

Efficacy of Intra-Operative Periarticular Injections among Patients Undergoing Total HIP Arthroplasty

Mustafa Pervez¹, Sateesh Pal², Azhar Rashid³, Vijay Golani¹,
Khalil Ahmed¹, Mohammad Umer¹

ABSTRACT

OBJECTIVE: To determine the efficacy of intra-operative periarticular injections (PAIs) among patients undergoing primary total hip arthroplasty.

METHODOLOGY: This study was conducted at the Department of Orthopedic Surgery, Institute of Orthopedics and Surgery Hospital, Karachi, from June 2021 to December 2022. This quasi-experimental study was done using a non-probability purposive sampling technique. Using the random table method, patients were randomly divided in two groups, i.e. groups A and B. Group A was the experimental group, having 34 patients treated with intra-operative PAI, while group B, also having 34 patients, was the control group. Data was entered and analyzed by the computer program SPSS-25.

RESULTS: 68 patients undergoing primary total hip arthroplasty were included; 41.2% (n=28) were male, and 58.8% (n=40) were female. The mean age was 53.53±9.39 years. Efficacy of intra-operative periarticular injection was observed in 60.3% (n=41); in group A, efficacy was 85.3% versus 35.3% in group B (P<0.001).

CONCLUSION: Intra-operative periarticular injection therapy is safe, effective and reliable in patients undergoing total hip arthroplasty. Periarticular injections can be safely employed intraoperatively for pain reduction and to achieve optimum functional outcomes to restore hip function, improving these patients' quality of life.

KEYWORDS: Total hip replacement, Periarticular injections, efficacy.

INTRODUCTION

Total joint arthroplasties (i.e. total hip arthroplasty or total knee arthroplasty) have been highly effective surgical techniques among patients with long-term degenerative joint issues of the hip or knee.^{1,2} However, postoperative pain following Total joint arthroplasty can be severe, often requiring prolonged hospitalization for intravenous analgesia. Prolonged duration of hospitalization and immobility can increase the chances of acquiring infections and developing deep vein thrombosis (DVT)^{3,4}. Furthermore, physical activities in these patients are also compromised by pain, affecting functional ability. Early postoperative recovery in quality of life is essential after Total hip replacement and anaesthetic infiltration at the surgical site is a crucial segment regarding pain management^{5,6}. For the reduction of perioperative morbidities and to achieve fast recovery following arthroplasty surgeries, anaesthetic protocols,

perioperative pain management techniques, and functional outcomes must be provided due consideration⁷. Injectable opioid intake or use of epidural analgesia can also be associated with adverse events which may interfere with early recovery and rehabilitation, which is preventable with the use of local infiltrations employing analgesic mixtures. Further research is required to improve early recovery followed by total hip arthroplasty⁸.

Periarticular injection (PAI), which is also regarded as local infiltration analgesia or periarticular multimodal drug injection, is a relatively newer technique for regional analgesia⁹. This technique involves the administration of analgesia into the adjacent tissues in the surgical area¹⁰. Typically, the mentioned method involves injecting a combination of local anaesthetic agents. Many recent research papers have confirmed the effectiveness of PAI in providing postoperative pain relief, while others have not found it to be significantly better than other pain management methods¹¹.

METHODOLOGY

This study was conducted at the Department of Orthopedic Surgery, Institute of Orthopaedics and Surgery Hospital, Karachi, from June 2021 to December 2022. This quasi-experimental study was

¹Department of Orthopedic Surgery, Institute of Orthopedic Surgery (IOS), Karachi, Sindh-Pakistan.

²Department of Orthopedic Surgery, United Medical and Dental College, Karachi, Sindh-Pakistan.

³Department of Orthopaedic Surgery, Bakhtawar Amin Medical and Dental College, Multan, Punjab-Pakistan.

Correspondence: mustafa_pervez@hotmail.com

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done using a non-probability purposive sampling technique.

Sixty-eight patients undergoing primary total hip arthroplasty who met our inclusion criteria were enrolled in the study. Patients with primary or secondary osteoarthritis of hip joint aged 40 – 70 years of either sex were included, while patients with rheumatoid arthritis, systematic inflammatory disease, active infection at operative site, history of bleeding disorders, severe arrhythmia and congenital dysplastic hip condition were excluded from our study. Prior permission was taken from the Hospital Ethical Review Committee. Using the random table method, these patients were randomly divided in two groups, i.e. groups A and B. Group A was the experimental group, having 34 patients treated with intra-operative PAI, while group B, also having 34 patients, was the control group. Group A received a multimodal drug PAI consisting of 15ml of 5mg/ml bupivacaine, 1ml of 30mg/ml ketorolac, 1ml of 25mg/ml dexamethasone, 0.1ml of 0.1% epinephrine, and saline to make up 50 ml in total before the incision was closed. Group B received a placebo saline injection simultaneously during the operation. Intravenous Paracetamol and tramadol were used for postoperative analgesia. The pain score was calculated as a mean of 3.25±0.78 versus 5.04±0.11 after 24 hours of surgery, as reported by Xiong et al.¹², using the CDC's EPI info software. These patients were followed for six months to ascertain efficacy, defined as patients having a visual analogue score or pain score less than three after one week of surgery and a Harris Hip score more than 80 6 months of surgery.

Data analysis was done using SPSS-25 to calculate mean and standard deviation for the age of patients, VAS score, Mean Harris Hip Score and BMI. Frequencies and percentages were calculated for categorical variables like gender, obesity, occupation, age groups, residential status, occupation and efficacy. Efficacy was compared using a chi-square test at 95 % CI.

RESULTS

Sixty-eight patients undergoing total hip arthroplasty were included; 41.2% (n=28) were male and 58.8% (n=40) were female. Mean age was 53.53±9.39 years (range; 37 – 70 years). The mean age of male patients was 52.14±9.28 years, while that of female patients was 54.50±9.46 years (P=0.312), and 60.3% (n=41) were more than 50 years old. Of these 68 patients, 30.9 % (n=21) were diabetic, and 36.8% (n=25) were hypertensive. The mean body mass index was 26.32±2.44 kg/m² and 29.4% (n=20) were obese. Efficacy was observed in 60.3% (n=41); in group A, efficacy was 85.3% versus 35.3% in group B (P<0.001).

Table I: Baseline characteristics in experimental and control groups (n=68)

Characteristics	Groups		P value
	Group A (n = 34)	Group B (n = 34)	
Gender			
Male (n= 28)	13 (38.2%)	15 (44.1%)	0.622
Female (n=40)	21 (61.8%)	19 (55.9%)	
Age groups			
Up to 50 Years (n= 27)	13 (38.2%)	14 (41.2 %)	0.804
> 50 Years (n=41)	21 (61.8%)	20 (58.8%)	
Diabetes			
Yes (n=21)	10 (29.4%)	11 (32.4%)	0.793
No (n=47)	24 (70.6%)	23 (67.6%)	
Hypertension			
Yes (n=25)	13 (38.2%)	12 (35.3%)	0.801
No (n=43)	21 (61.8%)	22 (64.7%)	
Obesity			
Yes (n=20)	11 (32.4%)	09 (26.5%)	0.595
No (n=48)	23 (67.6%)	25 (73.5%)	
Pain Score			
Mean (SD)	2.26±0.10	4.13 ± 0.14	< 0.001
Harris Hip Score			
Mean (SD)	89.10±0.41	88.72± 1.87	<0.001

Table II: Distribution of efficacy of periarticular injection among study cases (n= 68)

Efficacy (n=68)	Group A		Group B		P Value
	Frequency	%	Frequency	%	
Yes (n=41) (60.3 %)	29	85.3	12	35.3	< 0.001
No (n=27) 39.7 %	05	14.7	22	67.7	
Total	34	100	34	100	

DISCUSSION

Intra-operative Periarticular injection, a multimodal drug, has been demonstrated as safe and effective in relieving postoperative pain, leading to better functional outcomes after surgery among patients undergoing total joint replacement¹³. Available literature has documented that the reflection of changes in inflammatory features after joint replacement assists surgeons in categorizing and identifying atypical characteristics in a timely and accurate manner¹⁴. Most of the previous research has primarily focused on cases of femoral neck fractures, while data regarding osteoarthritis of the hip or

avascular necrosis of the femoral head remains obscure^{15,16}. Furthermore, the use of PAI in these patients with osteoarthritis of the hip is also scarce, and results are inconclusive.

Sixty-eight patients undergoing total hip arthroplasty were included; 41.2% (n=28) were male and 58.8% (n=40) were female. Xiong et al.¹² have also reported 62% of female patients undergoing total hip arthroplasty due to osteoporotic femoral neck fracture, similar to our study results. Fayyaz et al.¹⁷ have also reported 63% of female patients undergoing total hip arthroplasty, similar to our study results. Piovella et al.¹⁸ reported 60 % female gender predominance, close to our study results. However, a study by Inam et al.¹⁹ reported 66% male patients, which differs from our study results. Saeed et al.²⁰ have reported 69% male gender predominance, different from our study results. Wang et al.²¹ from China have also written 52 % of female patients predominance, similar to our study results. Hirasawa et al.²² have also reported 85% of female patients undergoing total hip arthroplasty, similar to our study results.

Mean age was 53.53±9.39 years (range; 37 – 70 years). The mean age of male patients was 52.14±9.28 years, while that of female patients was 54.50±9.46 years (P=0.312), and 60.3% (n=41) were more than 50 years old. Fayyaz et al.¹⁷ have also reported 51±8.89 years mean age of the patients undergoing total hip arthroplasty, similar to our study results. A study by Inam et al.¹⁹ has reported 63.05±4.35 years mean age of the patients undergoing total hip arthroplasty, similar to our study results. Saeed et al.²⁰ have also reported 53.72±8.08 years mean age, similar to our study results. Wang et al.²¹ from China have also reported 69.03 years mean age, similar to our study results. Hirasawa et al.²² have also reported 63.0±10.05 years mean age, similar to our study results.

Of these 68 patients, 30.9% (n=21) were diabetic, and 36.8% (n=25) were hypertensive. Piovella et al.¹⁸ reported 37.6% hypertension and 13 % diabetes, similar to our results.

The mean body mass index was 26.32±2.44 kg/m², and 29.4% (n=20) were obese. Fayyaz et al.¹⁷ have also reported 36% obesity among patients undergoing total hip arthroplasty, similar to our study results from Piovella et al.¹⁸ reported similar results. Hirasawa et al.²² have also reported 24.4±3.1 kg/m² mean BMI of patients undergoing total hip arthroplasty, similar to our study results.

Efficacy was observed in 60.3% (n=41); in group A, efficacy was 85.3% versus 35.3% in group B (P<0.001). Xiong et al.¹² also reported that there was significant pain reduction in the PAI group versus the control group (P<0.001) postoperatively, as well as a substantial improvement in Harris Hip score (P<0.001) in the PAI group as compared with controls, similar to our study results.

CONCLUSION

Intra-operative periarticular injection therapy is safe, effective and reliable in patients undergoing total hip arthroplasty. Periarticular injections can be safely employed intraoperatively for pain reduction and to achieve optimum functional outcomes to restore hip function, improving these patients' quality of life.

Ethical Permission: Institute of Orthopaedics & Surgery, Karachi, letter No.

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Data Sharing Statement: The corresponding author can provide the data proving the findings of this study on request. Privacy or ethical restrictions bound us from sharing the data publically.

AUTHOR'S CONTRIBUTION

Pervez M:

Pal S:

Rashid A:

Golani V:

Ahmed K:

Umer M:

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