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Different dexamethasone doses in the perioperative period improve short-term outcomes of total hip arthroplasty: a randomized controlled trial

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Abstract. – OBJECTIVE: This study aimed to evaluate the efficacy of different dexamethasone doses in the perioperative period of total hip arthroplasty (THA).

PATIENTS AND METHODS: We randomly divided 180 patients into three groups: three perioperative saline injections (Group A, placebo); two perioperative doses of 15 mg dexamethasone plus a postoperative saline injection at 48 h (Group B); and three perioperative doses of dexamethasone (10 mg) (Group C). Primary outcomes were postoperative pain at rest and while walking. We also recorded consumption of analgesics and antiemetics, incidence of postoperative nausea and vomiting (PONV), C-reactive protein (CRP) and interleukin-6 (IL-6) levels, postoperative length of stay (p-LOS), range of motion (ROM), nausea, Identity-Consequence-Fatigue-Scale (ICFS), and severe complications (e.g., incidence of surgical site infection, SSI and gastrointestinal bleeding, GIB).

RESULTS: Group B and C had significantly lower pain scores at rest than Group A on postoperative day 1. Group B and C also had significantly lower dynamic pain score, CRP, and IL-6 than Group A on postoperative day 1, 2, and 3. Patients in Group B and C had lower PONV incidence, reduced use of analgesics and antiemetics, improved ROM, shorter p-LOS, lower VAS nausea score, and lower ICFS than Group A patients. On postoperative day 3, patients in Group C had significantly lower dynamic pain and ICFS scores, IL-6, and CRP than Group B patients, as well as higher ROM. None of the groups exhibited SSI or GIB.

CONCLUSIONS: Dexamethasone provides short-term advantages in reducing pain, PONV, inflammation, and ICFS, and increasing ROM in the early postoperative period after THA. Dexamethasone efficacy in reducing post-THA pain, inflammation, and PONV at 10 mg and 15 mg is similar during the first 48 h. Dexamethasone (30 mg) divided into three 10 mg doses was superior to two doses (15 mg) in reducing pain, inflammation, and ICFS, as well as in increasing ROM on postoperative day 3.

Key Words:
Total hip arthroplasty, Dexamethasone, Dosage efficacy, Postoperative complications.

Introduction

Total hip arthroplasty (THA) is an effective procedure for treating advanced osteoarthritis and other hip diseases, improving patient hip function and quality of life[1,2]. However, the procedure often causes moderate-to-severe postoperative pain, limiting early recovery[3,4]. Despite multimodal analgesia minimizing opioid use in recent years, the opioid epidemic remains a problem, generating challenges for optimal pain control during the perioperative period of THA. In addition, opioid analgesics often cause side effects, such as postoperative nausea and vomiting (PONV) or postoperative constipation and addiction, significantly reducing postoperative satisfaction[5-8].

Inflammation plays a crucial role in postoperative pain[9-11]. The medium-long-acting glucocorticoid dexamethasone can reduce acute and chronic inflammation after THA, while also having a positive effect on postoperative analgesia[12-14]. However, its clinical heterogeneity has caused uncertainty regarding optimal administration time and dosage[7,15]. Studies[13,16] have reported that 5-10 mg of dexamethasone is generally required to prevent PONV in the perioperative period of THA. A high preoperative dose of dexamethasone can ameliorate pain[17], but the analgesic effect is limited after 24 h[18]. Pain response is the most pronounced within 3 days of THA because inflammatory response is highest at that point. Combined with the results of previous studies, we can conclude that a single high preoperative dose

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of dexamethasone does not provide sustained analgesic and anti-inflammatory effects. In this study, we divided a high dose (30 mg) of dexamethasone into two or three equivalent split doses. We then attempted to identify the difference between 10 mg and 15 mg of dexamethasone in reducing pain and inflammation during the THA perioperative period. Additionally, we aimed to determine whether three equivalent split doses had a superior effect to two doses. Finally, we analyzed the safety of repeated dexamethasone administration within 48 h of the THA perioperative period.

Patients and Methods

Patients

This prospective, double-blind, randomized, controlled study was conducted from December 2020 to July 2022. Recruitment was approved by the institutional review board and registered at the International Clinical Trials Registry (ChiCTR2000040160). All patients provided written informed consent before participation. Inclusion criteria were unilateral THA and a signed informed consent form. Exclusion criteria were as follows: (1) dexamethasone allergy; (2) age ≤18 years or ≥75 years; (3) glucocorticoid use within 3 months or any strong opioids within a week;(4) history of severe heart disease (NYHA>2), liver/kidney failure, or systemic rheumatic diseases (rheumatoid arthritis, ankylosing spondylitis, systemic lupus erythematosus); (5) prior ipsilateral hip surgery, (6) lack of cognitive function or normal sensation, and (7) loss to follow-up.

Methods

The 180 patients were randomly divided into three groups (A, B, and C), each with 60 patients. All patients were randomly assigned sequences hidden in opaque, sealed envelopes that were opened before surgery. Patients in Group A received three doses of intravenous saline, first before anesthesia induction, then at 24 and 48 h after surgery. Patients in Group B were intravenously injected with dexamethasone (15 mg) before anesthesia induction (2 mL; Sinopharm, China) and after 24 h; a 15 mg dose of normal saline was administered after 48 h. Patients in Group C were administered dexamethasone (10 mg) intravenously before anesthesia induction, then at 24 h and 48 h after surgery. All participants, surgeons, anesthesiologists, nurses, and research assistants were blinded to group allocation.

Patient Demographics

From December 2020 to July 2022, 192 patients scheduled to undergo primary unilateral THA were screened for inclusion in the study. Eight patients did not meet the inclusion criteria, and four refused to participate, leading to 180 participants (Figure 1). None of these individuals were lost to follow-up at the three-month endpoint. There was no statistical difference in the general data of the patients (Table I).

All surgeries were performed by a senior physician of the surgical team in a hundred-level laminar flow operating room. Patients were evaluated by an anesthesiologist and given general anesthesia in the lateral decubitus position, anterolateral approach, and non-bone cement prosthesis. To control for confounding variables, none of the patients were given nerve block or intravenous analgesia during the perioperative period.

Postoperative Nursing

Ankle dorsal, plantar flexion, and quadriceps strength exercises began in the recovery bay. These three regions were subcutaneously injected with LMWH 6h post-operation. Patients received standard supervised physiotherapy daily, including active range of motion (ROM) training, strength training, and walking. All patients received identical analgesia and PONV management regimens. After returning to the ward, pain was assessed using a visual analog scale (VAS; 0: no pain, 10: the worst pain imaginable). If VAS scores were between 4 and 6, oxycodone was administered orally at Q8h (10 mg). If pain VAS exceeded 6, 100 mg of tramadol was administered intramuscularly. Another VAS (0: no nausea, 10: the worst nausea imaginable) was used to assess nausea severity. If nausea VAS exceeded 5, 10 mg of metoclopramide was administered as a first-line antiemetic. After 30 min, if nausea persisted, 5 mg of ondasetron was administered as a second-line antiemetic.

At postoperative 24, 48, and 72 h, CRP, IL-6, pain VAS score, nausea VAS score, and POVN incidence were recorded. Total number and dose of postoperative analgesics (oxycodone, tramadol hydrochloride), along with antiemetics (metoclopramide, ondansetron), were noted. The Identity-Consequence-Fatigue-Scale (ICFS)[19] was used to determine fatigue before surgery and on postoperative day 3(POD3). A nurse assessed ROM using a goniometer before surgery and on POD3. Postoperative length of stay (p-LOS) and complications were also recorded.

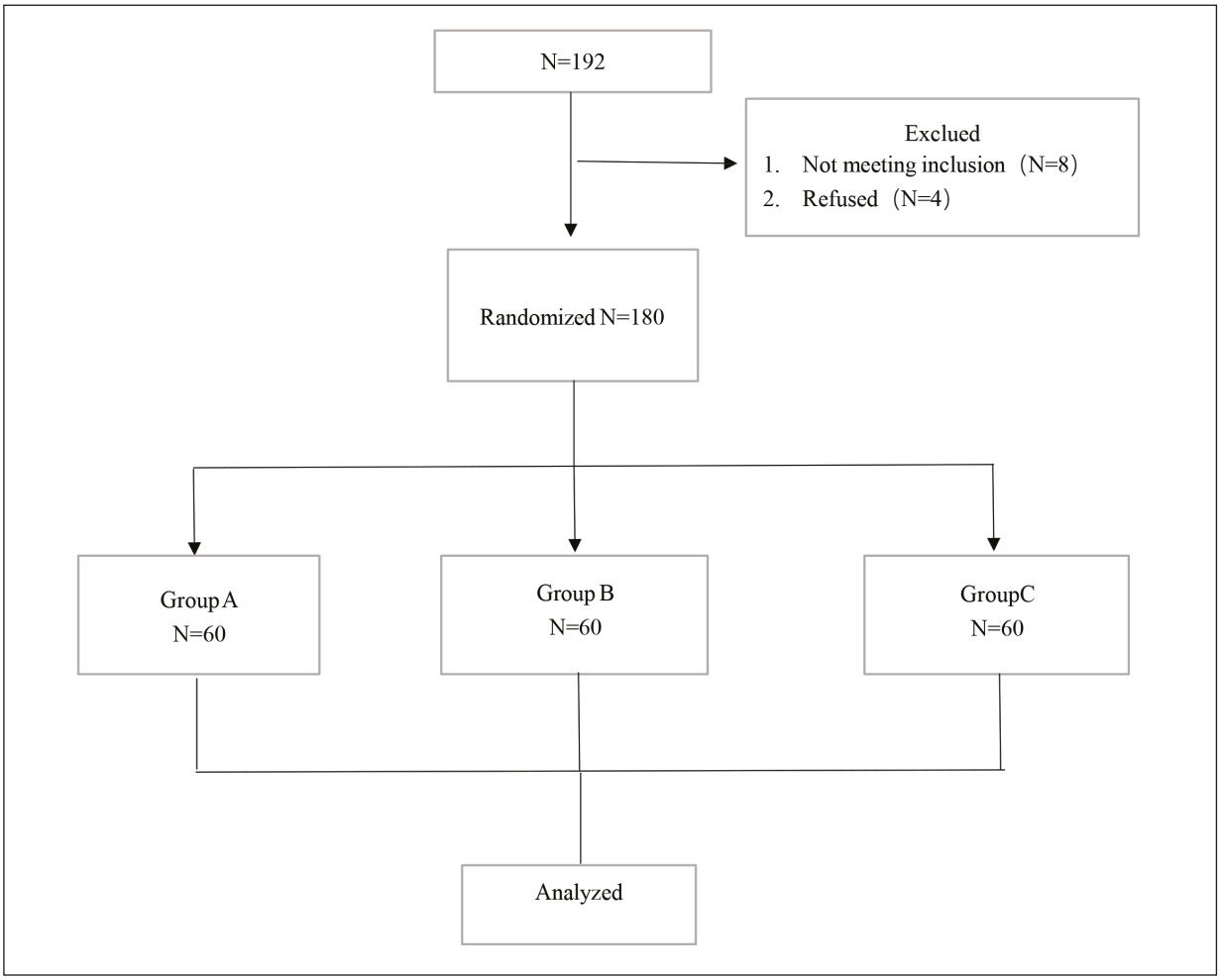

Figure 1. Schematic diagram of the patient study process.

Table I. Demographic data of the patients receiving THA.

	Group A	Group B	Group C	*p*
N	60	60	60	-
Age (y)	63.88±5.90	64.50±5.18	64.83±4.30	0.59
Gender (M/F)	26/34	20/40	28/32	0.31
Height (m)	1.63±0.08	1.62±0.07	1.63±0.05	0.52
Weight (kg)	64.83±8.28	64.24±6.36	64.52±4.95	0.89
BMI (kg/m^2)	24.49±2.56	24.63±3.08	24.49±2.66	0.84
Hypertension (Y/N)	12/48	12/48	15/45	0.80
Diabetes (Y/N)	2/58	3/57	2/58	0.86
Etiology (ONFH/OA/DDH)	37/14/9	32/18/10	33/16/11	0.76
Preoperative CRP	7.93±2.78	7.47±2.09	7.94±2.11	0.46
Preoperative IL-6	2.43±1.42	2.39±1.50	2.80±1.48	0.24
Preoperative rest VAS	5.43±0.87	5.38±1.08	5.50±1.02	0.81
Preoperative motive VAS	8.00±0.84	8.03±0.90	8.10±0.82	0.81
Preoperative ICFS score	62.10±6.30	62.43±4.22	63.37±4.29	0.36
Preoperative ROM	90.43±3.88	91.10±3.97	90.92±3.65	0.62

Table II. The level of CRP and IL-6.

		Group A	Group B	Group C	*p*	p^1	p^2	p^3
POD1	CRP	46.86±11.55	35.63±6.70	36.70±8.58	0.00	0.00	0.00	0.52
	IL-6	95.51±19.97	65.80±8.72	67.86±9.22	0.00	0.00	0.00	0.59
POD2	CRP	102.30±11.56	68.82±12.36	70.52±11.60	0.00	0.00	0.00	0.43
	IL-6	83.55±12.90	56.76±7.70	58.44±8.87	0.00	0.00	0.00	0.36
POD3	CRP	82.66±9.05	50.63±11.20	40.42±6.53	0.00	0.00	0.00	0.00
	IL-6	67.63±11.67	42.59±5.54	38.99±6.26	0.00	0.00	0.00	0.026

p: A *vs*. B *vs*. C; p^1: A *vs*. B; p^2: A *vs* .C; p^3: B *vs*. C.

Statistical Analysis

Statistical analyses were performed in SPSS version 24 (SPSS Inc., Armonk, NY, USA). Data are presented as means±standard deviation (continuous variables) or raw numbers (qualitative variables). One-way ANOVA and Tukey's post-hoc test were used to evaluate parametric data, while the Mann-Whitney U-test was used for nonparametric data. Qualitative comparative data were analyzed with Pearson's chi-square test or Fisher's exact test. Significance was set at $p<0.05$.

Results

Inflammation Markers

At postoperative 24, 48, and 72 h, CRP levels in Group B (35.63±6.70, $p<0.001$; 68.82±12.36, $p<0.001$; 50.63±11.20, $p<0.001$) and C (36.70±8.58, $p<0.001$; 70.52±11.60, $p<0.001$; 40.42±6.53, $p<0.001$) were generally lower than those in Group A (46.86±11.55; 102.30±11.56; 82.66±9.05). Group B and C also differed in CRP at postoperative 72 h ($p=0.00$), but not at 24 and 48 h ($p=0.52$, $p=0.43$) (Table II and Figure 2).

Consistent with CRP differences, IL-6 levels in Group B (65.80±8.72, $p<0.001$; 56.76±7.70, $p<0.001$; 42.59±5.54, $p<0.001$) and C (67.86±9.22, $p<0.001$; 58.44±8.87, $p<0.001$; 38.99±6.26, $p<0.001$) were lower than those in Group A (95.51±19.97; 83.55±12.90; 67.63±11.67) at postoperative 24, 48, and 72 h. Group B and C also differed in IL-6 levels at 72 h ($p=0.026$) (Table II and Figure 3).

Pain Level and Analgesic Rescue

On POD1, pain scores at rest were significantly lower for Group B (3.93±0.64, $p<0.001$) and C (3.95±0.53, $p<0.001$) than for Group A (4.48±0.81).

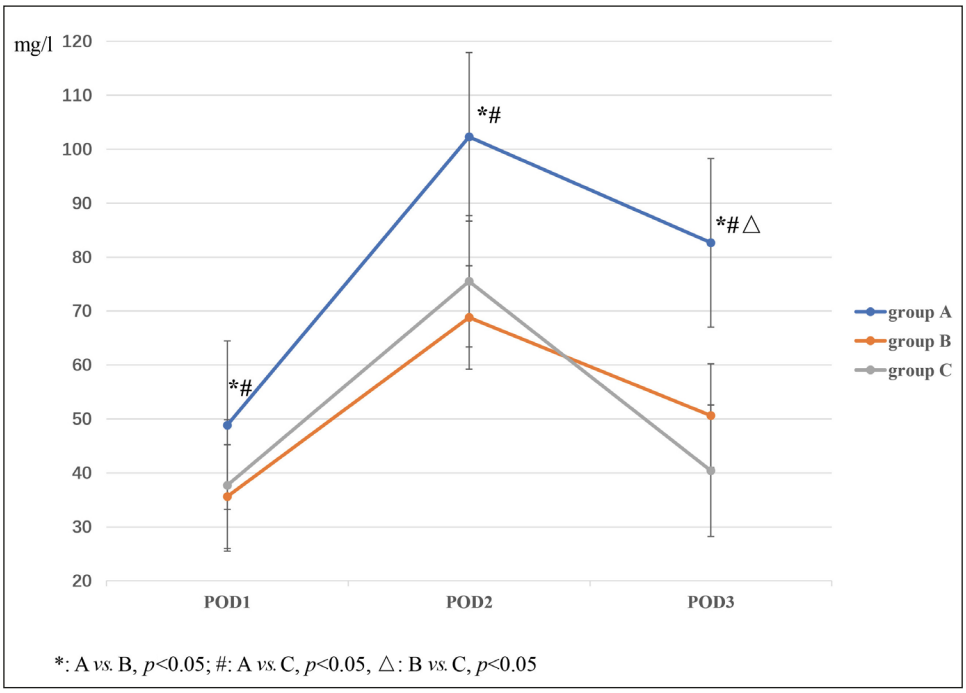

Figure 2. The comparison of CRP among the three groups on POD1, 2, and 3. The One-Way ANOVA of variance was performed to detect the difference among the groups. *$p<0.05$.

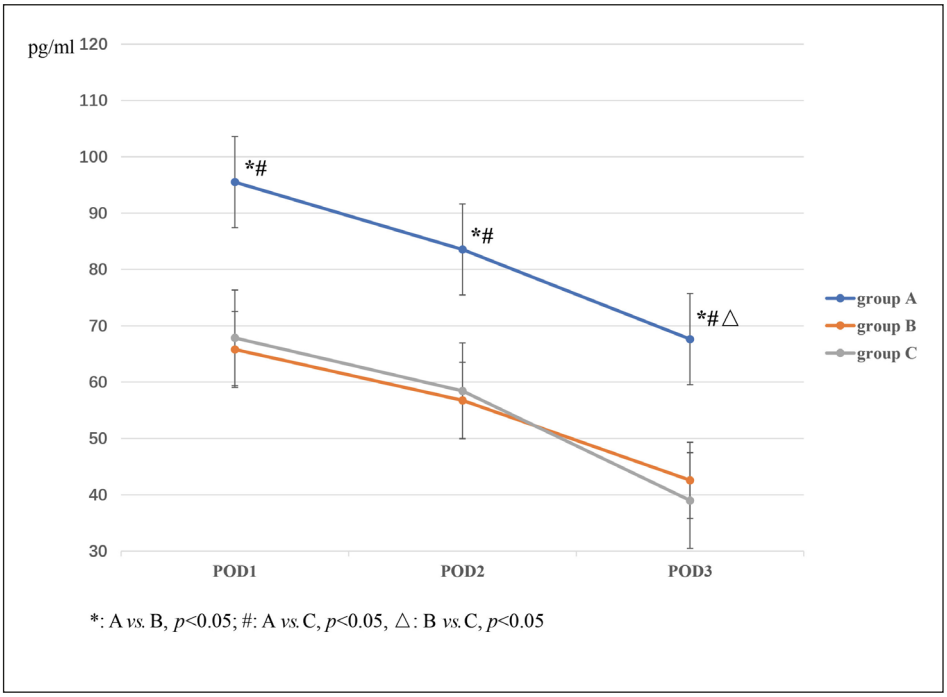

Figure 3. The comparison of IL-6 among the three groups on POD 1, 2, and 3. The One-Way ANOVA was performed to detect the difference between the groups. *p<0.05.

Dynamic pain scores on POD1, 2, and 3 were significantly lower for Group B (5.37±0.71, p<0.001; 4.58±0.70, p<0.001; 4.02±0.62, p=0.001) and C (3.63±0.62, P=0.001; 2.72±0.71, p<0.001) than for Group A (6.40±0.74; 5.45±0.75; 4.38±0.69). Group B and C also had different at rest and dynamic pain scores on POD3 (p<0.001). However, they did not differ at rest on POD2 and 3 (Table III and Figure 4, 5).

Table IV provides detailed data regarding the number of patients per group requiring oxycodone and tramadol, as well as cumulative oxycodone and tramadol consumption among all patients in each category. Fewer patients required tramadol in Group B (8 in 60, p=0.01) and C (7 in 60, p=0.005) than in Group A (10 in 50), while Group B and C did not differ (p=0.81). Overall tramadol consumption was lower in Group B (1300 mg, p=0.003) and C (1200 mg, p=0.002) than in Group A (3700 mg), but Group B and C did not differ (p=0.90; Table IV). Moreover, the latter two groups exhibited similar numbers of patients requiring oxycodone and cumulative oxycodone consumption (p=0.42; p=0.70).

PONV and Antiemetic Rescue

Incidence of PONV was significantly lower in Group B (3 in 60, p=0.017) and C (2 in 60, p<0.007) than in Group A (11 in 60), whereas Group B and C did not differ (p=0.76).

Table IV provides detailed data on number of patients per group requiring metoclopramide and ondansetron, along with cumulative metoclopramide and ondansetron consumption across all patients in each category. Fewer patients required metoclopramide in Group B (3 in 60, p=0.008)

Table III. The VAS of pain at rest and walking.

		Group A	Group B	Group C	p	p^1	p^2	p^3
POD1	R	4.48±0.81	3.93±0.64	3.95±0.53	0.00	0.00	0.00	0.89
	W	6.40±0.74	5.37±0.71	5.45±0.65	0.00	0.00	0.00	0.52
POD2	R	3.68±0.57	3.57±0.59	3.50±0.50	0.19	0.25	0.07	0.51
	W	5.45±0.75	4.58±0.70	4.70±0.56	0.00	0.00	0.00	0.34
POD3	R	3.05±0.53	2.98±0.43	2.93±0.36	0.36	0.42	0.16	0.54
	W	4.38±0.69	4.02±0.62	3.28±0.52	0.00	0.001	0.00	0.00

R: Rest; W: Walking; p: A *vs.* B *vs.* C; p^1: A *vs.* B; p^2: A *vs.* C; p^3: B *vs.* C.

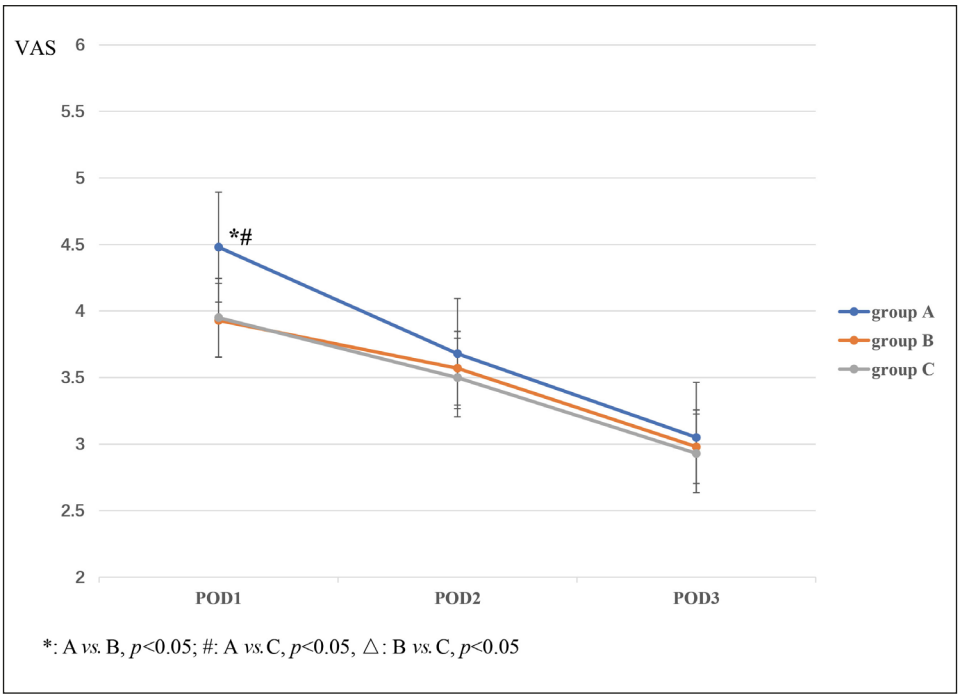

Figure 4. The comparison of VAS of pain at rest among the three groups on POD 1, 2, and 3. The One-Way ANOVA was performed to detect the difference among the groups. *p<0.05.

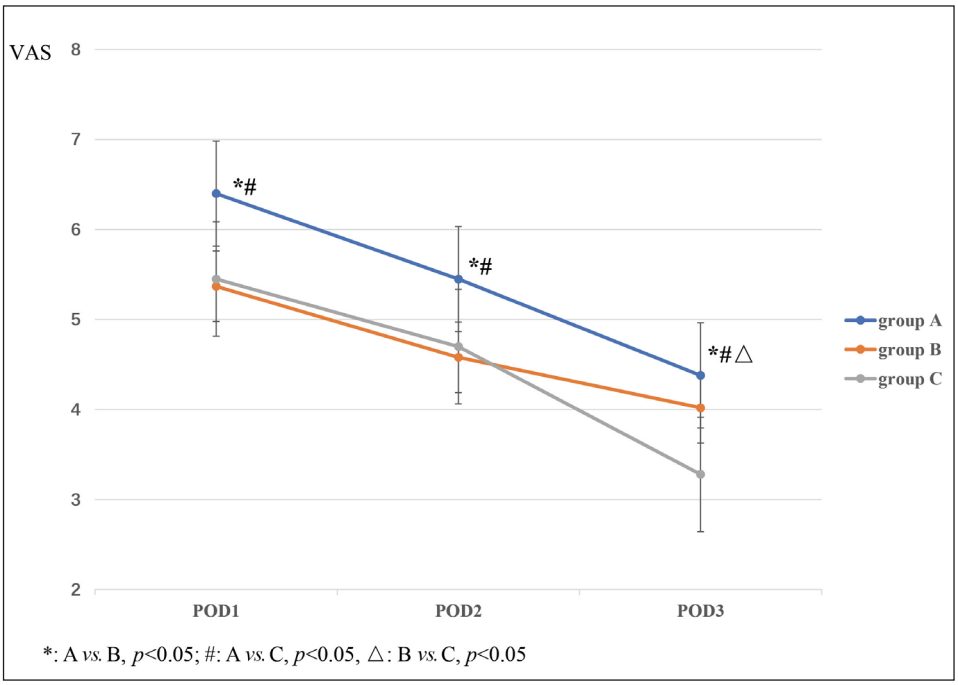

Figure 5. The comparison of VAS of pain at walking among the three groups on POD 1, 2, and 3. The One-Way ANOVA was performed to detect the difference among the groups. *p<0.05.

and C (2 in 60, p=0.005) than in Group A (13 in 60), while Group B and C did not differ (p=0.75). Overall tramadol consumption was lower in Group B (50 mg, p=0.008) and C (40 mg, p=0.005) than in Group A (180 mg). Again, Group B and C did not differ (p=0.84).

During the study period, there were no differences among the three groups in terms of the number of patients requiring ondansetron (four in Group A, two in Group B, and two in Group C; p=0.16) and overall consumption (20 mg in Group A, 5 mg in Group B, and 10 mg in Group C; p=0.16) (Table IV).

Table IV. The requirement of rescue treatment between the two groups.

	Group A	Group B	Group C	*p*	p^1	p^2	p^3
Oxycodone							
N	41/60	43/60	38/60	0.62	0.70	0.56	0.33
Total dose (mg)	800	700	620	0.30	0.42	0.12	0.47
Tramadol							
N	19/60	8/60	7/60	0.008	0.01	0.005	0.81
Total dose (mg)	3700	1300	1200	0.003	0.003	0.002	0.90
Metoclopramide							
N	13/60	3/60	2/60	0.001	0.002	0.001	0.75
Total dose (mg)	180	50	40	0.007	0.008	0.005	0.84
Ondansetron							
N	4/60	1/60	2/60	0.36	0.16	0.35	0.64
Total dose (mg)	20	5	10	0.36	0.16	0.35	0.64

p: A *vs.* B *vs.* C; p^1: A *vs.* B; p^2: A *vs.* C; p^3: B *vs.* C.

Table V. The clinical effect and complications.

	Group A	Group B	Group C	*p*	p^1	p^2	p^3
PONV	13/60	3/60	2/60	0.001	0.002	0.001	0.75
nausea	1.88±2.01	1.25±1.35	1.23±1.43	0.04	0.04	0.03	0.96
ICFS	78.73±10.74	70.07±8.93	65.85±8.19	0.00	0.00	0.00	0.01
ROM	93.97±3.65	95.35±3.37	96.95±2.67	0.00	0.02	0.00	0.01
pLOS	5.45±0.79	5.02±0.50	4.90±0.57	0.00	0.00	0.00	0.32
Wound problems	2/60	3/60	3/60	0.90	0.69	0.69	-
SSI	0/60	0/60	0/60	-	-	-	-
GIB	0/60	0/60	0/60	-	-	-	-

SSI: surgical site infection. *p*: A *vs.* B *vs.* C; p^1: A *vs.* B; p^2: A *vs.* C; p^3: B *vs.* C

Complications

Table V summarizes data on postoperative ROM. Group B (95.35±3.37, $p=0.02$) and C (96.95±2.67, $p<0.001$) improved in maximum hip flexion on POD3 compared with Group A (93.97±3.65). Group B and C also differed in ROM on POD3 ($p=0.01$; Table V). Post-operative nausea scores were significantly lower in Group B (1.25±1.35, $p=0.04$) and C (1.23±1.43, $p=0.03$) than in Group A (1.88±2.01). Scores of Group A and B did not differ ($p=0.96$; Table V).

On POD3, ICFS scores were significantly lower for Group B (70.07±8.93, $p<0.001$) and C (65.85±8.19, $p<0.001$) than for Group A (78.73±10.74). Group B and C also differed in ICFS scores on POD3 ($p=0.01$; Table V).

Group B (5.02±0.50, $p<0.001$) and C (4.90±0.57, $p<0.001$) had significantly lower p-LOS than Group A (5.45±0.79). No difference was identified between Group B and C ($p=0.32$; Table V).

Two patients in Group A had poor wound healing (incision fat liquefaction and thrum reaction), while three patients across Group B and C exhibited these complications (Table V). We did not observe any surgical site infections (SSI) or gastrointestinal bleeding (GIB).

Discussion

Dexamethasone is a medium-long-acting glucocorticoid with strong anti-inflammatory properties. It has been widely used to reduce perioperative inflammatory responses, postoperative pain, fatigue, and PONV[7,20]. Randomized controlled trials have demonstrated the efficacy of dexamethasone in preventing inflammatory stress after THA, without causing complications such as SSI or GIB[7,21]. However, the optimal dose and duration of dexamethasone administration during the THA perioperative period have not been determined.

Here, we compared the analgesic, antiemetic, and anti-inflammatory effects of dexamethasone in two (15 mg) and three (10 mg) doses after primary selective THA. Our first goal was to quantify any differences between 10 mg and 15 mg of dexamethasone in reducing pain and inflammation in the perioperative period of THA. Additionally, we wished to ascertain whether three equivalent dexamethasone doses had a superior effect than two doses. Thirdly, we aimed to determine the safety of repeated dexamethasone within 48 h in the THA perioperative period. We found that dexamethasone reduced postoperative pain intensity, PONV incidence, analgesic/antiemetic usage, and postoperative inflammatory cytokines beyond placebo levels. Second, two equivalent split doses (15 mg) of dexamethasone did not result in significantly different dynamic pain scores from three (10 mg) doses on POD1 and 2, nor did IL-6 and CRP levels differ between the two treatments. However, on POD3, three doses improved postoperative pain VAS, inflammation (CRP, IL-6), ICFS, and ROM than two doses.

Moderate-to-severe pain is common after THA and most prominent at 3 days post-surgery[22]. Several studies[22,23] have convincingly demonstrated that dexamethasone is effective in alleviating pain, but most are limited to 24 h post-surgery. Some research suggests that a larger dose of dexamethasone may produce a better analgesic effect than a smaller dose during total hip and knee arthroplasty[21]. A single high dose of dexamethasone (40 mg) before surgery reduced dynamic pain within 24 h after THA[18], but no data are available on effects at 48 or 72 h post-surgery. Additionally, while some studies[13,18,20] have demonstrated dexamethasone safety and efficacy compared with placebo, the tests did not extend beyond 48 h post-surgery. Repeated dexamethasone doses (10 mg) for up to 48 h was more effective in reducing pain on POD3 than a single dose or two doses[16].

Dynamic pain scores of patients treated with dexamethasone were lower than placebo scores on POD1, 2, and 3. However, 15 and 10 mg treatments did not yield significantly different scores on POD1 and 2, suggesting that their post-THA analgesic effect was the same. On POD3, the three-dose treatment significantly decreased dynamic pain compared with two doses. Therefore, one dexamethasone dose (30 mg) divided into three 10 mg doses was better at mitigating pain than two 15 mg doses. At-rest pain scores of dexamethasone treatment groups were also lower than placebo on POD1, but we were unable to monitor between-group differences on POD2 and 3. At-rest pain may be generally lower on POD3 for THA, so patients may not be able to detect relief even with additional dexamethasone.

Trauma from THA is closely related to postoperative complications and systemic inflammatory reactions[24,25]. Dexamethasone is an effective anti-inflammatory agent that acts through mechanisms on different cellular levels[12]. As markers of acute inflammation, CRP and IL-6 exhibit similar dynamics during the inflammatory response. A randomized controlled trial[20] of THA patients given intravenous dexamethasone (10 mg) at the beginning of anesthesia and 3 h later found that the treatment lowered postoperative inflammatory response. Nevertheless, many patients still had postoperative pain and other discomfort, suggesting 10 mg of dexamethasone may be insufficient for reducing inflammation. The study also did not clarify whether dexamethasone administration should be repeated at 24 and 48 h after surgery.

Here, we hypothesized that increasing post-THA dexamethasone doses could further lower postoperative inflammation and administering an additional dose at 24 or 48 h after THA could prolong efficacy. Our results showed that Group C did not differ in IL-6 and CRP levels from Group B on POD1 and 2, but both measures were significantly lower than in Group C than in Group B on POD3. Thus, during the THA perioperative period, 10 mg of dexamethasone appeared to be sufficient for reducing postoperative inflammatory response, and incremental doses did not have any additional effects on lowering inflammation. However, administration of 10 mg dexamethasone at 48 h post-operation continued to decrease inflammatory response and indirectly ameliorated postoperative dynamic pain, consistent with a previous study[16].

As a common complication of THA, PONV affects satisfaction, delays postoperative recovery, and increases psychological and economic burdens[26]. Previous scholars[7] have shown that dexamethasone is an effective preventive drug for PONV, but the optimal dosage is unclear. In this study, Group B and C had a lower PONV incidence and less need for antiemetics compared with Group A but did not differ from each other in either measure. One possible reason for this outcome was that over 80% of PONV occurred within 24 h after surgery[27], and 10 mg of dexamethasone was sufficient to prevent PONV, consistent with prior findings[21]. Therefore, repeated

dexamethasone administration or one increased dose of dexamethasone (>10 mg) may have a limited effect on reducing PONV incidence. This pattern was also visible in nausea VAS. However, we found that an additional 10 mg of dexamethasone at 48 h effectively reduced ICFS, which was conducive to postoperative recovery. Therefore, an additional 10 mg of dexamethasone at 48 h is recommended.

Both ROM and p-LOS are important indicators that contribute to comprehensively reflecting physiological changes during perioperative dexamethasone administration[15]. Hall et al[28] found that inflammatory response was significantly correlated with postoperative functional recovery, and appropriate pain management was conducive to early recovery after THA. In our study, dexamethasone had a stronger-than-placebo effect on ROM at POD3. Furthermore, three 10 mg doses of the drug improved ROM more than two 15 mg doses. A meta-analysis of the relationship between pain, sleep, and fatigue[29] demonstrated that the three factors influenced and interacted with each other. Each factor must be positively controlled to establish a regimen that would promote early recovery, shorten average length of stay, and improve patient satisfaction. In our study, p-LOS after dexamethasone treatment was significantly lower than placebo, corroborating previous studies. However, p-LOS did not differ between two- and three-dose treatments, suggesting that stay duration already reached a minimum threshold and more dexamethasone would not have an evident effect.

Although dexamethasone is increasingly used for THA, its potential side effects (such as SSI and GIB) remain understudied[8,21]. Here, we did not observe SSI or GIB in any patient, but our sample size was small (60 cases per group) and our follow-up period was only 3 month. Therefore, we may have lacked sufficient power to measure these low-incidence events[21], and the results should be cautiously interpreted. Large-scale prospective studies are required to confirm the safety of dexamethasone.

Limitations

This study had some limitations. First, follow-up time was too short to adequately assess dexamethasone efficacy and safety within 3 months. Second, we included 60 patients per group, a small cohort that weakened the persuasiveness of our findings. Third, our verification of dexamethasone's effects within 48 h post-surgery was preliminary, and more research is needed for further confirmation. Fourth, we only focused on two surgical complications (SSI and GIB), while ignoring other complications, such as blood glucose changes.

Conclusions

Dexamethasone provides short-term advantages during the early THA postoperative period, lowering pain, PONV, inflammation, and ICFS, as well as increasing ROM. Splitting 30 mg dexamethasone into multiple 10 mg and 15 mg doses was equally effective in reducing pain, inflammation, and PONV during the first 2 days after surgery. However, by the third day, three doses (10 mg) were superior to two doses (15 mg) in mitigating pain, inflammation, and ICFS, while improving ROM. Nevertheless, large-scale safety and dose studies are needed for further validation.

Clinical Trial Registration

Clinical trial was registered in the International Clinical Trial Registry, and the date of registration is 23/11/2020 (ChiCTR2000040160).

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Ethics Approval

We confirmed that all experimental protocols were approved by the People's Hospital of Guangxi Zhuang Autonomous Region (the Ethics Approval acceptance number: KY-ZC-2020-102) and all methods were carried out in accordance with relevant guidelines and regulations in the manuscript.

Authors' Contributions

Fulin-Li performed the data collection and analysis and participated in manuscript writing. Baichuan-Li, Xiao-Huang, Wenhui-Liu, Wenwen-Huang performed the database setup and statistical analysis. Dong-Yin performed the operations and participated in the study design and coordination and helped to draft the manuscript. All of the authors have read and approved the final manuscript.

Conflict of Interest

The authors declare that they have no competing interests.

Informed Consent

Patients involved in this study signed the informed consent.

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