groin pain and leg movement restriction. True subluxation also may be frequently diagnosed in girls and younger women who suddenly experience hip pain and is associated with first delivery (1).

ses, hip arthroplasty is significantly more complex because of the associated anatomical abnormalities. Biomechanically, the primary surgical objective is the reconstruction of the femoral offset and anatomical centre of rotation<sup>6</sup>.

Cementless total hip arthroplasty shows excellent long term implant survival, with a mean of 94.7% after 16 years<sup>7</sup>. However, the main reasons for revision are based on aseptic loosening, caused by factors such as missing primary stability, stress shielding and wear-particle-induced osteolysis<sup>8</sup>.

An implanted hip stem may change the bone structure in the proximal femur<sup>9</sup>. The aim of a modern cementless hip stem is to generate a metaphyseal fixation to reach a load transfer in

the subtrochanteric area closely comparable with physiological conditions. Proximal load transfer, therefore, reduces proximal stress shielding, which can lead to implant loosening<sup>10</sup>.

Fitmore<sup>®</sup> Hip Stem saving the bone mass in the area of greater trochanter and diaphysis of the femur. It has different curves in order to restore the hip joint anatomy and achieve a good offset of the femoral neck<sup>11</sup>.

In order to preserve greater trochanter bone tissue, Fitmore<sup>®</sup> Hip Stem has curved shape and trapezium-shaped cross-section allowing maximal rotational stability. Three-dimensional shape of the stem and Titan Vacuum Plasma Spray layer for press fit fixation enable good fixation and osseointegration, necessary for restoring hip joint biomechanics. The preoperative radiological templating is very important to determine the position of the prosthesis, its size, offset center of the rotation and leg length<sup>4,12</sup>.

The Fitmore<sup>®</sup> Hip Stem is a curved, uncemented, short-stem prosthesis which has been applied in clinical practice since 2007<sup>13</sup>. Only a few studies have presented the clinical and radiographic outcomes for short-stem prostheses with a mid- to long-term follow-ups.

A 10-year follow-up study of Pipino et al.<sup>14</sup> reported an 82 % survival of short-stem prosthesis after 10 years.

The results of the first 162 Mayo short stems published by Morrey et al.<sup>15</sup> reported revision surgery in 6 % of total hip arthroplasties (THA) after a 6-year follow-up.

Gustke<sup>11</sup> published 500 Fitmore<sup>®</sup> Hip Stems report, with a mean follow-up of 1.3 years. He reported a survival rate of 99.4 %.

Gasbarra et al.<sup>16</sup> assessed correlation between osseointegration (with radiographic evaluation and bone densitometry) and functional results (Harris Hip Score) 12 months after surgery in 33 patients with a Fitmore<sup>®</sup> Hip Stem. They confirmed the good results and anticipated a long and stable fixation of this type of stem<sup>16</sup>.

At our clinic, THAs were performed in 10 patients with primary and secondary osteoarthritis by using Fitmore<sup>®</sup> Hip Stem. After 2 years of follow-up, very good and excellent functional results according to Harris Hip Score and excellent radiological findings were achieved in all patients.

### Conclusion

Total cementless hip endoprosthesis with Fitmore<sup>®</sup> Hip Stem in the surgical treatment of advanced degenerative osteoarthritis is a good choice for younger patients with good bone quality. It can be also used in complex cases of secondary hip osteoarthritis after hip dysplasia associated with anatomical abnormalities. Future clinical and radiological follow-up and comparative studies are needed to show the advantages of this type of short prosthesis stem compared to classical cementless long-stem one.

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