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ORIGINAL RESEARCH

Effects of Fospropofol Disodium and Propofol on the Postoperative Recovery of Elderly Patients Who Underwent Total Hip Arthroplasty: A Retrospective Study

Sheng Ding[1,2], Zaibao Wang[1,2], Chunliu Li[1,2], Guizhi Wang[1,2], Juan Li[1], Hongrui Zhu[2], Keqiang He[1,2]

[1]Graduate School of Bengbu Medical University, Bengbu, People's Republic of China; [2]Department of Anesthesiology, The First Affiliated Hospital of USTC, Division of Life Sciences and Medicine, University of Science and Technology of China, Hefei, People's Republic of China

Correspondence: Keqiang He; Hongrui Zhu, Email doctorhector@ustc.edu.cn; zhuhongrui@mail.ustc.edu.cn

Purpose: Propofol is widely used for general anesthesia in elderly patients. Fospropofol disodium, a precursor of propofol, may reduce the incidence of postoperative nausea and vomiting (PONV). However, the effects of these two drugs on patients' postoperative recovery quality are unclear. The present study aimed to evaluate the effects of the two drugs on postoperative recovery quality in elderly patients who underwent total hip arthroplasty.

Patients and Methods: We retrospectively analyzed 168 patients from the First Affiliated Hospital of USTC from October 2022 to June 2024. These individuals were assigned to fospropofol disodium group (F) or propofol group (P) according to the patients' anesthesia induction and maintenance medication. The primary outcome was the rate of occurrence of PONV. The secondary outcomes included the time of extubation and the time of stay in post-anesthesia care unit (PACU), hospital length of stay, perioperative hemodynamic data and patients' liver and renal functions.

Results: PONV occurred to be lesser in group F than in group P (15.94% vs 33.33%, $P < 0.05$). Group P spent less in the extubation time (25.71 vs 33.36 min, $P < 0.05$) and PACU stay length (62.61 vs 65.65 min, $P > 0.05$), but hospital length of stay is longer (6.24 vs 5.8 days, $P > 0.05$). Liver and renal functions indexes and hemodynamic data between the 2 groups were similar ($P > 0.05$). The type of drug was a factor affecting the time of extubation. The type of drug and the patient's gender were influential factors in the incidence of PONV.

Conclusion: Fospropofol disodium reduces the incidence of PONV in patients. And the effects of fospropofol disodium on postoperative recovery quality are similar to that of propofol in older patients who underwent total hip arthroplasty.

Keywords: fospropofol disodium, propofol, total hip arthroplasty, recovery quality

Introduction

Total hip arthroplasty (THA) is a common orthopedic procedure used to treat primary or secondary osteoarthritis of the hip.[1] Fractures of the femoral neck, necrosis of the femoral head, and osteoarthritis of the hip are common causes of hip disease in the elderly. The escalating incidence of hip degenerative diseases has led to a surge in demand for THA.[2] It has shown clear results for the treatment of the above diseases and provides good relief from pain, an improvement in the quality of life of patients and increased mobility.[3,4]

Propofol acts by potentiation of the inhibitory neurotransmitter gamma-aminobutyric acid (GABA) at the GABAA receptor.[5] The liver is the major site of propofol metabolism, with most of the propofol bound to propofol glucuronide via uridine diphosphate glucuronosyltransferase. The remainder is oxidized by hepatic P450 enzymes and sulfated to inactive, water-soluble metabolites, which are excreted by the kidney.[6–8] Fospropofol disodium is a water-soluble precursor of propofol, with replacement of a carbon hydroxyl group in the propofol molecule with methylphosphatase.[9] This modification increases the water solubility of the molecule, which can be gradually

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metabolized by alkaline phosphatase (ALP) in vivo into the active metabolites of propofol, phosphate, and formaldehyde, which are then rapidly distributed to reach equilibrium in the neural tissues to exert anesthetic effects.[9] Compared with propofol in fat emulsion, fospropofol disodium in an aqueous solvent form effectively avoids the risk of allergy and microbial contamination and hyperlipidemia caused by fat emulsion. Furthermore, injection pain, nausea and vomiting are reduced and the degree of inhibition of the respiratory and circulatory systems is low.[10,11] This may reduce the incidence of complications perioperatively.

With the aggravation due to aging, the prognosis of the old patients after surgery should be a concern. The effects of propofol and fospropofol disodium on the quality of postoperative recovery in elderly patients have not been studied. Therefore, we administered the two drugs for the induction and maintenance of anesthesia in elderly patients who underwent total hip arthroplasty. Then, we compared various perioperative parameters. These included patients' mean arterial pressure (MAP) and heart rate (HR) during surgery, postoperative extubation time, duration of stay in the recovery room, incidence of nausea and vomiting, indicators of liver and renal function, markers of inflammation, and hospital length of stay. The main objective of this study was to compare fospropofol disodium and propofol in terms of postoperative recovery quality in elderly patients undergoing total hip arthroplasty.

Materials and Methods

Ethical Approval

The research was approved by the First Affiliated Hospital of University of Science and Technology of China (Anhui Provincial Hospital) Ethics Committee (Medical Ethics Approval No:2024-RE-324), which was conducted in compliance with the Declaration of Helsinki's ethical principles. As the study was retrospective, patients' consent was not required. At the same time, we anonymized the data, and protected patients' privacy.

Sample Size Calculation

In our preliminary retrospective analysis, we examined 20 cases in the propofol group (group P) and 20 cases in the fospropofol disodium group (group F). We found that the incidence of nausea and vomiting was 40% in the group P and 15% in the group F. Based on these initial findings, we calculated that a sample size of 65 patients per group would be required to achieve a power of 90% with a type 1 error of 0.05. We finally included 168 subjects for analysis in this study.

Design and Patients

We retrospectively collected data from 168 elderly patients who underwent total hip arthroplasty between October 2022 and June 2024. They were divided into two groups (group F and group P) to receive medication for the induction and maintenance of general anesthesia. The primary outcome was measured by using the rate of occurrence of postoperative nausea and vomiting (PONV). The secondary outcomes included situation of stay in post-anesthesia care unit (PACU), including time of extubation and time of stay in PACU, hospital length of stay, perioperative hemodynamic data and patients' liver and kidney functions' data. Inclusion criteria were patients who were between 65 and 80 years old; a body mass index (BMI) between 18 and 30 kg/m^2; American Society of Anesthesiologists (ASA) II–III; and required total hip arthroplasty surgery. Exclusion criteria were double hip replacement; hyperthyroidism; active rheumatic immune disease; hematologic disorders; history of surgery on vital organs such as the brain or heart; renal or hepatic organ failure; and significant cardiac, pulmonary, hepatic, or renal impairment; postoperative incision infection; secondary surgery; perioperative data not available through the medical record system; or missing data.

Anesthesia Method

Upon entering the operating room, patients' heart rate (HR), blood pressure (BP), pulse oxygen saturation (SpO_2), temperature (T), and depth of anesthesia were measured. Invasive arterial pressure was measured if necessary. The

induction of general anesthesia was started with i.v. methylprednisolone 40 mg and sufentanil 0.3–0.4 μg/kg. Patients then were received either i.v. fospropofol disodium at a dosage of 10–12 mg/kg (group F) or propofol disodium at a dosage of 1–2 mg/kg (group P). After patients were unconscious, the two groups were received rocuronium 0.6–0.9 mg/kg and then performed intubation. A continuous i.v. infusion of fospropofol disodium at 10–15 mg/kg/h was administered to maintain general anesthesia in group F, and propofol disodium at 3–5 mg/kg/h in group P. The patients were all given remifentanil i.v. at 10–15 μg/kg/h for anesthesia maintenance. The induction and maintenance protocols for both groups were used standardized methods. And patients vital signs were closely monitored throughout surgery. Bispectral index was maintained at values of 45–55 and $P_{ET}CO_2$ between 35 mmHg and 45 mmHg.

Surgical Approach and Postoperative Management

In our hospital, total hip arthroplasty adopts the direct anterior approach (DAA) in the lateral position, which is an ideal minimally invasive surgical access to the hip joint by revealing the hip joint through the Heuter hiatus without damaging the muscles around the hip joint.[12] The surgeon cuts the skin and subcutaneous tissue layer by layer, enters through the muscle gap of the vastus tensor fasciae latae and gluteus medius muscles to reveal the hip joint capsule. Then, they perform osteotomy of the femur followed by grinding and filing of the acetabular acetabulum, rinsing the acetabulum after satisfaction, and implanting the acetabular cup. When the femoral greater trochanter was fully exposed, the opening of the femoral marrow cavity and the expansion of the marrow were performed. After satisfaction, the femoral prosthesis was implanted, the hip joint was reset, and the stability of the joint was determined. Layer by layer suturing is routinely done without placing drains. Postoperative patients were routinely treated with multimodal analgesia, anti-infection, prevention of thrombosis, and elevation of the affected limb. Immediately after surgery, patients were encouraged to have early rehabilitation exercises including ankle pump exercises and quadriceps isometric exercises, etc. And patients were informed to start to go down to the ground on the first postoperative day (with or without a walker).

Data Collection

We recorded perioperative data including patients' general information (age, gender, BMI, ASA classification, admission principal diagnosis), chronic medical history (hypertension, diabetes mellitus), the occurrence of PONV, test results [preoperative and postoperative patients' creatinine (CRE), blood urea nitrogen (BUN), blood urea nitrogen/creatinine (BUN/CRE), uric acid (UA), alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), γ-glutamyl transpeptidase (GGT), aspartate aminotransferase/alanine aminotransferase (AST/ALT), the perioperative neutrophil/lymphocyte ratio (NLR), platelet/lymphocyte ratio (PLR), and lymphocyte/monocyte ratio (LMR)], tracheal intubation and extubation time, stay time in PACU, hospitalization time, and perioperative hemodynamic data (mean arterial pressure (MAP) and HR) in six time points (baseline, after the induction, at the time of skinning, end of surgery, after tracheal extubation, leave the PACU).

Statistical Analysis

SPSS (16.0) was employed for the statistical processing of the data. We used the Shapiro–Wilk test to assess the normality of continuous variables. Measurements that conformed to a normal distribution are given as the mean ± SD. Non-normally distributed data are given as the median (interquartile range [IQR]) and were compared using the Mann–Whitney *U*-test. Then, we used Levene's test to assess variance homogeneity and decided to use Welch's *t*-test or standard *t*-test. Count data are given as number of cases (%) and any differences are evaluated by employing a chi-squared or Fisher's exact tests. Regression analysis was conducted using either linear or logistic regression models. The results were displayed as β-values and P-values for linear regression, or as Exp(B), 95% confidence intervals (CI) for Exp(B) and P-values for logistic regression. A P-value less than 0.05 was considered to be statistically significant.

Results

With regard to demographic and clinical characteristics of the 168 included patients, such as age, gender, BMI, ASA, etiology, and preoperative comorbidities of the two groups were comparable and detailed in Table 1.

Table 1 The Comparison of General Information of Patients in the Two Groups

	Group F (n = 69)	Group P (n = 99)	P-value
Male, n (%)	23 (33.3)	38 (38.4)	0.503
Age (years), median (IQR)	70 (68, 72)	70 (68, 75)	0.168
BMI (kg/m^2), mean ± SD	24.7 ± 3.4	23,7 ± 3.3	0.054
ASA classification, n (%)			
II	37 (54)	51 (52)	0.788
III	32 (46)	48 (48)	0.788
Etiology, n (%)			
Femoral neck fracture	13 (18.8)	20 (20.2)	0.827
Hip arthritis	16 (23.2)	31 (31.3)	0.248
Hip dysplasia	13 (18.8)	16 (16.2)	0.651
Femoral head necrosis	27 (39.1)	32 (32.3)	0.241
Preoperative comorbidities			
Hypertension, n (%)	30 (43)	42 (42)	0.892
Diabetes mellitus, n (%)	6 (9)	19 (19)	0.06

Abbreviations: ASA, American Society of Anesthesiologists; BMI, body mass index; Group F, fospropofol disodium group; Group P, propofol group.

Our comparison of preoperative liver and renal functions and inflammatory markers between the two groups did not reveal any statistical differences, except for urea nitrogen (Table 2). No statistically significant differences were found in postoperative liver and renal functions in the 2 groups (Table 3) and perioperative hemodynamic data (Figure 1). PONV

Table 2 The Comparison of the Preoperative Biochemical Indexes Between the Two Groups

	Group F (n = 69)	Group P (n = 99)	P-value
Liver function			
ALT (U/L), median (IQR)	17 (13, 20)	16 (2, 22)	0.964
AST (U/L), median (IQR)	21 (18, 25)	21 (18, 26)	0.883
ALP (U/L), median (IQR)	83 (65.45, 99.50)	82 (68, 97)	0.887
GGT (U/L), median (IQR)	17 (11.8, 26)	16 (11, 27)	0.746
AST/ALT, mean ± SD	1.44 ± 0.88	1.35 ± 0.38	0.431
Renal function			
CRE (μmol/L), median (IQR)	54 (46, 68.5)	60 (49, 68)	0.168
BUN (mmol/L), median (IQR)	5.69 (4.805, 6.94)	6.48 (5.31, 7.83)	0.011
UA (μmol/L), median (IQR)	303 (251, 360.8)	300 (252, 354)	0.997
BUN/CRE, mean ± SD	26.69 ± 7.05	27.89 ± 7.35	0.287

(*Continued*)

Table 2 (Continued).

	Group F (n = 69)	Group P (n = 99)	P-value
Inflammation indicators			
NLR, median (IQR)	1.93 (1.655, 3.43)	2.02 (1.5, 2.79)	0.458
PLR, median (IQR)	131.63 (105.46, 161.655)	131.33 (98.45, 166.95)	0.932
LMR, mean ± SD	3.767 ± 1.626	3.807 ± 1.403	0.86

Abbreviations: ALP, alkaline phosphatase; ALT, alanine aminotransferase; AST, aspartate aminotransferase; AST/ALT, aspartate aminotransferase/alanine aminotransferase; BUN, blood urea nitrogen; BUN/CRE, blood urea nitrogen/creatinine; CRE, creatinine; Group F, fospropofol disodium group; Group P, propofol group; GGT, γ-glutamyl transpeptidase; LMR, lymphocyte/monocyte ratio; NLR, perioperative neutrophil/lymphocyte ratio; PLR, platelet/lymphocyte ratio; UA, uric acid.

Table 3 The Comparison of Postoperative Biochemical Indexes Between the Two Groups

	Group F (n = 69)	Group P (n = 99)	P-value
Liver function, median (IQR)			
ALT (U/L)	17 (13, 23)	17 (14, 24)	0.784
AST (U/L)	25 (22, 30)	25 (22, 30)	0.405
ALP (U/L)	68 (59.5, 83.5)	68 (59.5, 83.5)	0.672
GGT (U/L)	15 (10.5, 22)	15 (10, 24)	0.991
AST/ALT	1.47 (1.13, 1.805)	1.47 (1.24, 1.67)	0.963
Renal function			
CRE (μmol/L), median (IQR)	56 (47.5, 72.5)	59 (52, 59)	0.533
BUN (mmol/L), median (IQR)	6.88 (5.47, 8.15)	7.07 (5.95, 8.43)	0.174
UA (μmol/L), median (IQR)	261 (207.5, 303.5)	273 (231, 329)	0.063
BUN/CRE, mean ± SD	28.94 ± 7.25	30.48 ± 7.79	0.191
ΔBUN (mmol/L), mean ± SD	0.95 ± 1.76	0.79 ± 2.04	0.595
Inflammation indicators, median (IQR)			
NLR	7.25 (5.16, 10.06)	7.42 (5.23, 11.03)	0.665
PLR	158.39 (120.385, 256.82)	180.87 (130.50, 254.84)	0.273
LMR	1.45 (1.03, 1.81)	1.45 (1.005, 1.79)	0.977

Abbreviations: ALP, alkaline phosphatase; ALT, alanine aminotransferase; AST, aspartate aminotransferase; AST/ALT, aspartate aminotransferase/alanine aminotransferase; BUN, blood urea nitrogen; BUN/CRE, blood urea nitrogen/creatinine; ΔBUN, difference between postoperative and preoperative blood urea nitrogen; CRE, creatinine; Group F, fospropofol disodium group; Group P, propofol group; GGT, γ-glutamyl transpeptidase; LMR, lymphocyte/monocyte ratio; NLR, perioperative neutrophil/lymphocyte ratio; PLR, platelet/lymphocyte ratio; UA, uric acid.

occurred in 33 patients in the group P and 11 in the group F, with the incidence rate of 33.33% and 15.94%, respectively, and the difference was significant ($P < 0.05$) (Figure 2). Postoperative recovery quality in the 2 groups was similar in terms of extubation time (25.71 vs 33.36 min, $P < 0.05$), PACU stay time (62.61 vs 65.65 minutes, $P > 0.05$) and hospital length of stay (6.24 vs 5.8 days, $P > 0.05$) (Figure 2). After adjusting for potential various co-variables, such as BMI, BUN and NLR, the results showed that these indicators had no effect on the time to extubation of patients (Table 4). In summary, the type of drug has an effect on the time to extubation. In addition, we adjusted for various potential co-variables such as drug type, age, sex and PLR. The results indicated that patients administered propofol had a higher risk

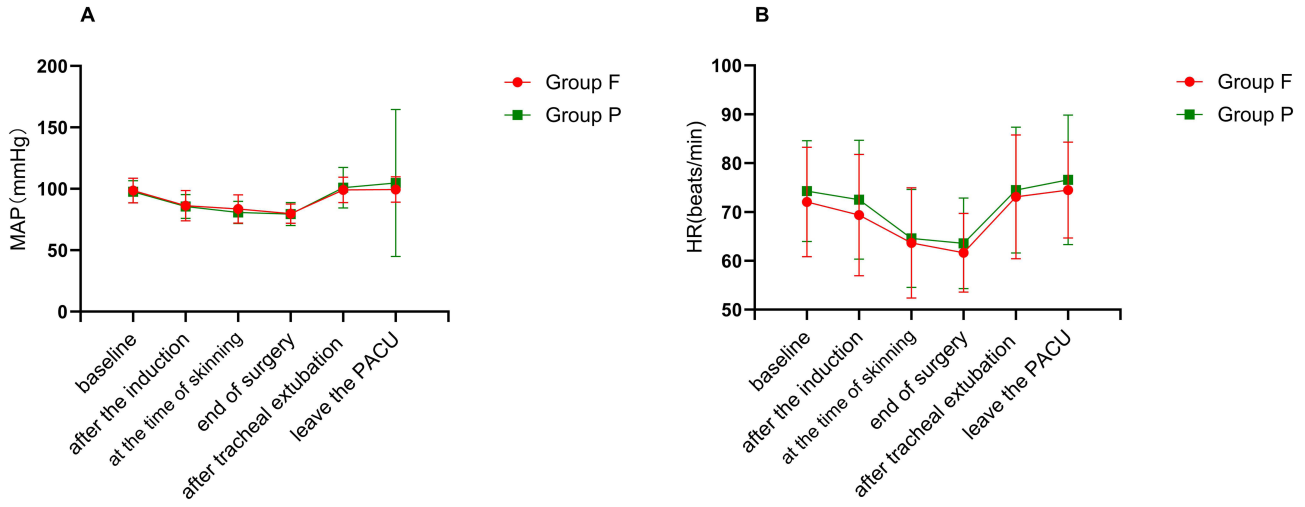

Figure 1 Vital signs at different time points between the two groups. (**A**) MAP at different time points between the two groups; (**B**) HR at different time points between the two groups.
Abbreviations: Group F, fospropofol disodium group; Group P, propofol group; MAP, mean arterial pressure; HR, heart rate.

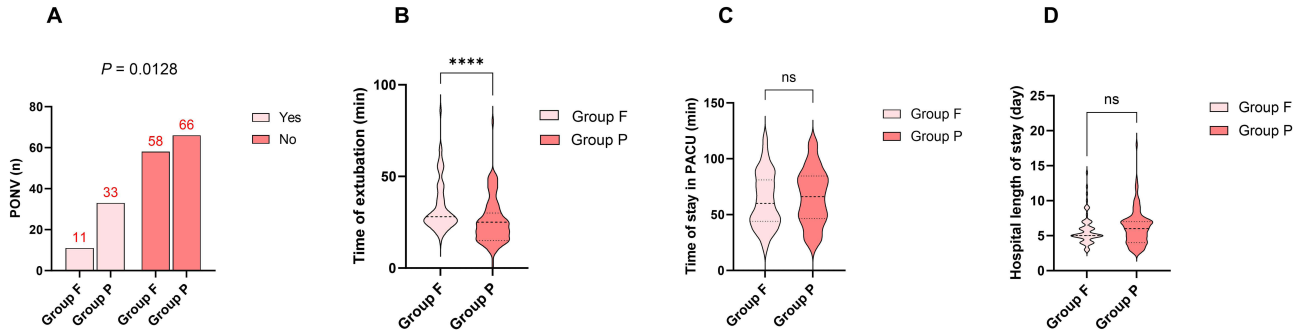

Figure 2 The comparison of PONV and the situation in PACU between the two Groups. (**A**) The incidence of PONV between the two groups; (**B**) Time of extubation between the two groups; (**C**) Time of study in PACU between the two groups; (**D**) Hospital length of study between the two groups. ****P < 0.001.
Abbreviations: Group F, fospropofol disodium group; Group P, propofol group; PONV, postoperative nausea and vomiting; PACU, post-anesthesia care unit.

of experiencing PONV (Exp (B) 0.365, 95% CI for Exp(B) (0.165, 0.807), p = 0.013). Additionally, female patients were more prone to experiencing PONV compared to male patients (Exp(B) 0.348, 95% CI for Exp(B) (0.150, 0.808), p = 0.014) (Table 5).

Table 4 Correlation Between the Various Variables and the Time to Extubation

	P1-value	P2-value
Age	0.249	/
BMI	0.09	0.138
Liver function	-	-
ALT (U/L)	0.5	/
AST (U/L)	0.314	/
ALP (U/L)	0.277	/
GGT (U/L)	0.249	/
AST/ALT	0.448	/

(*Continued*)

Table 4 (Continued).

	P1-value	P2-value
Renal function	-	-
CRE (μmol/L)	0.256	/
BUN (mmol/L)	0.048	0.660
UA (μmol/L)	0.894	/
Inflammation indicators	-	-
NLR	0.155	0.111
PLR	0.632	/
LMR	0.691	/

Abbreviations: ALP, alkaline phosphatase; ALT, alanine aminotransferase; AST, aspartate aminotransferase; AST/ALT, aspartate aminotransferase/alanine aminotransferase; BUN, blood urea nitrogen; BUN/CRE, blood urea nitrogen/creatinine; CRE, creatinine; GGT, γ-glutamyl transpeptidase; LMR, lymphocyte/monocyte ratio; NLR, perioperative neutrophil/lymphocyte ratio; PLR, platelet/lymphocyte ratio; UA, uric acid; P1-value, the P-value of one-way linear regression; P2-value, the P-value of multivariate linear regression.

Table 5 Correlation Between the Various Variables and the Occurrence of PONV in Patients

	One-Way Logistic Regression		Multivariate Logistic Regression	
	Exp(B) (95% CI)	P1-Value	Exp(B) (95% CI)	P2-value
Drug	0.379 (0.176, 0.818)	0.013	0.365 (0.165~0.807)	0.013
Age	1.071 (0.978~1.173)	0.136	1.048 (0.952~1.154)	0.336
Sex	0.356 (0.158~0.804)	0.013	0.348 (0.150~0.808)	0.014
BMI	1.023 (0.923~1.133)	0.666	/	/
Liver function	-	-	-	-
ALT (U/L)	0.992 (0.960~1.025)	0.623	/	/
AST (U/L)	1.010 (0.974~1.047)	0.596	/	/
ALP (U/L)	1.006 (0.994~1.018)	0.358	/	/
GGT (U/L)	1.007 (0.995~1.019)	0.238	/	/
AST/ALT	0.997 (0.577~1.721)	0.990	/	/
Renal function	-	-	-	-
CRE (μmol/L)	0.988 (0.964~1.012)	0.329	/	/
BUN (mmol/L)	1.052 (0.855~1.293)	0.632	/	/
UA (μmol/L)	1.002 (0.998~1.006)	0.235	/	/
BUN/CRE	1.022 (0.974~1.072)	0.374	/	/

(*Continued*)

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Table 5 (Continued).

	One-Way Logistic Regression		Multivariate Logistic Regression	
	Exp(B) (95% CI)	**P1-Value**	**Exp(B) (95% CI)**	**P2-value**
Inflammation indicators	-	-	-	-
NLR	1.053 (0.864~1.283)	0.607	/	/
PLR	1.005 (0.999~1.012)	0.095	1.004 (0.997~1.011)	0.265
LMR	0.946 (0.750~1.193)	0.638	/	/

Abbreviations: CI, Confidence Interval; ALP, alkaline phosphatase; ALT, alanine aminotransferase; AST, aspartate aminotransferase; AST/ALT, aspartate aminotransferase/alanine aminotransferase; BUN, blood urea nitrogen; BUN/CRE, blood urea nitrogen/creatinine; CRE, creatinine; GGT, γ-glutamyl transpeptidase; LMR, lymphocyte/monocyte ratio; NLR, perioperative neutrophil/lymphocyte ratio; PLR, platelet/lymphocyte ratio; UA, uric acid; 95% CI, 95% confidence intervals for Exp(B); P1-value, the P-value of one-way logistic regression; P2-value, the P-value of multivariate logistic regression.

Discussion

The results from the current study demonstrated that incidence of PONV in patients who underwent total hip arthroplasty in the fospropofol disodium group was significantly reduced compared with propofol group. In other respects, the two drugs were comparable in terms of the recovery quality of patients.

Total hip arthroplasty is currently the preferred clinical treatment for hip diseases that cannot be conservatively managed, such as femoral neck fracture, femoral head necrosis, hip arthritis, hip dysplasia, etc., a procedure that greatly improves elderly patients' quality of life.[3,13,14] Elderly patients are characterized by advanced age, many comorbidities and poor basic physical conditions, and reasonable general anesthesia medication can promote the postoperative recovery quality of these patients.

Firstly, we explored the haemodynamic effects of the two drugs in patients by comparing their MAP and HR. And we then compared MAP and HR at six time points (baseline, after the induction, at the time of skinning, end of surgery, after tracheal extubation, leave the PACU) and found that the differences were not clinically or statistically significant. It is possible that fospropofol disodium is ultimately converted to propofol and acts in the body, and thus the effects of the two drugs on patients are similar.[9]

During clinical treatment, drugs or drug metabolites can cause direct damage to the functions of liver and kidney.[15–17] Thus, we compared the two groups to investigate whether the postoperative liver and kidney functions have difference. When the preoperative values of urea nitrogen in the group F and P patients were compared, a difference was found between the two groups. However, we compared the change between the postoperative and preoperative of urea nitrogen and did not find a statistical difference. Considering that these values are within the normal clinical range, we do not consider them to be clinically different. In addition, we found no statistically significant differences in the preoperative and postoperative liver (AST, ALT, GGT, ALP, AST/ALT) and renal functions (CRE, UA, BUN/CRE) in two groups. We considered that despite the conversion of fospropofol disodium to propofol via ALP,[9] our data suggested that there was no statistical difference in the values of ALP between the two groups preoperatively and postoperatively. Therefore, we believe that there is no clinical difference between the two effects on liver and renal functions.

Surgical trauma and stimuli induce stress responses in the body, including suppressing cellular immune functions and increasing the risk of postoperative complications.[18] A study shows that propofol decreases the concentration of inflammatory cytokines and inhibits cell apoptosis.[19] As reliable indicators of systemic inflammation reaction, we compared the values of NLR, PLR and LMR in the two groups, but no statistical differences were found. It means that propofol and fospropofol both have anti-inflammatory effects.[20]

In a comparison of patients' situations in PACU, there was a significant difference in the mean extubation time between the fospropofol disodium group and the propofol group. But we also found that although group F had a longer stay than group P in PACU, the data did not reflect a statistical difference between the two groups. We understood that

the half-life of propofol would be about 0.97 h, while the half-life of propofol produced by fospropofol disodium metabolized by alkaline phosphatase in vivo 1.13 h, thus exerting a sedative-hypnotic effect with a longer duration of action.[10,21] We can observe that the half-life of both drugs is similar to the time of stay in PACU. It may explain why there is no significant difference in the PACU stay time or hospital length of stay. Therefore, we believe that statistical differences in extubation time do not make clinically significant difference.

Propofol has an antiemetic effect, but its specific mechanism is not clear. Some studies have suggested that it may reduce PONV by blocking 5-hydroxytryptamine-3 receptors in the adrenergic system. Some studies have shown that inhibition of the chemoreceptor trigger zone and the vagal nucleus, which is associated with nausea and vomiting, was correlated with its antiemetic effect.[22–24] We found that nausea and vomiting occurred in 11 patients in the fospropofol disodium group compared with 33 patients in propofol group, the incidences being 15.94% and 33.33%, respectively, which showed a statistical difference. Meanwhile, the results of the logistic regression analysis suggested that the occurrence of PONV in patients might be related to both the type of drug and the patients' gender. The incidence of nausea and vomiting was lower in the fospropofol disodium group, and the mechanism may be related to its being in an aqueous solvent, and the large apparent volume of distribution of the drug, with a short terminal elimination half-life, although the mechanisms involved require further research.[10] Postoperative nausea and vomiting are more frequent in female patients probably due to hormone levels and other factors.[25]

In the present study, we adjusted for potential various co-variables. The results showed that fospropofol disodium effects the rate of occurrence of PONV and time of extubation. Changes in other aspects such as postoperative hepatic and renal functions; hospitalization days; inflammation indicators are similar. Therefore, the use of fospropofol disodium for anesthesia induction and maintenance, which may play similar roles to propofol in suppressing surgical stress, reducing postoperative inflammatory response, and influencing liver and renal functions.

Because chronic diseases, cancer, inflammatory indicators, pain, and other factors all have significant impacts on patients' postoperative recovery quality.[26–28] So there were some likely shortcomings in the study. Firstly, we included only two underlying diseases, such as hypertension and diabetes, and did not include other diseases that may affect the postoperative recovery quality of old patients. Secondly, the sample size was not large enough. There was no way to subclassify the cause of the patient's etiology, which is another limitation of our study. Both of them may also have an impact on our results. Thirdly, there were multiple protocols for perioperative anesthetic management. The conditions of elderly patients were variable. The changes in BP and HR may also affect the postoperative recovery quality of elderly patients. Although we discussed the mean arterial pressure (MAP) and HR of patients at six time points, this approach is insufficient to fully capture the perioperative hemodynamic changes in elderly patients. Therefore, a more comprehensive and continuous monitoring of hemodynamic parameters is essential to better reflect the situation of patients. In addition, retrospective analysis of only simple laboratory indicators and other information may be insufficient. Other information including Quality of Recovery Scale-15 (QoR-15) scores, visual analogue scale scores, and Athens Insomnia Scale scores, etc., should be applied. So the results obtained may be more comprehensive and informative.[29–31] With the widespread use of fospropofol disodium, prospective randomized controlled clinical trials can be designed for all-age populations in future studies to reduce bias.

Conclusion

In our retrospective analysis, no difference was found between fospropofol disodium group and propofol group in terms of changes in patients' postoperative liver and renal functions, inflammatory indexes, PACU stays and days of hospitalization. It is worth noting that the incidence of PONV in patients of the fospropofol disodium group was significantly reduced, which may improve their postoperative comfort.[32,33] However, a research recommendation for the need for larger, more robust randomised controlled trials to overcome the issues of potential bias, which retrospective analyses offer.

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Disclosure

The authors report no conflicts of interest in this work.

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