

## EVALUATION OF DIFFERENT MODALITIES OF SURGICAL TREATMENT FOR AVASCULAR NECROSIS OF THE FEMORAL HEAD IN BASRAH

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### Abstract

This prospective study was done in Basrah General Hospital, from June 2009 to December 2011. It included 92 hips in eighty one patients affected clinically and radiologically by femoral head avascular necrosis. They were 50 males and 31 females, mean age 41 years with a range of 15-67 years with stage II-IV of femoral head AVN according to Ficat and Arlet radiological staging system. The aims of this study are; to know the pattern of avascular necrosis of the femoral head, and to evaluate the outcome of the different surgical modalities. Surgery was conducted in form of; group I includes twenty four hips (24.4%) which were treated by core decompression (12 hips =12.2% by multiple small drilling (group I-a); seven patients were satisfied with the result of surgery. Infection was reported in one patient. Twelve hips =12.2% by wide bore drilling "gutter" and bone graft(group I-b); nine patients were satisfied by the result of surgery). Group II includes fifty three hips (54.1%) which were treated by total hip arthroplasty (25=25.5% cemented THR (group II-a); seventeen patients were satisfied with the procedure; Complications were reported in three cases, and 28=28.6% cementlessTHR (group II-b); twenty one patients were satisfied; complications had been encountered in five cases); five patients had bilateral hip surgery. Group III includes twenty one hips (21.4%) which were tackled by Girdlestone (resection arthroplasty); six patients had bilateral hip surgery. Only nine patients were satisfied with this procedure.

In conclusion, core decompression surgery in form of wide bore drilling with bone graft is suitable treatment for early stages of avascular necrosis. Total hip replacement is suitable option for AVN in advance stage. Resection arthroplasty still is an option for patients in certain situations (e.g. infection), although the results were less favorable.

### Introduction

Osteonecrosis of the femoral head is a challenging disorder often occurring in young patients in the third through fifth decade of life<sup>1</sup>; if left untreated, it leads to complete deterioration of the hip joint<sup>2-4</sup>. Despite advances in the understanding of the pathogenesis and etiology of this disease, non-traumatic osteonecrosis remains a challenging diagnostic and therapeutic dilemma<sup>5,6</sup>. The natural history of non-traumatic osteonecrosis has been well documented<sup>4,7-10</sup>, and a high rate of progression has been reported when non-operative treatment alone has

been used for symptomatic patients<sup>4,8,11,12</sup>. Given the relatively young age at the time of presentation and the poor long-term results that have been reported after total hip arthroplasty in this population of patients, preservation of the joint is recommended for patients who have early-stage disease<sup>13-16</sup>.

### Patients & Methods

This is a prospective study which was conducted in orthopedic department at Basrah General Hospital and Ibn-Al-Baitar Private Hospital, from June 2009 to

December 2011. Ninety two hips in 81 patients (50 males and 31 females) their ages ranged from 15-67 years (mean age 41 years), presented with different stages of femoral head avascular necrosis were studied. Eleven patients had bilateral hip involvement and in the remaining 70 patients the involvement was unilateral. The data were recorded including the age at presentation, gender, duration of symptoms before presentation, and associated risk factors. Patients were evaluated preoperatively on the basis of the medical history, the results of physical examination, and anteroposterior radiographs. Preoperative magnetic resonance imaging studies were performed for forty seven patients. The extent of radiographic involvement of the disease was assessed quantitatively with use of a Ficat and Arlet staging system<sup>17</sup>. All patients were consented. All surgeries had been done under general anesthesia; antibiotics were given at time of anesthesia induction and were continued for 3-5 days postoperatively.

A.group I (core decompression): twenty four patients; procedure was done through lateral incision then the portal of entry was 2.5 cm below the greater trochanter; for multiple drilling procedures 3-4 holes by 3.2 mm pit was done, while those for wide bore core decompression single hole by 8 mm pit was done under image, and the defect was filled by cancellous bone graft from upper ipsilateral tibia. Patients kept for 2-3 days in hospital then discharged and instructed to avoid putting weight on the hip underwent surgery for 6 weeks while maintaining isometric exercise with muscle strengthening physiotherapy. High-impact loading such as jogging and jumping was not permitted for 12 months, squatting position (eastern toilet sitting position) also to be avoided. The patients were seen two weeks later for removal of stitches. Patients were encouraged to partial weight bearing after the 6th week postoperatively after clinical and radiological evaluation. Then the

patients were seen periodically in three, six then twelve months. Figure (1).

B.group II (total hip arthroplasty): fifty three patients; most of them approached by lateral incision apart from three patients approached by posterior incision and six patients by anterolateral approach (i.e. surgeries done in a standard way). Adductor tenotomy was done for 5 hips. After capsulotomy and hip dislocation, then excision of the femoral head, to start with acetabular reaming and fitting of acetabular cup then femoral reaming and fitting of the femoral stem, methyl methacrylate cement used for twenty five patients, the anesthesiologists were informed at time of reaming and application of bone cement. Thrombolytic drug was given 6 hours postoperatively in form of low molecular weight heparin "enoxaparin" (4000 I.U/day subcutaneously) and continued for five days, (we reported only one case of DVT which was managed successfully), then at morning the day after surgery, the patients were encouraged to sit in the bed and starting isometric exercise with muscle strengthening physiotherapy. The patients usually sent for radiography while maintaining proper transfer, then discharged and instructed to avoid weight bearing for six weeks, to be seen two weeks later for removal of stitches, After six weeks the patients encouraged for partial weight bearing using the assistive devices after clinical and radiological evaluation, while for patients with cemented THR early (within few days) weight bearing was the target, squatting position (eastern toilet sitting position) to be avoided. Then the patients were seen periodically in three, six then twelve months. We reported seven cases of hip dislocation which were managed successfully (five hips by manipulation under anesthesia using image and two hips by open reduction). Figure (2).

C.group III (Girdlestone excisional arthroplasty): In twenty one patients who were treated by Girdlestone excisional

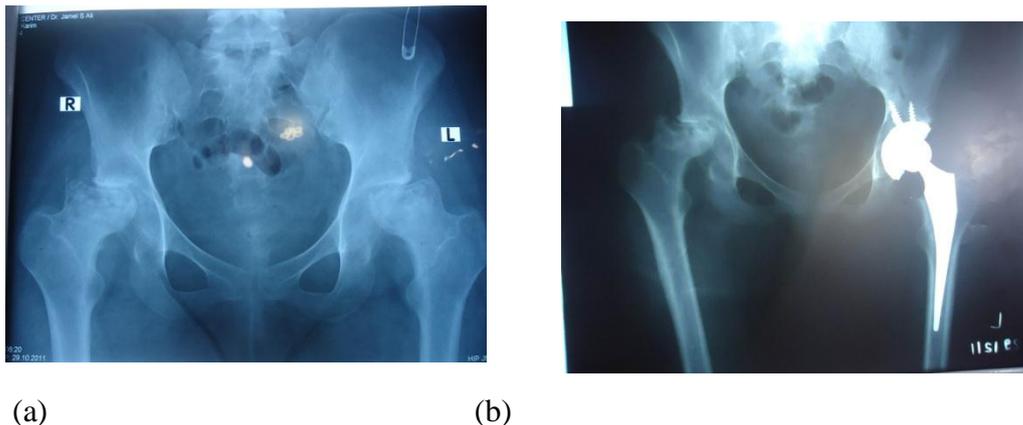
arthroplasty; anterolateral approach was used in 15 hip operations (according to surgeon preference), lateral approach in four patients, posterior approach in one patient and anterior approach in one patient, with average time 45 mints for each hip. In six patients with bilateral AVN, surgery was done in one session. Postoperatively skin traction used in 19 hips and skeletal traction in 2 hips (obese patients), with 4-5 kg weight for 4-6 weeks. The patients were discharged after 5-7days with their traction to be continued at home. Although the patients were kept on 6 weeks traction. In all patients, physiotherapy was started 6 weeks after operation in form of walking reeducation

and muscle strengthening exercise for 6 weeks. The patients were followed through 3 weeks visits. During follow up visits the patients were evaluated clinically for pain, sign of infection, shortening, unstable gait and radiologically to assess the proximal migration of femur. Figure (3).

Statistical analysis of data was done to evaluate the outcome of the varieties of the surgical treatment of avascular necrosis of femoral head by the aid of Microsoft Excel program and STAT program; in which the result considered significant if P value  $<0.05$ , highly significant if P value  $<0.01$  and non-significant if P value  $>0.05$ .



**Figure 1: Radiograph of a patient who was managed by core decompression of the left hip.**



**Figure 2: Radiographs of a patient who had (a) bilateral hip involvement with advanced osteonecrosis (b) was managed by cementless total arthroplasty of the left hip.**



**Figure 3: Radiographs of two patients managed by Girdlestone resection arthroplasty: (a) unilateral (b) bilateral.**

### Results

Ninety two hips in eighty one patients with different stages of femoral head AVN were studied.

**Age distribution:** The distribution of patients according to age group showed that most of AVN in our series presented between ages of 21-50 years (80.7%) as shown in (Table I). The age of our patients ranged from 15-67 years with mean age: 41 years.

**Gender distribution:** The operation was conducted on males (50=61.7%) more than females (31=38.3%) as shown in Table II.

**Presenting symptoms:** The eighty one patients (100%) presented by hip pain followed by decrease range of movement in 78(96.3%) and limping in 72(88.89%) as shown in Table III.

**Predisposing factors:** A lot of risk factors were contributed to the development of AVN single or in combination, table IV showed the distribution of patients according to the risk factors in order of frequency. Multiple risk factors (two or more) in 20(24.7%) patients followed by corticosteroid therapy in 14(17.3%) then by trauma and sickle cell disease in 8(9.9%) for each. While 22(27.2%) patients had unidentifiable risk factor(s).

**Duration of illness:** Most of patients; 32(39.5%) were presented within two years, followed by 19(23.46%) presented

within three years, then by 13(16%), 9(11%) within 4, 1 years respectively as shown in Table V.

**Radiological staging:** Most of the patients 55 (60%) presented with advanced stage (IV) followed by 23 patients (25%) presented with stage (III) then next to it 14(15%) patients presented with stage (II) as shown in Table VI.

**Outcome after surgery:** This differs according to the surgical modality:

**Multiple small drilling group:** In the twelve hips (12.2%) which treated by multiple drilling; the main complaint was pain in all patients (100%), eight (75%) limping, ten (83%) LOM, nine (75%) used walking aid preoperatively.

Postoperatively seven patients (58%) were satisfied with the result of surgery, four patients (33.3%) still had pain (statically significant), 3 patients still had LOM 3 (25%), 4 patients (33.3%) had limping, and 5 patients (41.7%) still using walking aids (statistically non-significant in the last three results). The mean follow up period was 20 months; Infection was reported in one patient (Table VII).

**Outcome in wide bore drilling and bone graft group:** Twelve hips (12.2%) were treated with wide bore drilling and tibial bone graft; all patients complained of pain (100%), eight of them (66.7%) had limping, eleven (92%) had LOM, and eight (66.7%) used walking aid

preoperatively. Postoperatively nine patients (75%) were satisfied by the result of surgery, five (41.7%) still had pain, three (25%) still had LOM (statistically significant in the last two results), four (33%) had limping, and five (41.7%) still using walking aids (statistically non-significant in the last two results). The mean follow up period was 12.4 months. No complication was reported, as shown in Table VIII.

Outcome in cemented THR group: In twenty five hips (25.5%) were treated by cemented THR; all (100%) were complained of pain, all (100%) had limping, twenty four (96%) had LOM, twenty one (84%) used walking aid, and ten (40%) had shortening preoperatively. Postoperatively seventeen (68%) patients were satisfied with the procedure, five (20%) remains with pain, six (24%) still had LOM, seven (28%) had limping, (these results are statistically highly significant), nine (36%) still using walking aids (statistically significant), and three (12%) still had shortening (statistically non-significant). The mean follow up period was 31 months. Three cases of complication were reported: infection in one patient and dislocation in two cases as shown in Table IX.

Outcome of cementless THR group: In twenty eight hips (28.6%) who were treated by cementless THR; all (100%) were complained of pain, twenty six (93%) with limping, all (100%) with LOM, nineteen (68%) used walking aid, and nine patients (32%) had shortening preoperatively. Postoperatively twenty one (75%) patients were satisfied, seven (25%) still had pain (2 had mild tolerable pain relieved by simple analgesics), three (10.7%) still had LOM, eight (28.6%) had limping (these results are statistically highly significant), eight still using walking aids, and three patients (10.7%) still had shortening (the last two results are statistically non-significant). The mean follow up period was 13 months. Dislocation was reported in five patients

In one of them the dislocation coincided with symptomatic DVT as shown in Table X.

Outcome in the Girdlestone group: In twenty one hips (21.5%) that were treated by Girdlestone resection arthroplasty; all (100%) were complaining of pain and LOM, eighteen (85.7%) had limping, all used walking aid, and four (19%) had shortening preoperatively. Postoperatively nine (43%) patients were satisfied with the procedure, two (9.5%) still had pain, four (19%) still had LOM (statistically highly significant), all (100%) had limping (statistically non-significant), and eleven (52%) still using walking aids (statistically highly significant) and shortening reported in all patients (100%). The mean follow up period was 44 months. Complication was not reported as shown in Table XI.

## Discussion

Avascular necrosis (AVN) has become a subject of interest amongst orthopedic surgeons only during the last four to five decades<sup>18</sup>. Both the Diagnosis and appropriate treatment of osteonecrosis of femoral head poses difficulty in the minds of all orthopedic surgeons. Osteonecrosis (ON) has a natural history of relentless progress once the disease has advanced but some efforts may certainly be taken to delay the so called speed of progression of collapse<sup>19</sup>.

In this study ninety two hips of eighty one patients were included, 61.7% were males and 38.3% were females, all were suffering from femoral head AVN; this can be explained by two facts: First; risk factors like (trauma, smoking and alcoholism) are quite common in males, while other risk factors like (SCD and steroid abuse) about evenly distributed for both sexes, though the latter is slightly common in females. Second fact; female patients often refuse surgery as a treatment option and even they do agree; they choose the least interventional option (if they are consented properly) The

age of patients in our series mostly range between 20 and 60 years; this is similar to a study done by Mark R. Brinker et al<sup>20</sup>, with a maximum number of patients who were operated on at the age group of 20-40 years; this age group is also included in other studies by Babhulkar S.<sup>19</sup>, Wang ZGet al<sup>21</sup>, Kevin J. Bozic et al<sup>22</sup>, while it differs from a study done by Wim H. C. Rijnen et al<sup>23</sup>. The presenting symptoms were; hip pain, limitation of movements (especially abduction and external rotation) and limping in the following orders of frequency; 100%, 96.3% and 88.9% respectively. Both hips were affected in 45.7 % of patients while single hip affection accounts for 55.3 % ; of them 31.9% the right hip, while in 23.4% the left hip was the side of complain. The mean of duration of presentation was 32 months and this is quite comparable to the findings in the above studies. A lot of risk factors were blamed to be contributed to the development of AVN single or in combination; corticosteroid medications in 17.3%, followed by trauma and sickle cell disease (SCD) in 9.9% for each, [SCD common in our locality; In one study which was conducted in Basrah, showed that AVN affects 44.3% of totally sickler patients<sup>24</sup>], smoking in 4.9%, alcoholism in 3.7% and rheumatoid arthritis in 2.5%. Multiple risk factors (two or more) in 24.7% of patients. While in 27.2% of patients there was no identifiable risk factor; this result near similar to study done by Kevin J. Bozic et al<sup>22</sup>.

Most of patients (60%) presented with advance stage (IV) followed by (25%) presented with stage (III) then 15% of patients presented with stage (II).

Most of surgeries were done by lateral incision 68.5% followed by anterolateral incision in 23.9%, while posterior and anterior approaches were chosen in 6.5% and 1.1% respectively. This was according to the surgeon's preference and the case merit. Multimodal surgeries had been done for them according to the

radiological (Ficat and Arlet) stage of the disease.

For stages II and III core decompression for 24.4% of patients in form of multiple small drilling (12.2%) and large bore drilling with tibial bone graft (12.2%). In the twelve patients who were treated by multiple small drilling; pain relief reported in eight patients, increase range of movement in 9 patients, no limping in 8 patients, and independent walking in 7 patients; Seven patients were satisfied with the result of this surgery, and these results were similar to studies done by DP Baksi<sup>25</sup>, Mont, Michael A. et al<sup>26</sup>, but not comparable with the results of a study done by M. S. Lee et al<sup>27</sup> who said "Multiple drilling was less effective in preventing progression of osteonecrosis in hips with considerable involvement and in those with a high intra-osseous pressure in the intertrochanteric region (mean 45 mmHg (SD 25)). This study is not able to answer whether a return of the intra-osseous pressure to normal levels is required for satisfactory healing". Single case of complication was reported in form of infection. Four patients required subsequent surgical treatment during the follow up period.

In twelve patients who were treated by wide bore drilling with tibial bone graft; pain relief in seven patients, range of movement improved in 9 patients, limping improved in 8 patients, seven patients walked independently, and 9 patients were satisfied with the result of this surgery. No complication was reported. No patient required subsequent surgery; this Corresponds to a study done by Kevin J. Bozic et al<sup>20</sup>, Wim H. C. Rijnen et al<sup>21</sup>, Mont, Michael A. et al<sup>28</sup>, AC Fairbank et al<sup>29</sup>, and Hernigou et al<sup>30</sup>, and this is not similar to S. M. Tooke et al<sup>31</sup> their study showed "Core decompression is prescribed for Ficat Stage I and II. Patients on continuous post-operative treatment with steroids for associated conditions should be advised of the high

risk of progression", K.H. Koo et al<sup>32</sup> who showed that "Core decompression may be effective in symptomatic relief, but is of no greater value than conservative management in preventing collapse in early osteonecrosis of the femoral head", S. Saito et al<sup>33</sup> who said "Core decompression and bone grafting by our techniques gave poor long-term results, but those of rotation or varus osteotomies, performed with care for the correct indications, were better".

In comparison between multiple small drilling and wide bore decompression with bone graft the results were nearly similar; this is supported by David R. Marker, et al<sup>34</sup>.

While for advanced stages (IV) THR was our choice for 53(54.1%) patients; 25 patients (25.5%) were treated with cemented THR and 28(28.6%) were treated with cementless THR. In the cemented THR group; Pain relieved in 20 patients, 19 patients showed significant improvement of range of movement, 18 patients were free of limping, 16 patients walk independently, 3 patients still had shortening, and 17 patients were satisfied with this option. This result is similar to that of a study done by Garino J.P. et al<sup>35</sup>, Dudkiewicz I. et al<sup>36</sup>, Zangger P. et al<sup>37</sup>, Christophe Nich et al<sup>38</sup> studies. Three cases ended with complications: infection in one patient and dislocation in two cases.

In twenty eight hips who were treated by cementless THR; 21 hips were pain free (2 had mild tolerable pain relieved by simple analgesics), 25 showed improved range of movement, 20 hips were free of limping, 20 patients walked independently, 3 patients still had shortening, and 21 patients were satisfied with this procedure. This looks like the results of studies done by Mark R. Brinker et al<sup>20</sup>, George E. Petsatodis et al<sup>39</sup>, Mark A. Fye et al<sup>40</sup>, Byung-Woo Min et al<sup>41</sup>, Marc W. Hungerford et al<sup>42</sup>, Hui Zhang et al<sup>43</sup>, Scott G. Kantor et al<sup>44</sup>, Cabanela M. E. et al<sup>45</sup>, and R E Lins, et al<sup>46</sup>. We reported

postoperative dislocation in five patients (in one of them there was symptomatic DVT also).

The rest of patients in our series with advanced stage IV( 21.4%) were treated by Girdlestone resection arthroplasty; pain relieved in 19 hips ,improve range of movement in 17 hips ,21 hips had limping,11patients still using walking aids, and only 9 patients were satisfied with this procedure. No case of complication was reported. Really there are only two researches about Girdlestone procedure and little has been published, and we could not face similar study to compare our result. In this study postoperatively 90.5 % of patients were pain free. Which is identical to study done by Sharma H., kakar R.<sup>47</sup> in which all patients was pain free? In a study done by Laat, E.A.T, et al<sup>48</sup> they attribute pain to "Bony impingement" as the most important reason for this persisting postoperative pain. Bony impingement is an impaction of the pelvis and the proximal femur; this was found in one patient of our study. A bout ROM, 81% of patients have good range of movement postoperatively. Regarding the ability to walk, postoperatively 11 patients had good ability to walk, two patients walked indoor, and two patients were still confined to wheelchair, this outcome is similar to Laat, E.A.T, et al<sup>48</sup> study, none of their patients walk without aids. In our study 43% of patients are satisfied about the result of operation (although totally satisfied were 4 patients and relatively satisfied were 5 patients) and 57 % of patients are unsatisfied, either due to persistence of hip pain, limping and Trendlenberg gait, in comparison to similar study by Sharma H., kakar R.<sup>47</sup> overall 83.3% of their patients noticed satisfaction with Girdlestone procedure. With the recent advance in orthopedic surgery, the indications of Girdlestone resection arthroplasty are limited and it is just illustrated to be condemned .This study found that Girdlestone resection

arthroplasty was a viable option to salvage irreversible AVN of femoral head in medically suboptimal patients or for infected THR, and this also confirmed by other similar study by Laat, E.A.T, et al<sup>48</sup>.

### Conclusion

1. The majority of the patients' age in this study was between 20-50 years with a male to female ratio ~ 2:1.
2. Hip pain was the main presenting symptom followed by decrease range of movement then by limping.
3. Multiple risk factors and unidentifiable risks were the most probable predisposing factor, followed by steroid use, then by trauma and sickle cell disease.
4. Majority of patients presented within two years and with advanced stage (IV).
5. Majority of patients treated by hip arthroplasty followed by coredecompression and Girdlestone resection arthroplasty. Core decompression surgery in form of wide bore drilling with bone graft is suitable treatment for early stages of avascular necrosis. Total hip replacement is suitable option for AVN in advance stage. Resection arthroplasty still as an option for patients in certain situations (e.g. infection), although the results were less favorable.
6. The best patient satisfaction was seen after cementless THR and wide bore core decompression. And early postoperative complications were mostly reported after arthroplasty.

**Table I: Distribution of the patients according to age:**

Percentage	Number	Age(year)
1.1%	1	<20
26%	21	21-30
30%	24	31-40
24.6%	20	41-50
14.7%	12	51-60
3.6%	3	61-70

**Table II: Gender distribution of the patients.**

Percentage	Number	Sex
61.7%	50	Male
38.3%	31	Female
100%	81	Total

**Table III: Distribution of the patients according to presenting illness.**

Percentage	Number	presenting illness
100%	81	Pain
96.3%	78	LOM $\Omega$
88.89%	72	Limping

$\Omega$  LOM: limitation of movement.

**Table IV: Distribution of the patients according to possible risk factors:**

Percentage	Number	Risk factor(s)
27.2%	22	Unidentifiable
24.6%	20	Multiple*
17.3%	14	Steroids
9.9%	8	Trauma
9.9%	8	Sickle cell disease
4.9%	4	Smokers
3.7%	3	Alcoholic
2.5%	2	Rheumatoid arthritis
100%	81	Total

\*alcoholic, smoker=3; alcoholic, smoker, steroid=2; alcoholic, smoker, trauma=2; alcoholic, steroid=1; SCA, smoker=1; SCA, steroid=1; smoker, steroid=4; smoker, steroid, trauma=1; smoker, trauma=3; steroid, trauma=1.

**Table V: Distribution of the patients according to the duration of complains before presentation:**

Percentage	Number	Duration (year)
11%	9	1
39.5%	32	2
23.5%	19	3
16%	13	4
6.3%	5	5
3.7%	3	6

**Table VI: Distribution of the patients according to the radiological stage of lesion.**

Percentage	Number	Stage (Ficat)
0	0	I
15%	14	II
25%	23	III
60%	55	IV
100%	92	Total

**Table VII: Comparison between preoperative complain and postoperative outcome in patients treated by multiple small drillings:**

Multiple small drillings	Preoperative complain	Postoperative outcome	P value
Pain	12 (100%)	4 (33.3%)	0.007
Limp	8 (75%)	4 (33.3%)	0.190
LOM*	10 (83%)	3 (25%)	0.081
Walking aid	9 (75%)	5 (41.7%)	0.239

\* LOM: limitation of movement, ¥complication reported in one (8.3%) patient in form of infection. Patients' satisfaction in 7(58%). <sup>TM</sup>: mean follow up period was 20 months.

**Table VIII: Comparison between preoperative complain and postoperative outcome in patients treated by wide bore drilling with tibial bone graft.**

P value	Postoperative outcome	Preoperative complain	Wide bore drilling and bone graft
0.010	5Ω (41.7%)	12 (100%)	Pain
0.294	4 (33%)	8 (66.7%)	Limp
0.029	3 (25%)	11 (92%)	LOM*
0.394	5 (41.7%)	8 (66.7%)	Walking aid

\*LOM: limitation of movement, Ω: Two had mild tolerable pain relieve by simple analgesia. Patients' satisfaction in 9(75%)<sup>TM</sup>: mean follow up period was 12.4 months.

**Table IX: Comparison between preoperative complain and postoperative outcome in patients treated by cemented THR:**

P value	Postoperative outcome	Preoperative complain	cemented THR
0.000	5 (20%)	25 (100%)	Pain
0.000	7 (28%)	25 (100%)	Limp
0.000	6 (24%)	24 (96%)	LOM*
0.014	9 (36%)	21 (84%)	Walking aid
0.386	3 (12%)	10 (40%)	Shortening

\*LOM: limitation of movement, Complication in 3 (12%); 2 dislocation. 1 infection. <sup>TM</sup>: mean follow up period was 31 months.

**Table X: Comparison between preoperative complain and postoperative outcome in patients treated by Cementless THR:**

P value	Postoperative outcome	Preoperative complain	Cementless THR
0.000	7Ω (25%)	28 (100%)	Pain
0.000	8 (28.6%)	26 (93%)	Limp
0.000	3 (10.7%)	28 (100%)	LOM*
0.071	8 (28.6%)	19 (68%)	Walking aid
0.486	3 (10.7%)	9 (32%)	Shortening

\*LOM: limitation of movement, Ω:2 mild negligible pain, Complications in 5 (18%) Patients: in form of dislocation; in one of them both dislocation and DVT were reported. <sup>TM</sup>: mean follow up period was 13 months.

**Table XI: Comparison between preoperative complain and postoperative outcome in patients treated by Girdlestone resection arthroplasty:**

P value	Postoperative outcome	Preoperative complain	Girdlestone resection arthroplasty
0.000	2 (9.5%)	21 (100%)	Pain
0.081	21 (100%)	18 (85.7%)	Limp
0.000	4¥ (19%)	21 (100%)	LOM*
0.001	11Ω (52%)	21& (100%)	Walking aid
0.002	21 (100%)	4 (19%)	Shortening

\*LOM: limitation of movement, &6 bilateral, 3 wheel chaired, 12 walking aids, #3 bilateral, ¥:2 bilateral, Ω :2 wheel chair. <sup>TM</sup>: mean follow up period was 44 months.

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