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Femoral nerve block versus fascia iliaca block for pain control in total knee and hip arthroplasty

A meta-analysis from randomized controlled trials

Xin Wang, MM, Yuan Sun, MM, Li Wang, MM*, Xuelian Hao, MB*

Abstract

Background: This meta-analysis aimed to perform a meta-analysis to compare the efficiency and safety between femoral nerve block (FNB) and fascia iliaca block (FIB) for postoperative pain control in patients undergoing total knee and hip arthroplasties.

Methods: A systematic search was performed in Medline (1966-2017.05), PubMed (1966-2017.05), Embase (1980-2017.05), ScienceDirect (1985-2017.05) and the Cochrane Library. Inclusion criteria (1) Participants: Only published articles enrolling adult participants that with a diagnosis of end-stage of osteoarthritis and prepared for unilateral TKA or THA; (2) Interventions: The intervention group received FIB for postoperative pain management; (3) Comparisons: The control group was received FNB for postoperative pain control; (4) Outcomes: Visual analogue scale (VAS) scores in different periods, opioids consumption, length of stay and postoperative complications; (5) Study design: clinical randomized control trials (RCTs) were regarded as eligible in our study. Cochrane Hand book for Systematic Reviews of Interventions was used for assessment of the included studies and risk of bias was shown. Fixed/random effect model was used according to the heterogeneity tested by I2 statistic. Sensitivity analysis was conducted and publication bias was assessed. Meta-analysis was performed using Stata 11.0 software.

Results: Five RCTs including 308 patients met the inclusion criteria. The present meta-analysis indicated that there were no significant differences between groups in terms of visual analog scale (VAS) score at 12 hours (SMD = −0.080, 95% CI: −0.306 to 0.145, $P = .485$), 24 hours (SMD = 0.098, 95% CI: −0.127 to 0.323, $P = .393$), and 48 hours (SMD = −0.001, 95% CI: −0.227 to 0.225, $P = .993$). No significant differences were found regarding opioid consumption at 12 hours (SMD = 0.026, 95% CI: −0.224 to 0.275, $P = .840$), 24 hours (SMD = 0.037, 95% CI: −0.212 to 0.286, $P = .771$), and 48 hours (SMD = −0.016, 95% CI: −0.265 to 0.233, $P = .900$). In addition, no significant increase of complications was identified between groups.

Conclusion: There is no significant differences of VAS scores at 12-48 hour and opioids consumption at 12-48 hour between two groups following total joint arthroplasty. No increased risk of nausea, vomiting and pruritus was observed in both groups. More high-quality large RCTs with long follow-up period are necessary for proper comparisons of the efficacy and safety of FNB with FIB. The present meta-analysis exists some limitations that should be noted: (1) Only five articles were included in present meta-analysis, although all of them are recently published RCTs, the sample size are relatively small; (2) Functional outcome is an important parameter, due to the insufficiency of relevant data, we cannot perform a meta-analysis. (3) Dose and types of local anesthetics are varied, which may influence the results; (4) The duration of follow up is relatively short which leads to underestimating complications. (5) Publication bias in present meta-analysis may influence the results.

Abbreviations: FIB = fascia iliaca block, FNB = femoral nerve block, RCTs = randomized controlled trials, THA = total hip arthroplasty, TKA = total knee arthroplasty.

Keywords: fascia iliaca block, femoral nerve block, meta-analysis, pain control, total hip arthroplasty, total knee arthroplasty

1. Introduction

Total joint arthroplasty (TJA) are common surgical procedures for treatment of the degenerative disorders and traumatic diseases. It has been estimated that more than 700 thousand total knee arthroplasties (TKAs) and 400 thousand total hip arthroplasties (THAs) are performed annually in the United States.[1–3] However, a majority of patients often experience moderate to severe postoperative pain after TJA.[4] Postoperative pain control has a significant impact on earlier ambulation, initiation of physiotherapy, and better functional recovery.[5] In addition, effective pain control would lower the length of hospital stay and the risk of thrombotic events which improves patients' satisfaction. Multiple analgesic strategies have been proposed including intravenous opioid, epidural analgesia, and peripheral nerve block.[6–8] Each of them has its limitations. Systemic use of opioids is associated with various adverse effects such as nausea, vomiting, pruritus, and respiratory depression which would influence rehabilitation. Patients who received epidurals had more frequent hypotension, urinary retention, and pruritus.

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Hypotension and urinary retention occurred more frequently in patients who received epidural analgesia. Multimodal analgesia with peripheral nerve block has been recommended and considered as gold standard for pain management in lower extremity joint arthroplasty.

Previous studies has shown that femoral nerve block (FNB) could significantly reduce pain scores and opioids consumption.[9,10] However, it was criticized for a potential injury to femoral nerve and femoral vessels. Recently, fascia iliaca block (FIB) has been proposed to avoid the complications by anesthetizing the femoral nerve remotely from major neurovascular structures, and achieve adequate analgesia.[11]

Whether FIB would be equivalent to FNB for analgesia in TJA remains unclear due to a lack of published studies and small sample sizes. Therefore, we performed the present meta-analysis from randomized controlled trials to compare the efficiency and safety between FNB and FIB for postoperative pain control. Only published articles enrolling adult participants that with a diagnosis of end-stage of osteoarthritis and prepared for unilateral TKA or THA. The intervention group received FIB for postoperative pain management. The control group was received FNB for postoperative pain control. Primary outcomes were VAS scores and opioids consumption in different periods. Secondary outcomes were length of hospital stay and postoperative complications.

2. Methods

This meta-analysis was reported according to the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines. All analyses were based on previous published studies, thus no ethical approval and patient consent are required.

2.1. Search strategy

Potentially relevant studies were identified from electronic databases including Medline (1966–2017.05), PubMed (1966–2017.05), Embase (1980–2017.05), ScienceDirect (1985–2017.05), and the Cochrane Library. The following key words were used on combination with Boolean operators AND or OR: "total knee replacement OR arthroplasty," "total hip replacement OR arthroplasty," "femoral nerve block," "fascia iliaca block," and "pain control." No restrictions were imposed on language. The bibliographies of retrieved trials and other relevant publications were cross-referenced to identify additional articles. The search process was performed as presented in Fig. 1.

2.2. Inclusion and exclusion criteria

(1) Participants: Only published articles enrolling adult participants that with a diagnosis of end-stage of osteoarthritis and prepared for unilateral TKA or THA.
(2) Interventions: The intervention group received FIB for postoperative pain management.
(3) Comparisons: The control group was received FNB for postoperative pain control.
(4) Outcomes: Visual analog scale (VAS) scores in different periods, opioids consumption, length of stay, and postoperative complications.

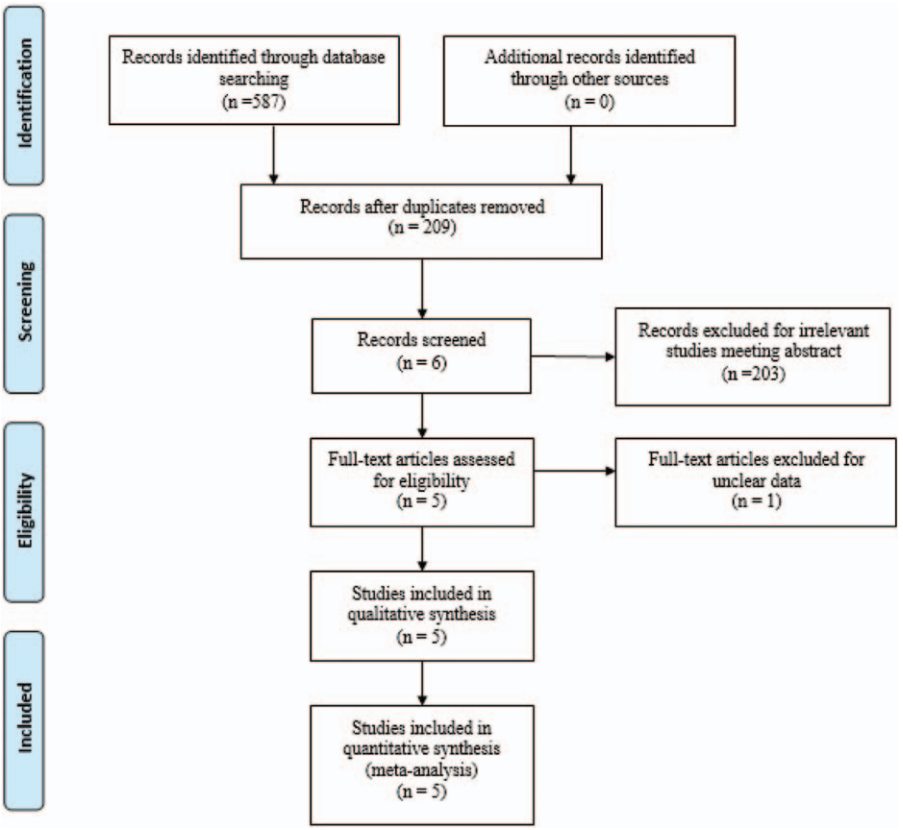


Figure 1. Search results and the selection procedure.

(5) Study design: clinical randomized control trials (RCTs) were regarded as eligible in our study.

Articles would be excluded from current meta-analysis for incomplete data, case reports, conference abstract, or review studies.

2.3. Selection criteria

Two reviewers independently scanned the abstracts of the potential articles identified by the above searches. Subsequently, the full text of the studies that met the inclusion criteria was screened, and a final decision was made. A senior author had the final decision in any case of disagreement regarding which studies to include.

2.4. Date extraction

Two of the authors independently extracted data from the included studies. Corresponding authors were consulted for details of data were incomplete. The following data were extracted and recorded in a spreadsheet: first author names, publication year, language, samples size, baseline characteristics, intervention procedures, anesthesia method, and outcome parameters. Other relevant data were also extracted from individual studies. Primary outcomes were VAS scores and opioids consumption in different periods. Secondary outcomes were length of hospital stay and postoperative complications.

2.5. Quality assessment

Quality assessment of each randomized trial was performed by 2 reviewers based on the Cochrane Handbook for Systematic Reviews of Interventions. We created a "risk of bias" table that included the following elements: random sequence generation, allocation concealment, blinding, incomplete outcome data, free of selective reporting, and other bias. Each item was recorded by "Yes," "No," or "Unclear." The quality of the evidence for the main outcomes in present meta-analysis was evaluated using the Recommendations Assessment, Development and Evaluation (GRADE) system including the following items: risk of bias, inconsistency, indirectness, imprecision, and publication bias. The recommendation level of evidence is classified into the following categories: high, which means that further research is unlikely to change confidence in the effect estimate; moderate, which means that further research is likely to significantly change confidence in the effect estimate but may change the estimate; low, which means that further research is likely to significantly change confidence in the effect estimate and to change the estimate; and very low, which means that any effect estimate is uncertain. Publication bias is a tendency on average to produce results that appear significant, because negative or near neutral results are almost never published. Publication bias may exist in all meta-analyses. Selective reporting is a strong bias that prevents correct conclusions arising from hypothesis tests, this bias is a specific form of selection bias whereby only interesting or relevant examples are cited. Therefore, the meta-analysis results should be considered appropriate. Subgroup analysis was performed for the main outcomes depending on if premedication was used.

2.6. Data analysis and statistical methods

Pooling of data was carried out using Stata 11.0 software (The Cochrane Collaboration, Oxford, United Kingdom). Statistical heterogeneity was evaluated based on the value of P and I^2 using

Table 1

Trial characteristics.

Studies	Reference type	Cases (FNB/FIB)	Mean age (FNB/FIB)	Female patient (FNB/FIB)	Anesthesia	Drug dose of FNB	Drug dose of FIB	Premedication	Concomitant pain	Follow up, mo
Brisbane et al[12]	RCT	47/51	67.7/68.2	28/31	General anesthesia	60 mL of 0.2% ropivacaine	60 mL of 0.2% ropivacaine	Oral 1 g paracetamol and celecoxib 200 mg	PCA with opioids	3
Thorsten[13]	RCT	40/40	64/62	17/19	General anesthesia	50 mL prilocaine	50 mL prilocaine	Intravenous 50 mL prilocaine 1%	PCA with opioids	3
Deniz[14]	RCT	20/20	67.8/59.1	9/12	General anesthesia	2% prilocaine, 30 ml of 0.25% bupivacaine	2% prilocaine, 30 mL of 0.25% bupivacaine	NS	PCA with opioids	4
Dragana[15]	RCT	15/15	70.4/71.2	10/9	General anesthesia	40 mL 0.75% ropivacaine	40 mL 0.75% ropivacaine	NS	PCA with morphine	3
Yu et al[16]	RCT	30/30	79.9/80.6	22/24	General anesthesia	20 mL 0.5% ropivacaine	20 mL 0.5% ropivacaine	Intramuscular 0.05 mg atropine and 0.1 g phenobarbital	PCA with opioids	1

FIB = fascia iliaca block, FNB = femoral nerve block, NS = not state, PCA = patient-controlled analgesia, RCT = randomized control trials.

standard Chi-square test. When $I^2 > 50\%$, $P < .1$ was considered to be significant heterogeneity, random-effect model was used for meta-analysis. Otherwise, fixed-effect model was performed. Sensibility analysis is conducted to assess the origins of heterogeneity. The results of dichotomous outcomes (postoperative complications) were expressed as risk difference (RD) with 95% confidence intervals (CIs). For continuous various outcomes (VAS scores, opioids consumption, and length of stay), mean difference (MD) or standard mean difference (SMD) with a 95% confidence intervals (CIs) was applied for assessment. Forest plots were exported to show the pooled data and present the results of included studies.

3. Results

3.1. Search result

A total of 587 studies were identified through the initial search. Three hundred seventy-eight studies were excluded for duplication. By scanning the abstracts, 203 reports did not meet inclusion criteria and 1 paper was excluded for unclear data. No gray literature was included. Finally, 5 RCTs[12–16] published between 2010 and 2016 were included in the present meta-analysis and all studies were published in English. These studies included 152 patients in the experimental groups and 156 patients in the control groups. No gray reference was included.

3.2. Study characteristics

The sample size of the included studies ranged from 30 to 98. All of them compare the analgesic efficiency between FNB and FIB in total knee and hip arthroplasties. Experimental groups received FNB, while control groups received FIB. There is a variation in dosage and types of local anesthetics among articles. All patients received general anesthesia for surgery. Four articles[11–14] reported that TJAs were performed by same teams. Three studies[11,13,15] received premedication for pain relief. All participates received patient-controlled analgesia (PCA) with opioids as an adjunct concomitant pain management. None of the included articles performed a sample size calculation. All of them suggest the outcomes for at least 95% of the patients. The follow-up period ranged from 1 to 4 months (Table 1).

3.3. Risk of bias within studies

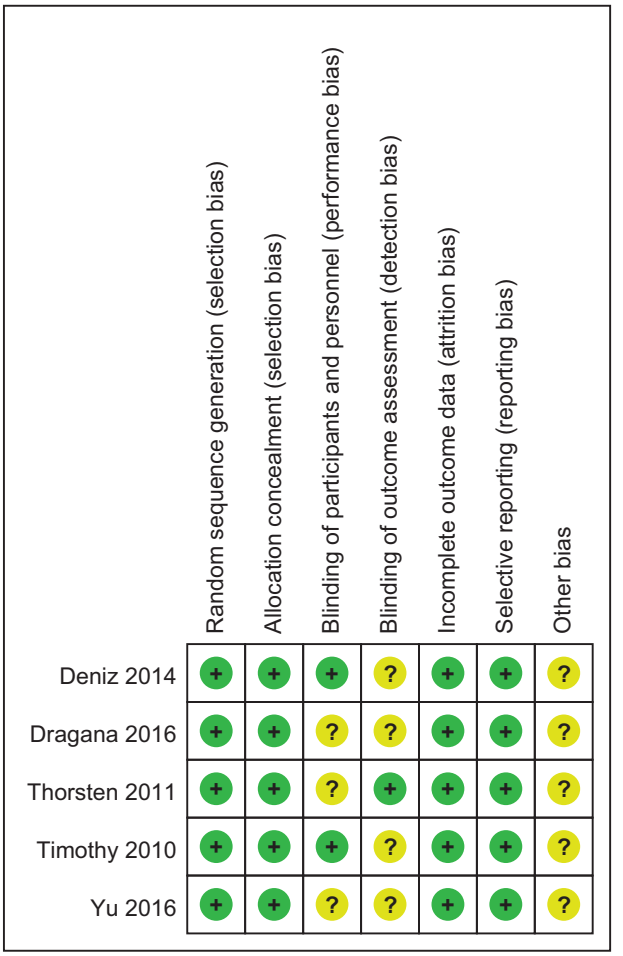
The Cochrane Handbook for Systematic Review of Interventions was consulted to assess risk of bias among RCTs. All RCTs provided clear inclusion and exclusion criteria and described their randomization methodology by using computer software. Five studies reported allocation concealment was achieved by sealed opaque envelopes. Double blinding was reported in 2 RCTs,[11,12] only 1[13] of the included articles attempted to blind the assessors. All RCTs provided complete outcome data. The methodological quality assessment is summarized in Table 2. Each risk of bias item is presented as the percentage across all included studies, which indicates the proportion of different levels of risk of bias for each item (Table 3).

3.4. Outcomes for meta-analysis

The most interesting finding of the meta-analysis was that FNB showed similar analgesic effect compared FIB within the first 48 hours. No significant difference regarding opioids consumption and postoperative complications were identified.

Table 2

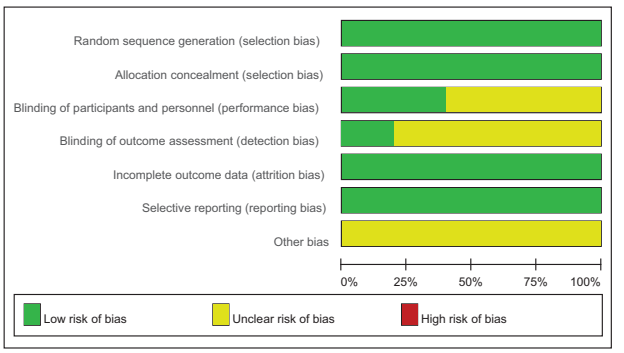
Methodological quality of the randomized controlled trials.



3.4.1. VAS scores at 12 hours. Five articles[11–15] reported the outcomes of VAS scores at 12 hours after TJA. A random-effects model was used because significant heterogeneity was found among the studies ($\chi^2 = 10.97$, df = 4, $I^2 = 63.5\%$, $P = .027$). The pooled results demonstrated that no significant difference in VAS scores at 12 hours was found between 2 groups (SMD = −0.080, 95% CI: −0.306 to 0.145, $P = .485$; Fig. 2).

Table 3

Risk of bias of included RCTs.



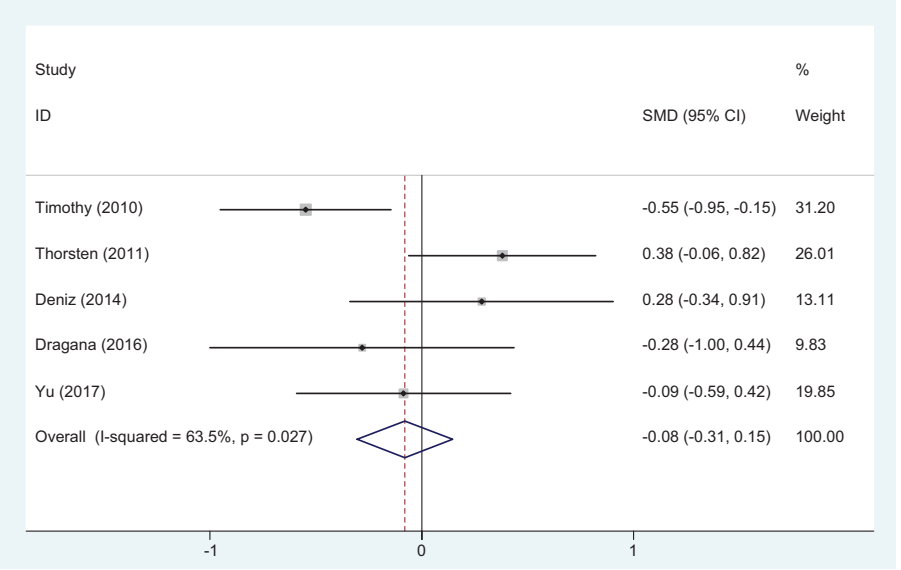


Figure 2. Forest plot diagram showing VAS scores at 12 hours following TJA.

3.4.2. VAS scores at 24 hours. Five studies[11–15] reported the outcomes of VAS scores at 24 hours after TJA. A fixed-effects model was used because no significant heterogeneity was found among the studies ($\chi^2=5.82$, df=4, $I^2=31.3\%$, $P=.213$). The pooled results demonstrated that there was no significant difference in VAS scores at 24 hours between groups (SMD = 0.098, 95% CI: −0.127 to 0.323, $P=.393$; Fig. 3).

3.4.3. VAS scores at 48 hours. Five studies[11–15] reported the outcomes of VAS scores at 48 hours after TJA. A random-effects model was used because significant heterogeneity existed among these studies ($\chi^2=11.38$, df=4, $I^2=64.9\%$, $P=.023$). The pooled results demonstrated that no significant difference in VAS scores at 48 hours was identified between groups (SMD = −0.001, 95% CI: −0.227 to 0.225, $P=.993$; Fig. 4).

3.4.4. Opioids consumption at 12 hours. Opioids consumption at 12 hours after TJA was reported in 4 articles.[11–14] A fixed-effects model was applied because no significant heterogeneity was found among these studies ($\chi^2=0.35$, df=3, $I^2=0\%$, $P=.951$). No significant difference was detected in opioids consumption at 12 hours between the 2 groups (SMD = 0.026, 95% CI: −0.224 to 0.275, $P=.840$; Fig. 5).

3.4.5. Opioids consumption at 24 hours. Opioids consumption at 24 hours after TJA was provided in 4 studies.[11–14] A fixed-effects model was used because no significant heterogeneity was found among these studies ($\chi^2=0.56$, df=3, $I^2=0\%$, $P=.906$). The pooled results demonstrated that there was no significant difference in opioids consumption at 24 hours between groups (SMD = 0.037, 95% CI: −0.212 to 0.286, $P=.771$; Fig. 6).

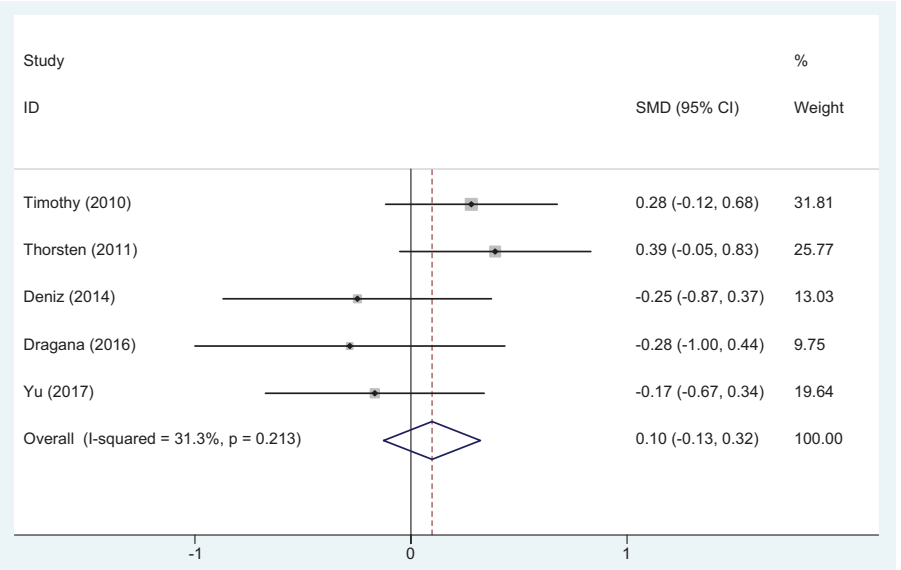


Figure 3. Forest plot diagram showing VAS scores at 24 hours following TJA.

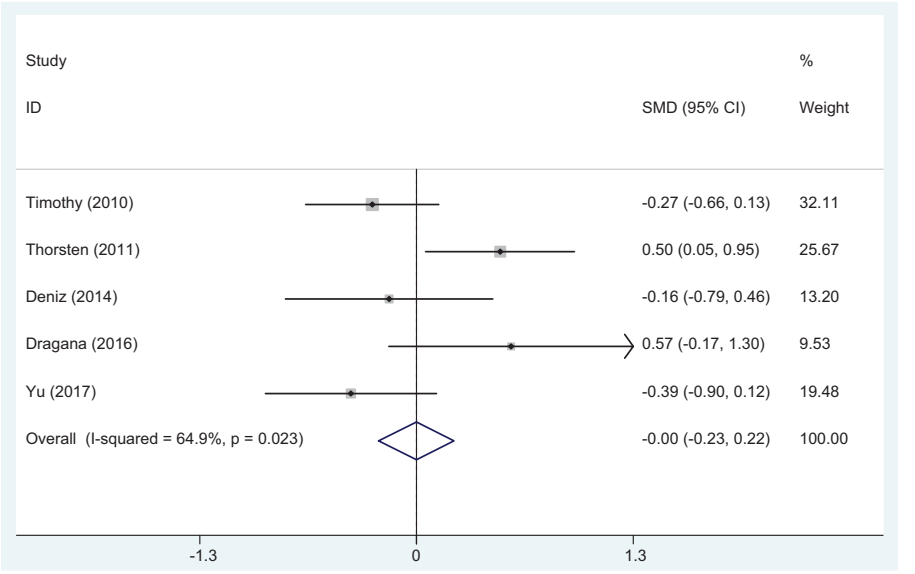


Figure 4. Forest plot diagram showing VAS scores at 48 hours following TJA.

3.4.6. Opioids consumption at 48 hours. Four articles[11–14] reported the outcomes of opioids consumption at 48 hours after TJA. A fixed-effects model was used because no significant heterogeneity was found among the pooled data ($\chi^2=0.61$, df = 3, $I^2=0\%$, $P=.893$). No significance difference in opioids consumption at 48 hours was observed between the 2 groups. (SMD = −0.016, 95% CI: −0.265 to 0.233, $P=.900$; Fig. 7).

3.4.7. Length of hospital stay. Five studies[11–15] reported the length of hospital stay for the groups. A random-effects model was used because significant heterogeneity was identified in the pooled results ($\chi^2=18.83$, df = 4, $I^2=78.8\%$, $P=.001$). No significant difference in the length of hospital stay was observed between the 2 groups (SMD = −0.044, 95% CI: −0.271 to 0.183, $P=.705$; Fig. 8).

3.4.8. Nausea and vomiting. Five studies[11–15] reported the postoperative complications of nausea and vomiting. A fixed-effects model was used because no significant heterogeneity was found among these studies ($\chi^2=4.01$, df = 4, $I^2=0.3\%$, $P=.405$). No significant difference in the incidence of nausea and vomiting was found between the 2 groups (RD = −0.001, 95% CI: −0.102 to 0.100, $P=.986$; Fig. 9).

3.4.9. Pruritus. Four articles[11–15] reported the incidence of pruritus following TJA. A fixed-effects model was used due to the low significant heterogeneity among these studies ($\chi^2=1.10$, df = 3, $I^2=0\%$, $P=.777$). No significant difference was found in terms of the incidence of pruritus between the groups (RD = 0.026, 95% CI: −0.041 to 0.094, $P=.448$; Fig. 10).

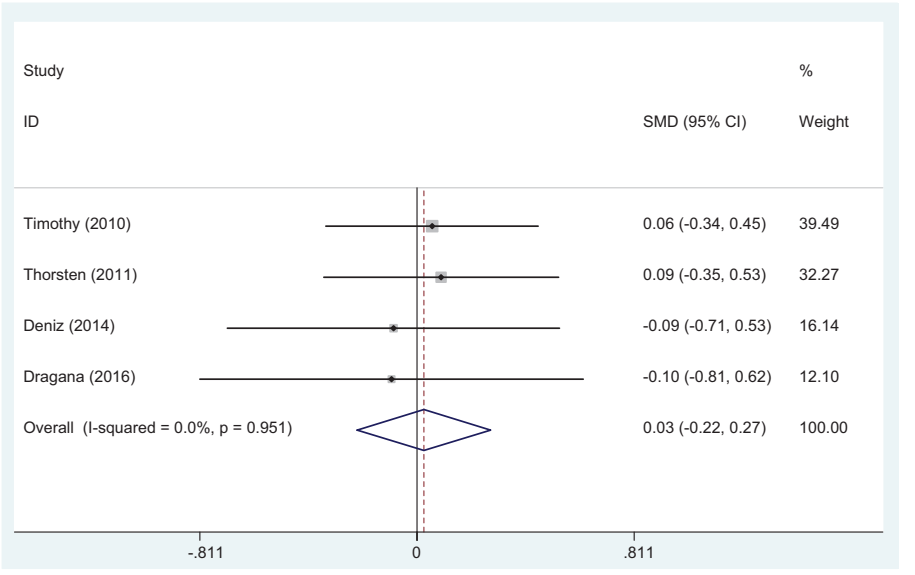


Figure 5. Forest plot diagram showing opioid consumption at 12 hours following TJA.

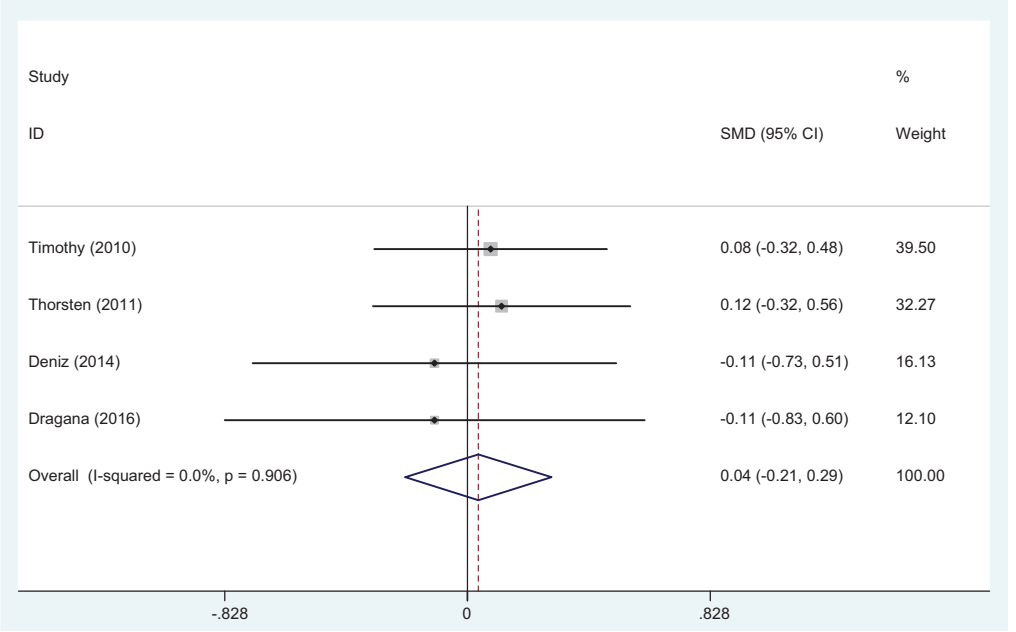


Figure 6. Forest plot diagram showing opioid consumption at 24 hours following TJA.

3.4.10. Publication bias and subgroup analysis. Publication bias was tested for the outcome of VAS scores at 24 hours after TJA (Fig. 11). Funnel plots were symmetrical and low risk of publication bias was showed. However, we cannot eliminate publication bias as the reliability of this evaluation strategy was weak especially when a small number of articles were enrolled. Subgroup analysis is presented in Table 4.

3.4.11. Evidence level. All main outcomes in this meta-analysis were evaluated using the GRADE system (Table 5).

The overall evidence quality for each outcome was high to moderate.

4. Discussion

The overall evidence of the present meta-analysis was high to moderate (Table 5) which means that further research is likely to significantly change confidence in the effect estimate and may change the estimate. To the best of our knowledge, this study is the first meta-analysis from RCTs to compare the efficiency and safety between FNB and FIB for pain management after TJA. The most interesting finding of the meta-analysis was that FNB showed similar analgesic effect compared FIB. No significant difference regarding opioids consumption and postoperative complications were identified.

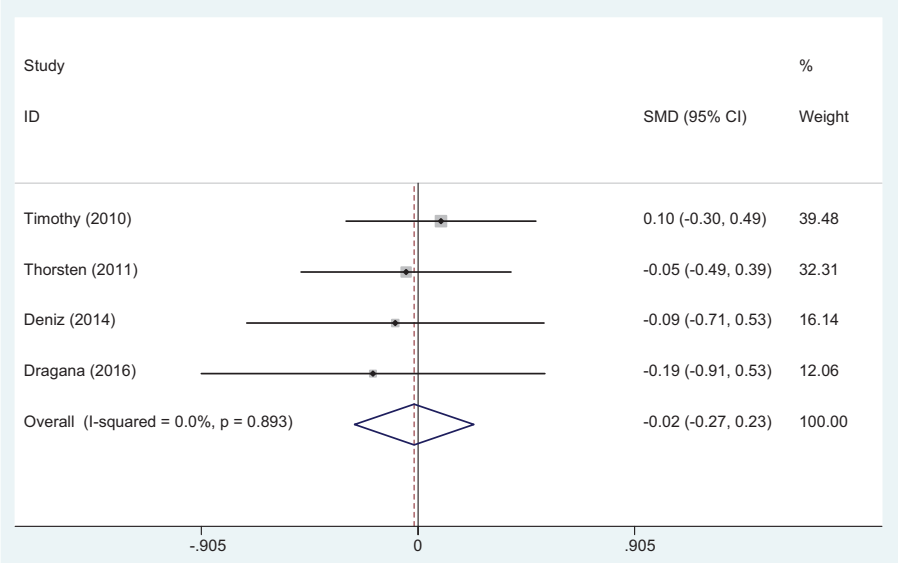


Figure 7. Forest plot diagram showing opioid consumption at 48 hours following TJA.

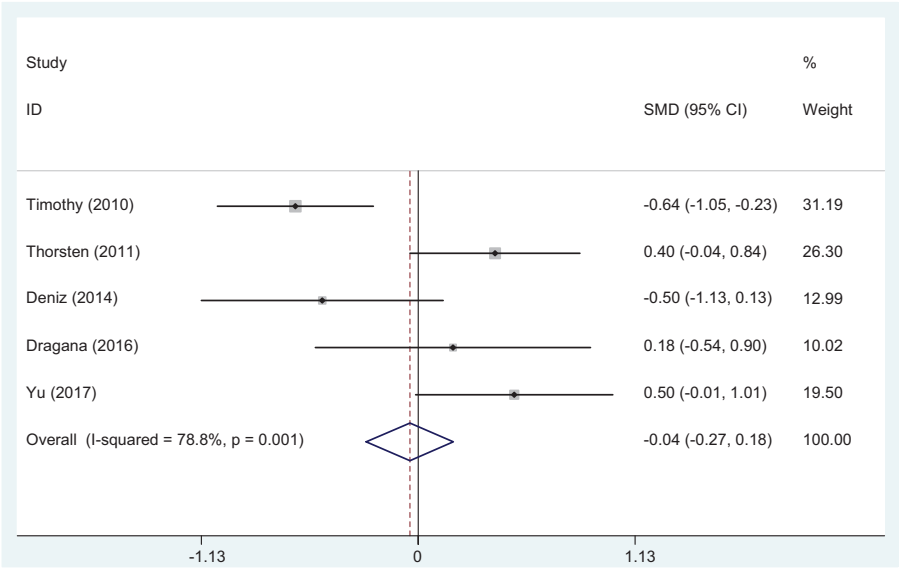


Figure 8. Forest plot diagram showing length of hospital stay following TJA.

With the aging population, TJA was frequently performed in patient who suffers knee and hip osteoarthritis and there has been a general uptrend by the year. However, pain control following TJA can be very problematic. Optimal analgesia may achieve early functional recovery and shorten hospital stays resulting in decreased risks of thrombotic events. Postoperative pain control is an interesting topic in orthopedic surgery and still remains controversial.

Regional anesthesia and analgesia is more and more popular and showed superior in reducing neurotoxic effects, medical costs compared general anesthesia.[17,18] Furthermore, it can be performed unilaterally and cardiovascular parameters are more stable. Multimodal techniques featuring peripheral nerve blocks have demonstrated superior efficacy for pain relief in TJA. Although nerve block is not completely sufficient in pain relief for TJA, it can significantly relieve pain with less morphine consumption. Published articles have shown its many advantages in reducing postoperative pain. Hadzic et al[3] demonstrated that FNB resulted in modestly lower pain scores and reduced opioid requirements without increasing the incidence of adverse events after TKA. Moreover, FNB has previously found to be superior compared PCA administrated opioids. However, some articles has criticized that there was a potential risk of femoral nerve injury which led to a weakness in the quadriceps muscles and subsequently resulting in an increased risk of postoperative falls.[19,20]

Recently, FIB has also showed effectiveness in pain management by anesthetizing the femoral nerve remotely from important neurovascular structures in lower extremity surgery and could avoid neurologic damage complications. It was considered as an

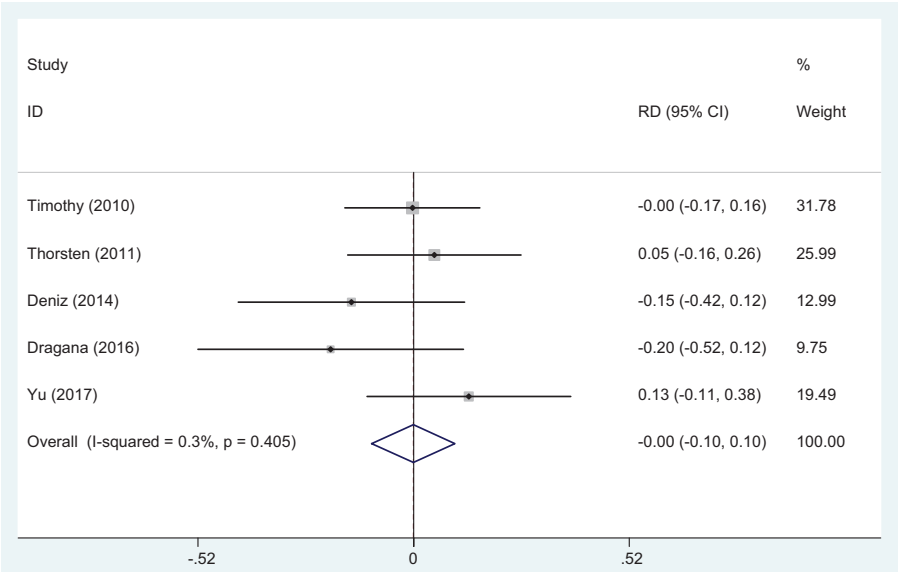


Figure 9. Forest plot diagram showing the incidence of nausea and vomiting following TJA.

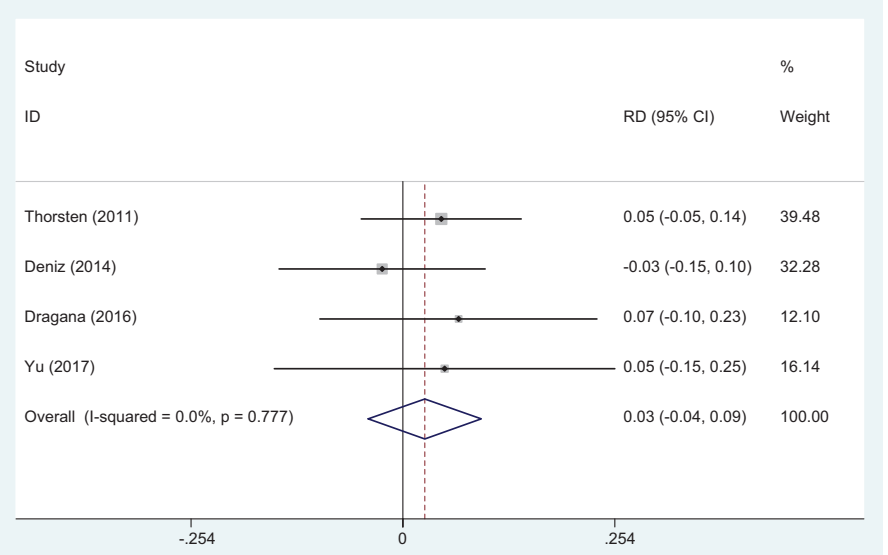


Figure 10. Forest plot diagram showing the incidence of pruritus following TJA.

alternative choice for pain management especially in children. Zhang et al[21] performed a meta-analysis from RCTs and suggest that the application of FIB could significantly reduce VAS scores and morphine consumption within the first 24 hours compared placebo following TJA. In addition, there were fewer adverse effects in FIB groups. In the present meta-analysis, both FNB and FIB were effectiveness in pain control and there was no significant difference in VAS scores within the first 48 hours following TJA. However, based on the current data available, we cannot compare the neurologic damage complications between groups and large sample of RCTs were required for further investigation.

It was reported that there was approximately 30% to 60% of patients who suffered moderate to severe pain in the first 2 days following TJA.[22,23] Additional opioids were used as an adjunct to concomitant pain control. The personal control aspect of PCA and the rapid onset were preferred by patients. Numerous articles have reported that the application of PCA device was associated with a high level of patients' satisfaction.[24,25] In our study, opioid consumption was considered as an objective means to measure pain. Morphine-related adverse effects including nausea, vomiting, respiratory depression, and pruritus were well known and drew our attention. Besides the side effects, drug dependence is also an important issue related to opioid administration that should be considered. It was crucial to minimize the opioid consumption for patients and improve their recovery and satisfaction. The use of local anesthetic nerve block has been recommended by the UK National Institute of Health and Care Excellence as part of an opioid sparing strategy.[26] Currently, FNB versus FIB in reducing opioids consumption remains controversial. Newman et al[27] reported that patients with femoral neck fracture receiving a FNB required less morphine after the block than those receiving fascia iliaca compartment block. While, Reavley et al[28] showed equivalent opioids consumption in adult neck of femur fractures between treatment groups. The present meta-analysis indicated that both FNB and FIB could significantly minimize opioids consumption and no significant difference was identified.

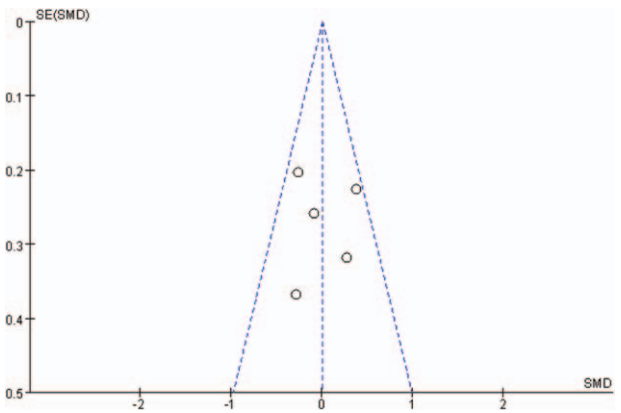


Figure 11. Funnel plot of VAS score at 24 hours.

Analgesia efficacy is not the only concern when comparing 2 kinds of strategies. Nausea and vomiting are known adverse effects that are frequently associated with PCA opioids. Decreased morphine consumption can subsequently avoid such complications effectively. The overall incidence of nausea and vomiting was 46/152 in FNB groups compared 47/156 in FIB groups. No significant difference was found regarding postoperative complications. Due to the small number of included articles, large sample sizes of high quality RCTs are further needed.

Although, further evidence of the clinical benefits and cost effectiveness of FNB versus with FNB is required, the current data support that both of them could reduce pain and opioid consumptions. For clinicians, owing to the quality of evidence, the current data support the either FIB or FNB was performed for the management of postoperative pain. For policymakers, the current data do not permit firm estimates of the size of the effect owing to the low number of studies in the analysis. For patients, both FIB and FNB could significantly reduce pain, morphine consumption, and adverse effects. Furthers studies should be focused on surgeries that are known to be associated with significant postoperative pain, particularly surgeries where improved pain control may deliver significant clinical benefits through reduced morbidity, or cost-effectiveness benefits through faster rehabilitation and discharge.

Table 4

Outcome of subgroup analysis for main results.

Variables	Studies (n)	Patients (n)	*P*	SMD (95% CI)	Heterogeneity *P*-value (I^2)	Model
VAS scores at 12 h						
Premedication	3	238	.375	−0.116 [−0.373,0.141]	.010 (78.5%)	Random
No premedication	2	70	.866	0.040 [−0.431,0.511]	.244 (26.3%)	Fixed
VAS scores at 24 h						
Premedication	3	238	.016	0.371 [0.060,0.574]	.081 (60.2%)	Fixed
No premedication	2	70	.274	−0.263 [−0.734,0.208]	.943 (0%)	Fixed
VAS scores at 48 h						
Premedication	3	238	.742	−0.043 [−0.300,0.214]	.013 (77.0%)	Random
No premedication	2	70	.557	0.142 [−0.332,0.615]	.136 (55.1%)	Fixed

CI = confidence interval, SMD = standard mean difference, VAS = visual analog scale.

Table 5

The GRADE evidence quality for main outcome.

Quality assessment							No. of patients		Effect			
No. of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	FNB groups	FIB groups	Relative (95% CI)	Absolute	Quality	Importance
VAS scores at 12 h (follow-up 1–4 months; better indicated by lower values)												
5	Randomized trials	No serious limitations	No serious inconsistency	No serious indirectness	No serious imprecision	None	152	156	—	SMD 0.080 lower (0.306 lower to 0.145 higher)	⊕⊕⊕⊕ High	Critical
VAS scores at 24 h (follow-up 1–4 months; better indicated by lower values)												
5	Randomized trials	No serious limitations	No serious inconsistency	No serious indirectness	No serious imprecision	None	152	156	—	SMD 0.098 higher (0.127 lower to 0.323 higher)	⊕⊕⊕⊕ High	Critical
VAS scores at 48 h (follow-up 1–4 months; better indicated by lower values)												
5	Randomized trials	No serious limitations	No serious inconsistency	No serious indirectness	No serious imprecision	None	152	156	—	SMD 0.001 lower (0.227 lower to 0.225 higher)	⊕⊕⊕⊕ High	Critical
Opioid consumption at 12 h (follow-up 3–4 months; better indicated by lower values)												
4	Randomized trials	No serious limitations	No serious inconsistency	No serious indirectness	Serious	None	152	156	—	SMD 0.026 higher (0.224 lower to 0.275 higher)	⊕⊕⊕O Moderate	Critical
Opioid consumption at 24 h (follow-up 3–4 months; better indicated by lower values)												
4	Randomized trials	No serious limitations	No serious inconsistency	No serious indirectness	Serious	None	152	156	—	SMD 0.037 higher (0.212 lower to 0.286 higher)	⊕⊕⊕O Moderate	Critical
Opioid consumption at 48 h (follow-up 3–4 months; better indicated by lower values)												
4	Randomized trials	No serious limitations	No serious inconsistency	No serious indirectness	Serious	None	152	156	—	SMD 0.016 lower (0.265 lower to 0.233 higher)	⊕⊕⊕O Moderate	Critical

CI = confidence interval, FIB = fascia iliaca block, FNB = femoral nerve block, SMD = standard mean difference, VAS = visual analog scale.

The present meta-analysis exists some limitations that should be noted. Only 5 articles were included in present meta-analysis, although all of them are recently published RCTs, the sample size are relatively small; functional outcome is an important parameter, due to the insufficiency of relevant data, we cannot perform a meta-analysis. Dose and types of local anesthetics are varied, which may influence the results; the duration of follow up is relatively short which leads to underestimating complications. Publication bias in present meta-analysis may influence the results.

Despite the limitations above, this is the first meta-analysis from RCTs to compare the efficiency and safety between FNB and FIB for postoperative pain control in patients undergoing total knee and hip arthroplasties. Due to the quality of the evidence currently available, high quality RCTs are required.

5. Conclusion

FNB provides equal postoperative pain control compared with FIB following total joint arthroplasty. Both of them can reduce the consumption of opioids without severe adverse effects. More high-quality large RCTs with long follow-up period are necessary for proper comparisons of the efficacy and safety of FNB with FIB.

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