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A prospective study of local infiltration analgesia for post-operative pain control following total hip replacement

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Abstract

Objective: Local infiltration analgesia has gained popularity in recent past using mixture of drugs for various surgeries. This study was planned to assess the efficacy of local infiltration, which is a mixture of ropivacaine, clonidine, adrenaline, ketorolac, adrenalin and normal saline, for total hip replacement based on postoperative outcomes like Visual Analogue Score (VAS), mobilization time and hospital stay.

Materials and methods: A prospective study was conducted with 30 patients of both the gender of all age groups, fit for total hip replacement. During the operative procedure local infiltration analgesia was infused at 3 stages. Patient was assessed for post operative pain based on visual analogue score, mobilization time and hospital stay.

Results: Among 30 patients included in the study, 23 (76.7%) were male and 7 (23.3%) were female. Of total 30 patients 83% of the patients had a VAS of 0-3 at rest for 6th, 12th, 18th and 24th hour intervals and on movements 80% of the patients had a VAS of 0-3 at rest for 12th, 18th and 24th hour intervals. The age of patients ranged from 17yrs to 83 years. The mean duration of hospital stay was 3.53 days. The mean time duration of first walk was 14.1467hrs.

Conclusion: Local infiltration analgesia can be considered as safe practice in efficiently controlling pain after total hip arthroplasty.

Keywords: Local infiltration analgesia, total hip replacement, VAS, post-operative pain

Introduction

Local infiltration analgesia (LIA) in total hip replacement is used to reduce severe postoperative pain which may delay recovery and rehabilitation. The aim is to achieve adequate pain relief in combination with good muscle function and help in early mobilization. In recent decades, in spite of studies showing a better understanding of pain mechanism, increased awareness regarding postsurgical pain and advances in pain-management approaches, still controlling postoperative pain has been an unresolved problem. In a remarkable number of patients, post-operative pain is not efficiently managed, due to which it can have negative effects on patients including function, recovery from surgery, and quality of life; extended opioid use, increased morbidity, and increased medical costs. Postoperative pain may hamper physical functioning, recovery, and quality of life [1, 2, 3, 4]. This has been dealt with spinal or parenteral opioids, peripheral nerve blocks, and epidural analgesia conventionally [5]. In 2008, Kerr and Kohan described local infiltration anesthesia (LIA) to reduce pain, opioid consumption and improve mobilization after total hip replacement (THR). The analgesic effect from LIA is directly proportional to the direct actions of each constituent drug [6, 7, 8]. The primary objective of this study is to know the effect of local infiltration analgesia following total hip replacement based on postoperative outcomes like analgesia score using Visual Analogue Score at rest and on mobilization, first assisted walk and hospital stay.

Materials and methods

This is a prospective observational study conducted over a period of one year from January 2018 to December 2018 in the Department of orthopedics, KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belagavi attached to KLE University's Jawaharlal Nehru

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medical college, Belagavi. Thirty patients of both genders of all age group, admitted for Total Hip replacement were included in the study. Demographic data such as age, sex and history was obtained through an interview. These patients were further subjected to clinical examination and the findings such as type and extent were noted on a predesigned and pretested Proforma. Patients were operated for total hip replacement through Hardinge approach under spinal anesthesia.

Table 1:

Cocktail in THR	unilateral
INJ. Ropivacane	40ml
INJ. Clonidine	0.6ml
INJ. Adrenaline	0.3ml
INJ. Ketorolac	1ml
Normal Saline	18ml
Total	60ml

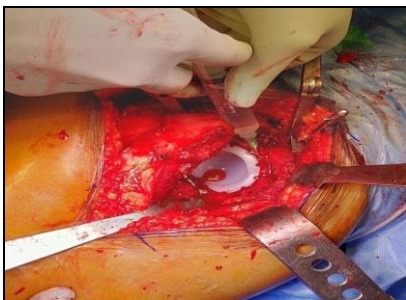


Fig 1: Infiltration into the tissues around the rim of the acetabulum

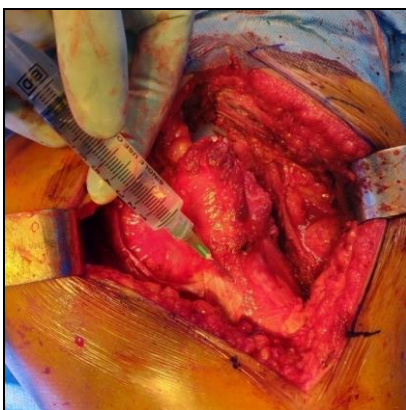


Fig 2: Infiltration into the iliotibial band



Fig 3: Infiltration into the gluteal tendon and external rotators



Fig 4: Infiltration into the subcutaneous tissue

Local infiltration analgesia (LIA) of 20ml was infused in 3 stages during the procedure. In the 1st stage LIA of 20mL injected around the rim of the acetabulum, joint capsule and in to the gluteal and adductor muscles.⁹ In the 2nd stage LIA 20 mL injected around the gluteal tendon, external rotators, and iliotibial band. In the 3rd stage LIA of 20 mL was injected into the subcutaneous before the closure of the skin.⁹ Post operatively patient was assessed for pain via VAS at rest and movements, every 6th hourly for the 1st 24 hours. Patients were also assessed for first assisted walk and number of days of stay in hospital. Data were entered into Microsoft excel data sheet and analyzed using SPSS 22 version software. Categorical data represented in the form of frequencies and proportions. Chi-square used as test of significance. Continuous data represented as mean and standard deviation. For qualitative data, median and interquartile ranges were estimated. Independent t-test used as a test of significance to identify the mean difference between two groups. p value <0.05 was considered as statistically significant.

Results

Thirty patients were included in the study, and the observations of these patients were compiled and analyzed. The age of patients ranged from less than 40 to more than 60 years. Among 30 patients included in the study, 23 (76.7%) were male and 7 (23.3%) were female.

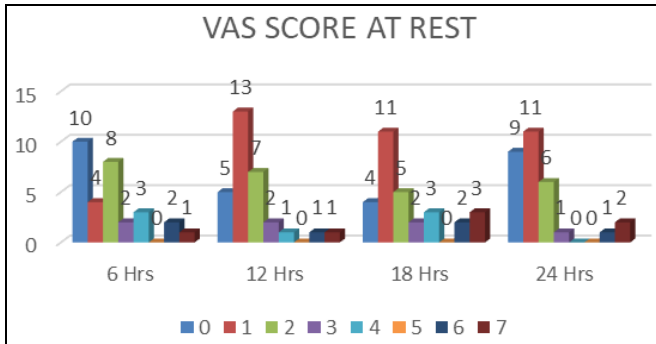
Mean duration of hospital stay: Of total 30 patients included in the study, the mean duration of hospital stay was 3.53day (SD:1.04)

Mean time duration of starting first walk among study subjects: Of total 30 patients included in the study, the mean time duration of starting first walk was 14.1467 hrs. (2.1279)

Distribution of VAS scores at rest, at 6, 12, 18 and 24 hrs.
 Of total 30 patients (100%), 10 (33.3%), 5 (16.7%), 4 (13.3%) and 9 (30%) patients had no pain at 6, 12, 18, 24 hrs, respectively. VAS 1 was seen in 4 (13.3%), 13 (43.3%), 11 (36.7%) and 11 (36.7%) patients at 6, 12, 18, 24 hrs, respectively. VAS 2 was seen in 8 (26.7%), 7 (23.3%), 5 (16.7%) and 6 (20.0%) patients at 6, 12, 18, 24 hrs, respectively. VAS 3 was seen in 2 (6.7%), 2 (6.7%), 2 (6.7%) and 1 (3.3%) patients at 6, 12, 18, 24 hrs, respectively. VAS 4 was seen in 3 (10.0%), 1 (3.3%), 3 (10.0%) and 0 (0%) patients at 6, 12, 18, 24 hrs, respectively. VAS score 6 was seen in 2 (6.7%), 1 (3.3%), 2 (6.7%) and 1 (3.3%) patients at 6, 12, 18, 24 hrs. respectively. VAS 7 was seen in 1 (3.3%), 1 (3.3%), 3 (10.0) and 2 (6.7%) patients at 6, 12, 18, 24 hrs. respectively.

Table 2: Distribution of VAS at rest, at 6,12,18 and 24 hrs.

Vas score at rest	@ 6HRS		@12 HRS		@18 HRS		@24HRS	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
0	10	33.3	5	16.7	4	13.3	9	30.0
1	4	13.3	13	43.3	11	36.7	11	36.7
2	8	26.7	7	23.3	5	16.7	6	20.0
3	2	6.7	2	6.7	2	6.7	1	3.3
4	3	10.0	1	3.3	3	10.0	0	0
5	0	0	0	0	0	0	0	0
6	2	6.7	1	3.3	2	6.7	1	3.3
7	1	3.3	1	3.3	3	10.0	2	6.7



Graph 1: Distribution of VAS score at rest, at 6, 12, 18 and 24 hrs.

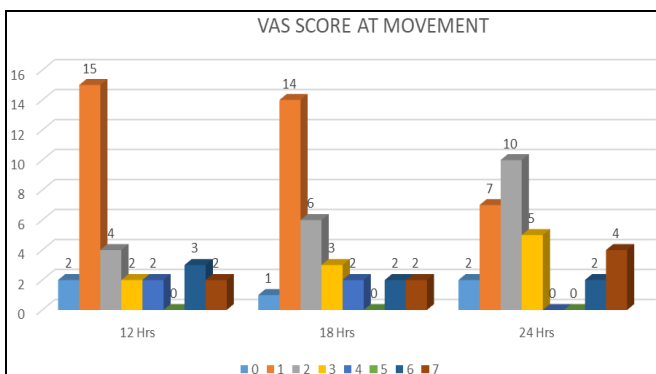
X-axis: Time in hours
Y-axis: VAS (patients)

Distribution of VAS at movement of study subjects at 12, 18 and 24 hrs.

Of total 30 patients (100%), 2 (6.7%), 1 (3.3%) and 2 (6.7%) had no pain at 12, 18, 24 hrs, respectively. Total 15 (50.0%), 14 (46.7%) and 7 (23.3%) patients had VAS at movement of 1 at 12, 18, 24 hrs, respectively; 4 (13.3%), 6 (20.0%) and 10 (33.3%) patients had VAS at movement of 2 at 12, 18, 24 hrs, respectively; 2 (6.7%), 3 (10.0%) and 5 (16.7%) patients had VAS at movement of 3 at 12, 18, 24 hrs, respectively; 2 (6.7%), 2 (6.7%) and 0 (0%) had VAS at movement of 4 at 12, 18, 24 hrs, respectively; 3 (10.0%), 2 (6.7%) and 2 (6.7%) patients had VAS at movement of 6 at 12, 18, 24 hrs, respectively; and 2 (6.7%), 2 (6.7%) and 4 (13.3%) patients had VAS at movement of 7 at 12, 18, 24 hrs, respectively.

Table 3: Distribution of VAS at movement, at 12, 18 and 24 hrs

Vas score movements	@12HRS		@18 HRS		@24HRS	
	Frequency	%	Frequency	%	Frequency	%
0	2	6.7	1	3.3	2	6.7
1	15	50.0	14	46.7	7	23.3
2	4	13.3	6	20.0	10	33.3
3	2	6.7	3	10.0	5	16.7
4	2	6.7	2	6.7	0	0
5	0	0	0	0	0	0
6	3	10.0	2	6.7	2	6.7
7	2	6.7	2	6.7	4	13.3



Graph 2: Distribution of VAS score at movement, at 12, 18 and 24 hrs

X-axis: Time in hours
Y-axis: VAS (patients)

Table 4:

Rating	Pain level
0	NO PAIN
1-3	Mild pain (Nagging, Annoying, Interfering little with ADLS)
4-6	Moderate pain (Interferes significantly with ADLS)
7-10	Severe pain (Disabling: Unable to perform ADLS)

Discussion

Kerr DR, *et al.*, conducted a study named, “Local infiltration analgesia: a technique for the control of acute postoperative pain following knee and hip surgery.” In this study, they developed a technique called “local infiltration analgesia” (LIA) for pain management post-surgery for the hip and knee. This practice involves in infiltration of the combination of drugs i.e. ropivacaine, ketorolac and adrenaline into the tissues during the procedure for pain management, immediate mobilization and early discharge from the hospital, without much adverse effects. This was an open non-randomized study, involving 325 patients for hip resurfacing (HRA), primary THR and primary TKR, from January 1, 2005, to December 31, 2006. They noted down pain scores, mobilization time, and the amount of usage of morphine in all patients. They concluded that pain was satisfactory (pain score ranging from 0-3). In two-third of the patients, morphine was not used. The first assisted walk was between 5 to 6 hours post-surgery and the independent walk was between 13-22 hours post-surgery. Out of 325 patients, 230 patients got discharged home after one single night stay in hospital postoperatively. When comparing our study with the above-mentioned study (Dennis R Kerr and Lawrence) 83% of the patients had VAS of 0-3 at 6th hrs. interval for 1st 24 hrs. post THR at rest and 80% of the patients had VAS of 0-3 at 12th, 18th and 24th-hour interval on walking. This is found

to be a satisfactory VAS score, in managing post-operative pain, post THR. The average first walk of the patient's post THR was 14.1467 hrs. and 46% of the patients who underwent THR had 3 days and 10% had 2 days of hospital stay i.e more than 50% of the patients had less than or equal to 3 days of hospital stay, which is a significant result obtained.

Conclusion: In the past LIA for managing post-operative pain has not be successful. – both because there has been no systemic technique available for effective drug delivery to all relevant parts of surgical sites. Currently continuous wound infiltration with local anesthetics through wound catheters and continuous nerve block techniques may perhaps be considered to be gold standard for analgesia after hip replacement surgery. In our study, local infiltration analgesia was infiltrated at 3 stages intraoperatively. Postoperatively pain was graded based on VAS, our observations shows that it is possible to achieve satisfactory control of pain using local infiltration analgesia. Local infiltration analgesia can be considered as safe practice in efficiently controlling pain after total hip arthroplasty.

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