

# CEMENTLESS TOTAL HIP ARTHROPLASTY IN ADULT PATIENTS WITH CONGENITAL HIP DYSPLASIA: A FIFTEEN-YEAR RETROSPECTIVE STUDY

ISTVÁN GERGELY<sup>1</sup>, MIHAI ROMAN<sup>2</sup>, ANDREI-MARIAN FEIER<sup>3</sup>, RADU FLEACĂ<sup>4</sup>, SANDOR-GYORGY ZUH<sup>5</sup>, ANDREI-CONSTANTIN IOANOVICI<sup>6</sup>, CRISTIAN TRÂMBIȚAȘ<sup>7</sup>, TUDOR SORIN POP<sup>8</sup>, OCTAV MARIUS RUSSU<sup>9</sup>

<sup>1,3,5,6,7,8,9</sup>University of Medicine and Pharmacy Târgu-Mureș <sup>2,4</sup>“Lucian Blaga” University of Sibiu

**Keywords:** cementless hip arthroplasty, hip dysplasia, osteoarthritis

**Abstract:** Introduction: Congenital hip dysplasia is caused by abnormal development of the hip joint in early stages of fetal development. Uncemented total hip arthroplasty in adult patients with congenital hip dysplasia is commonly performed as end-stage treatment. Purpose: to evaluate the 3-15 year results of cementless total hip replacement in adult patients diagnosed with congenital hip dysplasia. Materials and Methods: A retrospective, single-center study was conducted comprising 151 patients diagnosed with congenital hip dysplasia and underwent cementless total hip replacement. Clinical evaluation tool used was Harris hip score (HHS combined with radiological examinations. Paprosky's classification was used for acetabular bone loss and Gruens zones for femoral bone loss. Follow-up time was minimum 3 years (range 3-15 years). Results: HHS improved from a mean preoperative score of  $49 \pm 12$  to  $90 \pm 9$  at the final follow-up. There were 28 (18.5%) cases of femoral osteolysis and significantly more common in Gruens Zone 7 ( $p=0.032$ ). 18 cases had acetabular bone loss (Paprosky 2A=nine cases, 2B=three cases, 2C=five cases, 3A=one case). Conclusions: Cementless hip arthroplasty in patients with congenital hip dysplasia proved its ability to restore patient quality of life for prolonged period of time. Complications are considered minimal according to similar studies published in the literature.

## INTRODUCTION

As novel implants and surgical techniques develop, a clear retrospective view regarding long-term outcomes of any given surgical procedure is required. Uncemented total hip replacement (THR) results in adult patients diagnosed with hip dysplasia partook controversies in the past two decades.(1,2,3) In congenital hip dysplasia, both femoral and acetabular anatomic landmarks are severely modified, making the surgical management and treatment of the condition, a challenge even for senior surgeons.(4) Femoral and acetabular components failure have been reported as the primary long-term complication of THR.(5,6)

Describing and analysing outcomes in a retrospective manner may help the process of developing new techniques with innovative approaches. Therefore, our aim was to evaluate the 3-15 year results of cementless THR in adult patients diagnosed with congenital hip dysplasia.

## PURPOSE

Our aim was to evaluate the 3-15 year results of cementless THR in adult patients diagnosed with congenital hip dysplasia.

## MATERIALS AND METHODS

A retrospective, single-center study was conducted including 157 adult patients diagnosed with congenital hip dysplasia who underwent cementless total hip replacement between 2000-2015. The average follow-up was 10.2 years ranging from 3-15 years. Main clinical evaluation used was Harris Hip Score (HHS).

Data regarding demographics, associated disorders, clinical diagnosis, follow-up periods and initial surgical procedure was collected by a study nurse using our joint replacement registry.

Preoperatively, radiographs of the pelvis in anteroposterior view and in axial view were obtained. A lateral hip approach with a lazy-J incision of approximately 15-20 cm centered on the big trochanter was performed in every case. The incision included the skin, subcutaneous tissue and fasciae latae. Gluteus maximus muscle was retracted posteriorly with tensor fasciae latae anteriorly. Gluteus medius muscle was partially incised on its trochanteric insertion. “T” capsulotomy was performed exposing the affected femoral neck and head. Hip was dislocated by abduction and external rotation and afterwards the femoral neck and head was resected. Acetabular preparation was performed and cup was implanted with the aim of approximately 45 degrees in abduction and 15 degrees anteversion. Afterwards, the femoral canal was prepared and the measured hip stem was inserted as calculated preoperatively on roentgen examinations. Intra-articular drainage was applied for 24-48h. Every included case was operated by the same senior surgeon.

## Evaluation tools

Clinical evaluation tool used was HHS, standardly completed preoperatively, at 6, 12 and 24 months after the surgery. Radiological evaluation included antero-posterior and axial views of the hip. After the aforementioned follow-up times, each patient was monitored every 12 months, depending on surgery time using HHS and roentgen examinations. Acetabular osteolysis was documented using Paprosky's

<sup>5</sup>Corresponding author: Sandor-Gyorgy Zuh, Str. Mihai Viteazul, Nr. 31, Târgu-Mureș, România, E-mail: andreifeier@gmx.com, Phone: +40265 213720

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classification (7) of bone loss, while the femoral osteolysis was evaluated using the 7 zones described by Gruen.(8)

### Statistical analysis

GraphPad InStat (GraphPad, San Diego, USA), EpiInfo v. 7.1.4.0 (Centers for Disease Control and Prevention, Atlanta, USA) and Microsoft® Excel v15.0 (Redmond, Washington, USA) were used to analyse data. 2-Way ANOVA test was used to analyse and compare HHS scores at different follow-up periods.

## RESULTS

During the follow-up, three patients were declared deceased by the relatives and their data were completely removed from the study database. During surgeries, no major intraoperative events were registered. Postoperatively, two cases developed wound infections and were managed during hospital stay. No septic complications were reported regarding implants. Two patients developed deep venous thrombosis at 13 and respectively 17 days postoperative and were successfully treated during hospital stay. Three cases developed aseptic loosening of the acetabular component at 6, 8 and 10 years postoperative follow-ups and their data (HHS score) were not added to the final statistical analysis. The final cohort included 151 patients, 88 females and 63 males. Other demographic data and patient characteristics can be observed in table no. 1.

**Table no. 1. Patient demographics and characteristics (N= 151 patients)**

|  |           |
|--|-----------|
| Sex, male/female, n                    | 63/88     |
| Age at surgery, y, mean ± SD           | 56 ± 14.2 |
| Body mass index, mean ± SD             | 27 ± 6.1  |
| Smokers, n                             | 73        |
| Level of education, n                  |           |
| Less than high school                  | 111       |
| High school diploma or above           | 40        |
| Surgery time (minutes) mean ± SD       | 117 ± 22  |
| Affected and operated hip, n           |           |
| Left                                   | 71        |
| Right                                  | 80        |
| Underwent childhood hip osteotomies, n | 32        |
| Associated knee osteoarthritis, n      |           |
| Left                                   | 23        |
| Right                                  | 98        |

**Table no. 2. Harris Hip Score for different follow-ups**

|                              | Preoperatively           | 3 months follow-up       | 6 months follow-up       | 12 months follow-up       | 24 months follow-up      | Last follow-up*          |
|------------------------------|--------------------------|--------------------------|--------------------------|---------------------------|--------------------------|--------------------------|
| <b>Mean Harris Hip Score</b> | 49 ± 12<br>(range 31-62) | 67 ± 18<br>(range 55-91) | 85 ± 13<br>(range 67-97) | 88 ± 11<br>(range 73-100) | 91 ± 8<br>(range 79-100) | 90 ± 9<br>(range 81-100) |

\*minimum 36 months

There were significant differences between preoperative HHS and 12 months postoperative HHS ( $p < 0.0001$ ). There were no significant differences regarding HHS at 24 and last follow-up times ( $p = 0.538$ ).

Femoral osteolysis was present in 28 (18.5%) cases and significantly more common in Gruens Zone 7 ( $p = 0.032$ ). 9 (5.9%) cases presented with acetabular osteolysis (Paprosky's

classification) type 2A, 3 (1.9%) cases with type 2B, 5 (3.3%) cases with type 2C. The cohort included one patient with acetabular bone loss type 3A (at 11 years follow-up).

## DISCUSSIONS

Congenital hip dysplasia is nowadays considered a severe articular malformation that may lead to important deformities of the hip joint. Our main finding is that uncemented total hip arthroplasty increased the quality of life in adult patients diagnosed with hip osteoarthritis secondary to congenital hip dysplasia. Main limitation of the study was the limited cohort. Given the limited amount of surgeons practicing this type of surgery, having the same senior surgeon for all the cases may be considered a limitation for some authors. The low level of education may affect the primary care and lead to loosening of components faster than expected. The complications occurred as frequently as described by other authors.(9,10,11) Femoral and acetabular loosening were the primary complications that occurred and were managed conservatively, depending on the case subjected. Faldini et al. published an article with outcomes following cementless total hip arthroplasties in adult patients with congenital hip dysplasia after 12 years follow-up.(4) Their cohort comprised 28 patients and HHS increased from  $56 \pm 9$  preoperatively to  $90 \pm 9$  at the 12 months follow-up. Complications described were similar to our study. In a 10-year clinical and radiological study performed on 28 patients, Biant et al. had lower HHS compared to our outcomes at 12 months follow-up (81 vs 88).(12) Even though, their conclusion was that cementless total hip arthroplasty had excellent results for the timeframe. Wu et al. performed a retrospective study analyzing results after hip arthroplasty with a cementless cup and femoral head autografts in patients with hip dysplasia.(13) Their average follow-up was 4.7 years and HHS score increased from 46 preoperatively to 89 at the final follow-up. During the follow-up, no loosening of components was recorded and the authors concluded that this option provides favourable results for patients with accurate diagnosis. Our study highlighted the demographic characteristics and clinical outcomes at different follow-up times emphasizing complications that may occur over time in cementless total hip arthroplasty in patients with hip arthritis secondary to congenital hip dysplasia.

## CONCLUSIONS

Uncemented total hip arthroplasty in patients with congenital hip dysplasia provided excellent long-term outcomes at a minimum follow-up of three years. Complications were considered minimal and were expected as described in the literature. Larger cohort studies with multiple surgical teams are demanded in order to establish future guidelines and directions in these patients.

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