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Research Article

Outcomes of Total Hip Arthroplasty for Post-Traumatic Arthritis

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Abstract

Introduction

Acetabular fractures are often serious injuries that may affect all age groups. Even with the best operative treatment, post-traumatic arthritis is likely to evolve over time. The only viable definitive treatment option is total hip arthroplasty (THA). In this study we identify the intraoperative challenges, evaluate the radiographic results and patient-reported outcomes of THA in these patients at one year follow up in comparison to a matchedcontrol group.

Methods

A retrospective review of THA for patients with prior acetabular fractures over a period of 7 years in a single institution was performed. Data collection included demographics, length of hospital stay, past surgical history, estimated blood loss, duration of surgery and complications. Bony defects of the acetabulum and femoral head were classified according to the Paprosky classification. Harris hip score (HHS) and Oxford hip score (OHS) were used to assess outcome of the procedure.

Results

The mean age for the study group was 55.8 years (27-84 years).11/19 (57.9%) were male.The average length of hospital stay for the study group was 6 days (range 4 -14 days). Most of the patients had Paprosky Grade 0-1 bony defects. There was a significant difference between the two groups in terms of intraoperative blood loss and duration of surgery (p- value=0.019). The mean HHS at one year follow up was 78.2 in the study group and 89.2 in the matched group with no significant p-value (>0.05). The mean OHS at one year was 24.9 for the study group and 18 for the matchedgroup (>0.05). No deep infections or dislocation encountered. Pain scores showed no significant difference.

Conclusion

Patients who undergoTHA for posttraumatic arthritis tend to have longer operative times and more blood loss. However, similar clinical outcomes should be expected in this population as compared to their age and gender matched peers in short-term follow up.

Keywords: Hip joint, Arthroplasty, Acetabular fractures

Abbreviations: THA: Total Hip Arthroplasty; HHS: Harris Hip Score; OHA: Oxford Hip Score

Introduction

Acetabular fractures are often serious and life-altering orthopedic injuries that may affect all age groups. The incidence of acetabular fractures increases with ageand can result from a simple fall in the presence of osteopenia and osteoporosis [1]. In younger patients with good bone quality,acetabular fractures are more usually seen following high energy trauma -such as motor vehicle accidents (MVA).Open reduction and internal fixation is generally considered as the standard surgical treatment for displaced acetabular fracture [2]. Optimum reduction and internal fixation of the acetabular fractures are linked to a marked improvement in functional outcomes and a decrease in postoperative complications [3]. However, despite modern methods of surgical intervention and near-anatomical reduction techniques, post traumatic arthritis is likely to evolve over time.

Giannoudis et al in a meta-analysis reviewed the incidence of post traumatic arthritis after surgically managed acetabular fracture [4]. In patients wherea satisfactory reduction (<2mm) was achieved the incidence was reported to be 13% with the incidence risingto 44% in patients with non-satisfactory reduction (>2mm) [4]. Articular cartilage injury, residual joint incongruity, avascular necrosis and malposition of hardware are some of the factors contributing to this high incidence [3].

With the onset of disabling post-traumatic osteoarthritis the only viable definitive treatment option is total hip arthroplasty(THA) [5]. THA for post traumatic arthritis following acetabular fractures has been reported to have variable outcomes when compared with THA performed for non-traumatic arthritis [6-8]. The purpose of this study was to the identify the intraoperative challengesassociated with this specific clinical setting as well as to evaluate the radiographic results and patient-reported outcomes at one year follow up in comparison to a matched-control group of patients who underwent THA for other surgical indications, mainly primary osteoarthritis.

Methods and Materials

We undertook a retrospective review of patients who underwent primary THA over a period of 7 years in a single institution (1998 - 2005). Institutional review board approval was obtained prior to the initiation of the study. Data collection was carried out using the prospectively tabulated database of the Hamilton Arthroplasty Group. Patients with prior acetabular fractures and underwent salvage THA for post traumatic arthritis in regardless of their initial management were included. The database comprised 2415 primary THA (performed by six surgeons) of which 19 (7.9%) were performedfor post traumatic arthritis as a late complication of a previous acetabular fracture. We excluded patients who did not have a completeone year follow up. Demographic data and length of hospital stay were obtained along with information of the past surgical history for each patient. We categorized patients according to the American society of anesthesiologist grade (ASA) to assess their medical conditionprior to surgical intervention.

Intraoperative findings were also reported includingestimated blood loss, operative time and complications. We classified bony defects of acetabulum and femoral head according to the Paprosky grading system [9]. Through the same database, control patients were identified and matched for age, gender, ASA, and surgeon. For clinical evaluation, Harris hip score and Oxford hip score were utilized as well as visual analog scale for pain [10,11]. All the clinical and radiographic data were obtained pre-operatively, at six weeks, six months and 12 months. Parametric data was analyzed using the paired samples t-test. Categorical data analyzed using chi-square or Fischer's exact test where appropriate. We considered our finding as statistically significant when p-value was less than 0.05.

Results

The mean age for the study group was 55.8 years (27-84).11/19(57.9%) were males. 11 out of 19 patients had undergone previous open reduction and internal fixation that required intraoperativehardware removal during the total hip replacement. The average length of hospital stay for the study group was 6 days (range 4 -14 days). The majority of the patients were classified as ASA II (42.1%) and ASA I (31.6%). Most of the patients had Paprosky Grade 0-1 bony defects with 10.5% Grade 3 (Table 1). Primary non-cemented cup was the predominated acetabular reconstruction type in 16 out of 19 patients. Primary cementlessstem

Table 1: Bony defect according to Paprosky classification

Acetabular Defects		
Grade	Study Group	Control group
0 - 1	57.9%	89.5%
2	31.6%	5.3%
3	10.5%	5.3%
Femoral Defects		
Grade	Study Group	Control group
0 - 1	84.2%	100%
2	10.5%	0
3	5.3%	0

was performed in 18 out of 19 patients for femoral reconstruction. There was a significant difference between the study and matched groups in terms of intraoperative blood loss and operative time (p=0.019) (p= 0.012) (Figure 1). The mean Harris hip score at one year follow up was 78.2 in the study group and 89.2 in the matched group with no significant p-value (>0.05) (Figure 2). The mean Oxford hip score at one year was 24.9 for the study group and 18 for the matched groupbut this did not reach statistically significant difference (Figure 3). Regarding complications, three calcarfractures (Vancouver A) occurred intraoperatively in the study group. Similar two calcar fractures occurred in the matched groups which both were dealt with during the surgery utilizing cerclage wiring. No deep infections or dislocationencountered. Pain scoresshowed no significant difference between the two groups at one year follow up.

Discussion

THA has justifiably been hailed as one of the most successful of orthopedic procedures with excellent results in terms of pain relief, functional outcomes and improvements in quality of life [12]. A recent article reported that 20% of patients underwent surgical fixation of acetabular fracture ultimately required THA [13]. In the setting of prior operative management of acetabular fractures, scarring, residual deformity and retained hardware may all pose challenges to address and add to the complexity of restoringthe mechanical integrity of the hip joint with THA.Even in the setting of a prior acetabular fracture treated non-operatively, residual anatomical distortion may be encountered.In our series, duration of surgery and intraoperative? blood loss were found to be significantly higher in the patients with prior acetabular fracture in comparison to patients with no prior acetabular fracture. These findings are in accordance with other series reported previously in the literature [14,15]. This can be due to the time required for hardwareremoval or the difficulty in finding surgical planes because of scarring caused by the previous fracture and/or surgery.

Despite these challenges and more prolonged surgery, in our series clinical outcomes as measured by postoperative Harris Hip Score(HHS) showed no statistically significant differencesbetween the study and the control group at six weeks, six months and then at one year final follow up.. Further, postoperative Oxford Hip Scores showed no significant difference between the study group and the control group at one-year follow-up.

A higher incidence of postoperative complications has been reported following THA forpost-traumatic arthritis.Boardman and Charnley reported that ten out of sixty six such patients developed postoperative complications including three mortalities [16]. Romness reviewed 55 THA in patients with previous acetabular fracture [7]. He reported significantly higher incidence of acetabular loosening (27%) in the fracture group compared to primary osteoarthritis group (5%) at ten years. However, in our series, we did not encounter any postoperative complications such as deep infections, loosening or dislocations.

Bellabarba reported on thirty THAs performed for posttraumatic arthritis and compared the results with 204 THA performed for other surgical indications demonstrating no difference in HHS between the two groups [14]. In a more recent study of 47 patients who underwent THA due to previous acetabular fracture, 29 patients (86%) achieved HHS ≥ 90 [17]. Salama had showed good-to-excellent HHS in 18 patients out of 21 patients who had THA for posttraumatic arthritis [18]. Ranawat included 32 hips which underwent THA for posttraumatic arthritis and showed postoperative HHS of 82 [19]. Another study of 20 THA demonstrated long-term excellent results of HHS of 93 at 9.5 years follow up [20]. Huo reported 21 hips that achieved HHS 95 at two years follow-up after THA for previous acetabular fracture [15].

Lizur-Utrilla's report on 24 patients who underwent THA for posttraumatic arthritis -who were matched to 48 patients who had THA for non-traumatic arthritis- demonstrated a significant inferior HHS results in the posttraumatic arthritis group compared to the control patients [21].

Scott published a recent a study of 49 patients who had THA with a previous history of acetabular fracture and compared them to control-group who underwent THA for non-traumatic OA [22]. Significantly worse results were observed in the fracture group.

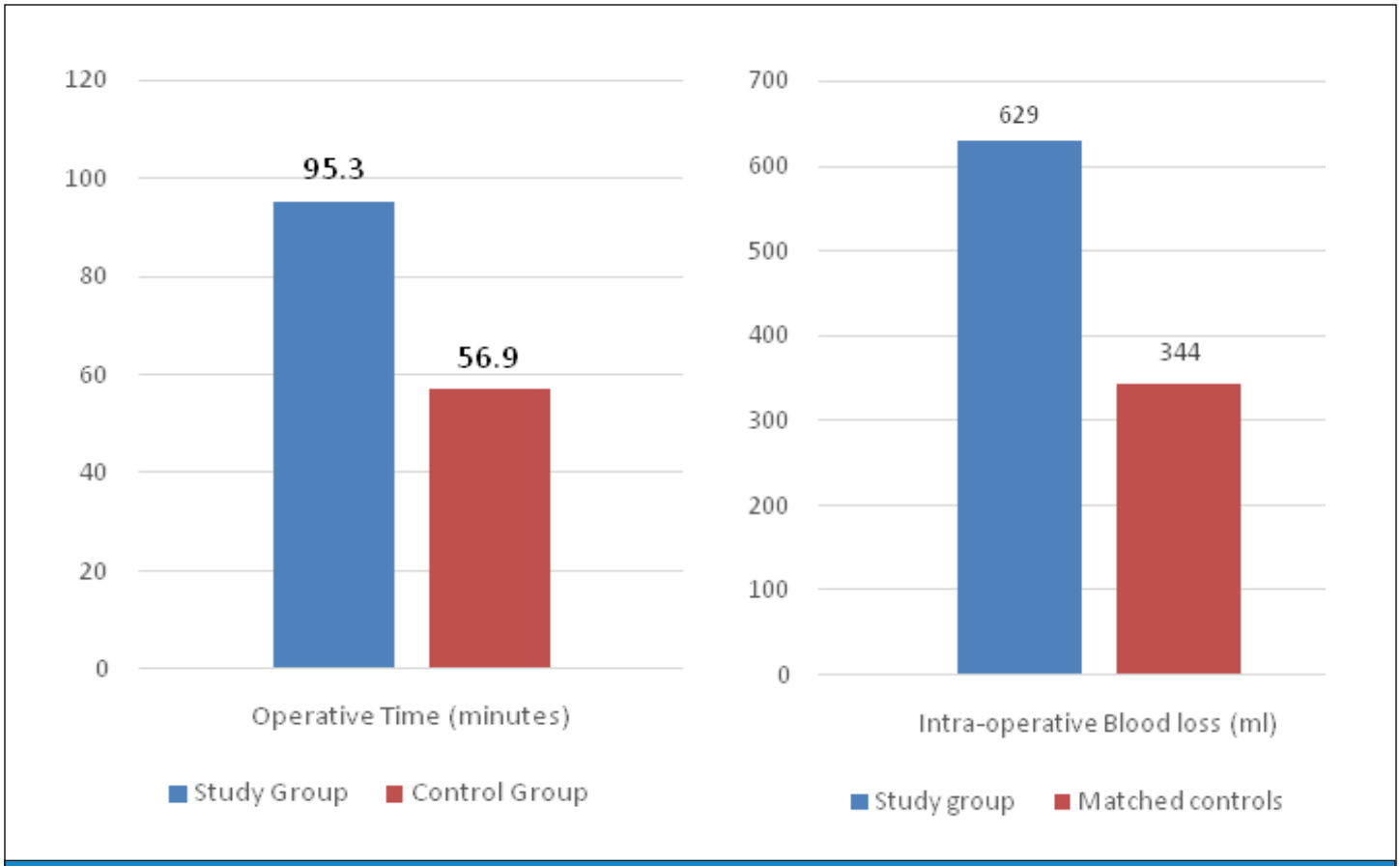

Figure 1: Operative time & intra-operative blood loss

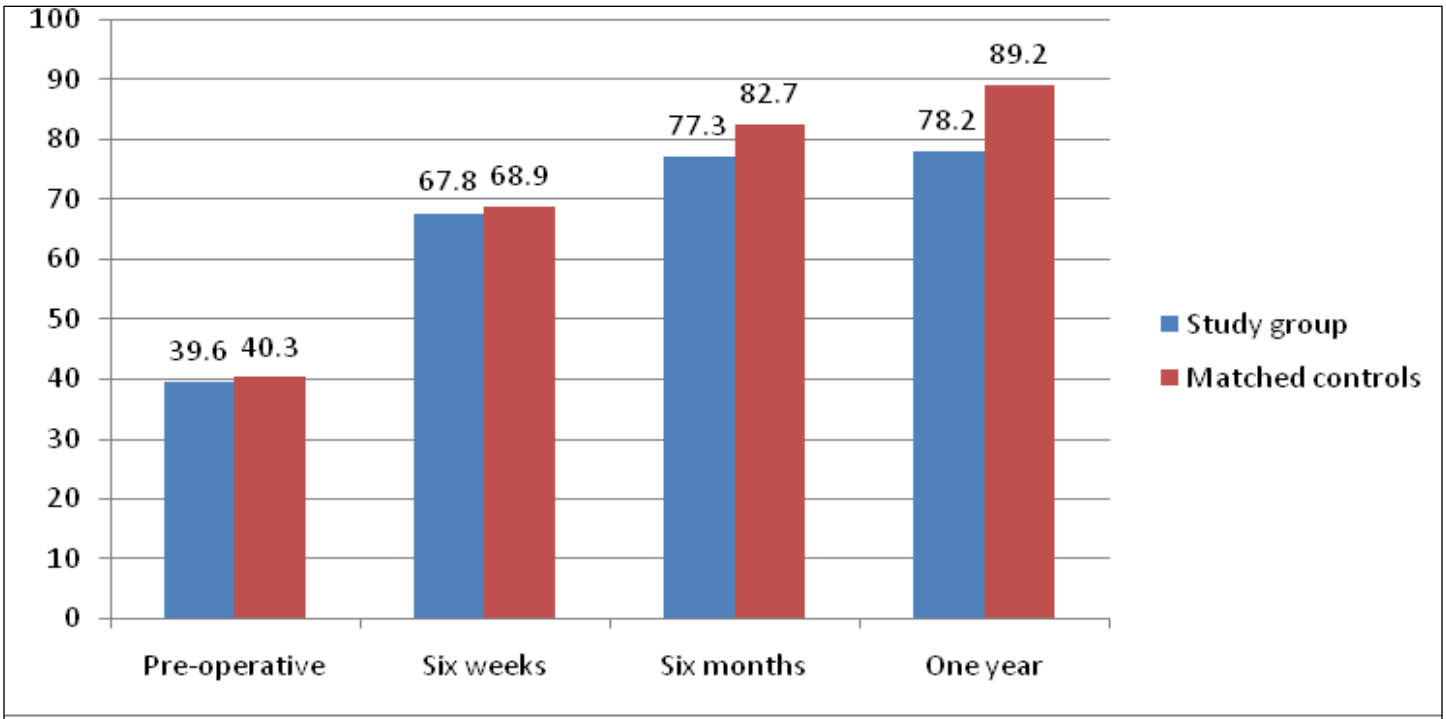

Figure 2: Harris hip scores

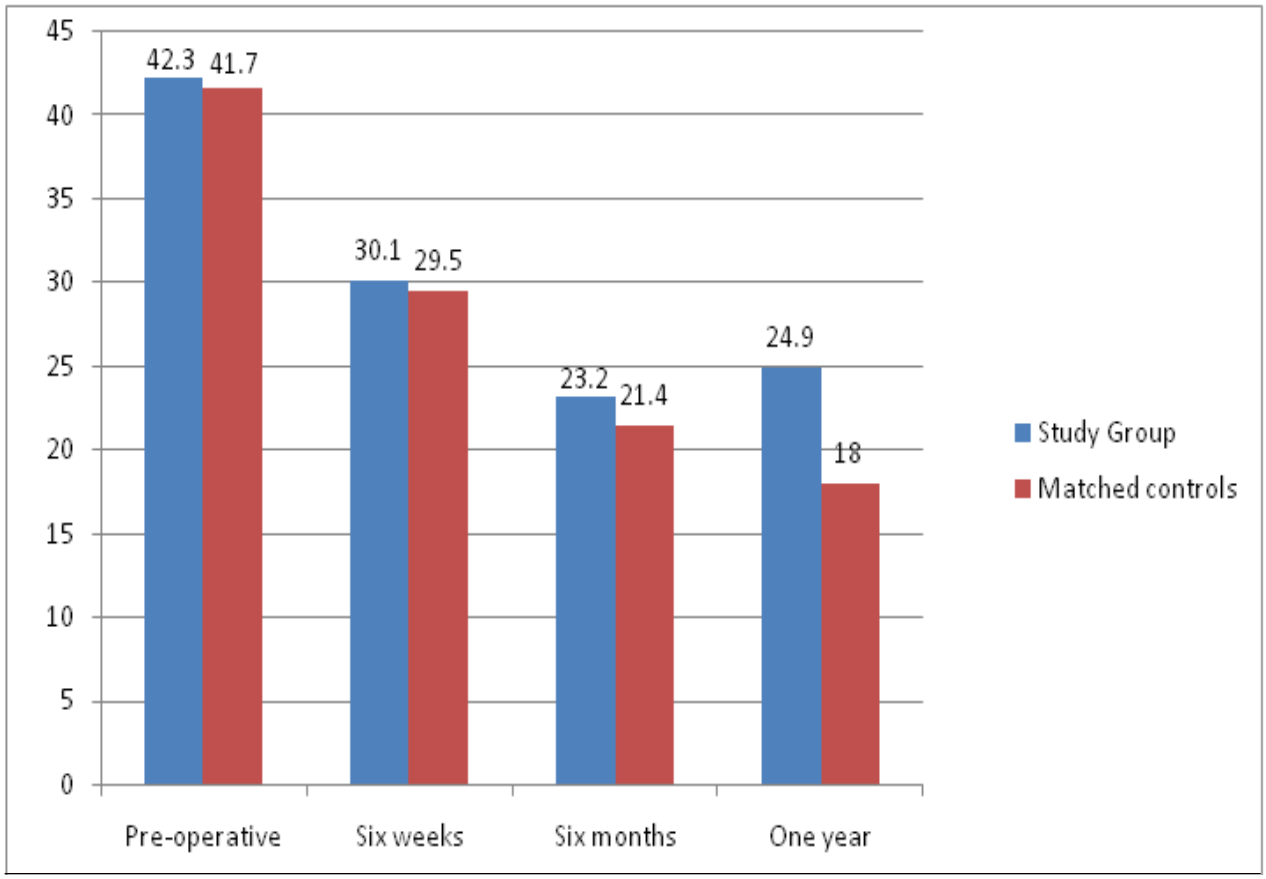

Figure 3: Oxford hip scores

The short-term follow-up is a clear limitation of this study, and-long-term follow-up of our patients is ongoing. The sample size of our study is also considered as a limitation, although it is comparable to otherpublished series. Further, the retrospective nature of review has itsinherent limitations, however the data has been obtained from a prospectively tabulated database. Utilizing the same database, we were able to carefully match the control group to eliminate the influence of confounding factors (such as surgeon, approach and implant fixation) which may otherwise have altered the final conclusion.

Conclusion

Patients who undergoTHA for posttraumatic arthritis following previous acetabular fracture tend to have longer operative times and more blood loss in comparison to THA for non-traumatic arthritis. However, similar clinical outcomes should be expected in this population as compared to their age and gender matched peersin short-term follow up. Long-term clinical assessment in larger future studies are recommended.

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Data Sources

The clinical and radiologic data used to support the findings of this study are available from the corresponding author upon request.

Conflict of Interest Statement

The authors declare that there are no known conflicts of interest in preparation of this manuscript.

References

1. Laird, A., Keating, JF. (2005) Acetabular fractures: a 16-year prospective epidemiological study. J Bone Joint Surg Br, 87(7): 969-73.

2. Matta, JM., Merritt, PO. (1988) Displaced acetabular fractures. Clin Orthop Relat Res, 230:83-97.
3. Matta, JM. (1996) Fractures of the acetabulum: accuracy of reduction and clinical results in patients managed operatively within three weeks after the injury. J Bone Joint Surg Am, 78(11): 1632-1645.
4. Giannoudis, PV., Grotz, MR., Papakostidis, C., Dinopoulos, H. (2005) Operative treatment of displaced fractures of the acetabulum. A meta-analysis. J Bone Joint Surg Br, 87(1): 2-9.
5. Dunet, B., Tournier, C., Billaud, A., Lavoinne, N., Fabre, T., Durandeau, A. (2013) Acetabular fracture: long-term follow-up and factors associated with secondary implantation of total hip arthroplasty. Orthop Traumatol Surg Res, 99(3): 281-290.
6. von, Roth, P., Abdel, MP., Harmsen, WS., Berry, DJ. (2015) Total hip arthroplasty after operatively treated acetabular fracture: a concise follow-up, at a mean of twenty years, of a previous report. J Bone Joint Surg Am, 97(4): 288-291.
7. Romness, DW., Lewallen, DG. (1990) Total hip arthroplasty after fracture of the acetabulum. Long-term results. J Bone Joint Surg Br, 72(5): 761-764.
8. Morison, Z., Moojen, DJ., Nauth, A., Hall, J., McKee, MD., Waddell, JP., et al. (2016) Total Hip Arthroplasty After Acetabular Fracture Is Associated With Lower Survivorship and More Complications. Clin Orthop Relat Res, 474(2): 392-398.
9. Paprosky W. Femoral defect classification: clinical application. Orthop Rev Oct. 1990.
10. Harris, WH. (1969) Traumatic arthritis of the hip after dislocation and acetabular fractures: treatment by mold arthroplasty. An end-result study using a new method of result evaluation. J Bone Joint Surg Am, 51(4): 737-755.
11. Dawson, J., Fitzpatrick, R., Carr, A., Murray, D. (1996) Questionnaire on the perceptions of patients about total hip replacement. J Bone Joint Surg Br, 78(2): 185-90.
12. Learmonth, ID., Young, C., Rorabeck, C. (2007) The operation of the century: total hip replacement. Lancet, 370(9597): 1508-19.
13. Briffa, N., Pearce, R., Hill, AM., Bircher, M. (2011) Outcomes of acetabular fracture fixation with ten years' follow-up. J Bone Joint Surg Br, 93(2): 229-236.
14. Bellabarba, C., Berger, RA., Bentley, CD., Quigley, LR., Jacobs, JJ., Rosenberg, AG., et al. (2001) Cementless acetabular reconstruction after acetabular fracture. J Bone Joint Surg Am, 83(6):868-876.
15. Huo, MH., Solberg, BD., Zatorski, LE., Keggi, KJ. (1999) Total hip replacements done without cement after acetabular fractures: a 4- to 8-year follow-up study. J Arthroplasty, 14(7): 827-831.
16. Boardman, KP., Charnley, J. (1978) Low-friction arthroplasty after fracture-dislocations of the hip. J Bone Joint Surg Br, 60-B(4): 495-497.
17. Sharma, M., Behera, P., Sen, RK., Aggarwal, S., Tripathy, SK., Prakash, M., et al. (2019) Total hip arthroplasty for arthritis following acetabular fractures-evaluation of radiological, functional and quality of life parameters. J Clin Orthop Trauma, 10(1): 131-137.
18. Salama, W., Ditto, P., Mousa, S., Khalefa, A., Sleem, A., Ravera, L. (2018) Cementless total hip arthroplasty in the treatment after acetabular fractures. Eur J Orthop Surg Traumatol. 28(1): 59-64.
19. Ranawat, A., Zelken, J., Helfet, D., Buly, R. (2009) Total hip arthroplasty for posttraumatic arthritis after acetabular fracture. J Arthroplasty, 24(5): 759-767.
20. Schreurs, BW., Zengerink, M., Welten, ML., van, Kampen, A., Slooff, TJ. (2005) Bone impaction grafting and a cemented cup after acetabular fracture at 3-18 years. Clin Orthop Relat Res, 437: 145-151.
21. Lizaur-Utrilla, A., Sanz-Reig, J., Serna-Berna, R. (2012) Cementless acetabular reconstruction after acetabular fracture: a prospective, matched-cohort study. J Trauma Acute Care Surg, 73(1): 232-238.
22. Scott, CEH., MacDonald, D., Moran, M., White, TO., Patton, JT., Keating, JF. (2017) Cemented total hip arthroplasty following acetabular fracture. Bone Joint J, 99-B(10): 1399-408.