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Opioid-Sparing Outcomes of Intraoperative Open-Field Adductor Canal Injection Combined with Intravenous Dexamethasone in Total Knee Arthroplasty: A Retrospective Cohort Study

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Abstract

Background

Reducing postoperative opioid exposure is an important goal after total knee arthroplasty (TKA). We evaluated the association of an intraoperative open-field, landmark-guided adductor canal injection combined with intravenous dexamethasone with postoperative opioid requirement, compared with either component alone.

Methods

This single-center retrospective cohort included 90 primary TKA patients treated with open-field adductor canal injection alone (n = 28), intravenous dexamethasone alone (n = 30), or their combination (n = 32). The principal focus of this report was the proportion requiring postoperative opioids; opioid dose among recipients, postoperative pain, mobilization, knee flexion, and other outcomes were also described. This emphasis on opioid requirement should not be interpreted as a prospectively prespecified primary endpoint.

Results

Opioids were required by 15/32 (46.9%) patients receiving combined treatment, compared with 26/28 (92.9%) receiving injection alone and 28/30 (93.3%) receiving dexamethasone alone. Thus, 17/32 (53.1%) in the combined group received no opioids. Among the 15 opioid recipients in the combined group, mean morphine-equivalent dose was 7.5 ± 3.2 mg; this is not the mean across all 32 patients. The combined group also had lower reported postoperative pain and earlier mobilization. Comparisons of opioid dose and adjusted regression estimates require verification against the underlying patient-level data.

Conclusions

The combined open-field injection and intravenous dexamethasone protocol was associated with a substantially lower proportion of patients requiring postoperative opioids after TKA. As this was a retrospective, nonrandomized comparison, causation and the independent contribution of the injection technique cannot be established.

Background

Total knee arthroplasty (TKA) is among the most frequently performed and most effective orthopedic procedures for patients in whom conservative treatment of advanced knee osteoarthritis has failed [1, 2]. By replacing the damaged knee joint with a prosthetic implant, it relieves pain and restores joint function;

primary knee osteoarthritis accounts for more than 95% of cases, and incidence is climbing worldwide, particularly among younger patients [3]. In the United States, demand for the procedure is projected to exceed one million by 2030 [4]. Yet TKA is also regarded as one of the most painful orthopedic operations, and more than half of patients experience moderate-to-severe pain in the early period [3, 5]. Pain left poorly controlled delays early mobilization, lowers patient satisfaction, and increases hospital resource use [1, 4].

Multimodal analgesia, which combines agents with different mechanisms of action, is the standard approach for strengthening pain control while reducing opioid requirements; procedure-specific recommendations pair a single-shot adductor canal block (ACB) with local infiltration and one intraoperative intravenous dexamethasone dose, reserving opioids for rescue [3, 6]. Opinion still divides over which peripheral nerve block serves best, and trials that compare them directly are few [1]. For dexamethasone the situation is much the same: its route, dose, and timing shift from one protocol to the next, and the safety concerns around raised blood glucose and infection risk remain a live question [7, 8]. Reports on whether single-shot ACB lowers opioid consumption and improves functional outcomes pull in different directions, and the adjuvants added to it have yet to settle into a standard form [2]. For a clinician weighing these options separately, or thinking of combining them, the evidence gives little to go on.

ACB suppresses peripheral nociceptive transmission, and corticosteroids blunt the inflammatory response to surgical trauma; used together, the two may act in complementary fashion. With that rationale, we compared open-field adductor canal injection, perioperative corticosteroid, and their combination, focusing on postoperative opioid requirement and secondarily on pain and early functional recovery in patients undergoing primary TKA, hypothesizing an association between combined treatment and reduced opioid requirement.

Methods

Study Population

The study was designed as a single-center retrospective cohort. Patients who underwent primary total knee arthroplasty (TKA) between January 2019 and December 2025 were identified from the hospital electronic records. A total of 126 records were reviewed. Twenty-one patients were excluded for missing data, nine for chronic opioid use, and six for revision surgery. The remaining 90 patients entered the analysis. Inclusion required primary TKA, surgery under spinal anesthesia, and available postoperative pain records and clinical follow-up. Revision surgery, general anesthesia, chronic opioid use, and incomplete data were grounds for exclusion. Patients were categorized retrospectively into three groups according to the perioperative analgesia protocol they received: ACB (n = 28), corticosteroid (n = 30), and combined treatment (n = 32) (Fig. 1).

Study Procedures

All data were retrieved from patient files. Demographic variables were age (years), sex, body mass index (kg/m²), American Society of Anesthesiologists (ASA) physical status class, and history of diabetes [9]. Perioperative records covered operative time (min), estimated blood loss (mL), tourniquet time (min), tranexamic acid use, and length of hospital stay (days). Blood glucose (mg/dL) was measured perioperatively. Outcomes included postoperative opioid requirement (the main focus of the present report) and pain; rest pain was scored on a visual analog scale (VAS; 0–10) at the sixth, twelfth, twenty-fourth, and forty-eighth hours, and movement-evoked pain at the twenty-fourth hour [10]. Opioid consumption was recorded as cumulative morphine-equivalent dose (mg); the proportions of patients requiring and not requiring opioids, the need for rescue analgesia, and time to first analgesic request (hours) were also determined. Postoperative nausea and vomiting (PONV), defined as nausea, vomiting, or retching, and antiemetic use were noted. For early functional recovery, time to first mobilization (hours), time to independent ambulation (hours), and knee flexion angle (°) measured by goniometer on the first day were recorded [11]. The inflammatory response was assessed at the twenty-fourth hour by serum C-reactive protein (CRP; mg/L) and interleukin-6 (IL-6; pg/mL). Patient satisfaction was rated on a 0–10 scale at discharge. For safety, delayed wound healing, surgical site infection, and venous thromboembolism were monitored throughout admission.

Intervention / Surgical Method

All patients were operated on under spinal anesthesia by the same surgical team, following a standardized perioperative rehabilitation protocol. Surgery proceeded through a medial parapatellar arthrotomy, with a pneumatic tourniquet used throughout. After standard distal femoral and proximal tibial bone resections, the joint was prepared, and tranexamic acid was given for hemostasis [12]. The open-field, landmark-guided adductor canal injection was administered intraoperatively by the surgical team through the open surgical field, without ultrasound, using an anatomical landmark technique. The needle was introduced at the posterior corner of the medial femoral condyle and advanced proximally beneath the vastoadductor membrane, and the solution was intended to reach the adductor canal; spread was not verified by ultrasound or other imaging (Fig. 2). The 20 mL mixture combined 10 mL of 0.5% bupivacaine (Marcaine) with 10 mL of normal saline (0.9% sodium chloride). Groups receiving corticosteroid were given 16 mg of intravenous dexamethasone in total: 8 mg 30 to 60 minutes before surgery and a further 8 mg intraoperatively; no corticosteroid was given postoperatively. The combined group received both the ACB and the dexamethasone protocol. Once the block was placed, the operation was completed and the incision closed, and all patients followed the same early-mobilization rehabilitation program.

Statistical Analysis

Analyses were performed with IBM SPSS Statistics 26.0. Distribution normality of continuous variables was examined with the Shapiro–Wilk test. Continuous variables were presented as mean (SD) and categorical variables as number (percentage). For comparison of the three groups, one-way analysis of variance was used for normally distributed data and the Kruskal–Wallis test for non-normally distributed data. When a significant difference was found, pairwise comparisons were made with Bonferroni correction. Categorical variables were assessed with the chi-square test or, for small expected counts, the Fisher exact test. Multivariable linear regression (standardized β coefficients) was constructed for independent determinants of postoperative pain and logistic regression (odds ratio [OR] and 95% confidence interval [CI]) for opioid use (the originally reported estimates require source-data verification); both models were adjusted for age, sex, body mass index, and operative time, with combined analgesia entered as the predictor. Exploratory post-hoc power estimates were reported in the original analysis, but do not substitute for effect estimates with confidence intervals. Two-sided $P < 0.05$ was considered significant.

Results

Patient and perioperative characteristics

The 90 patients were distributed across three groups: ACB (n = 28), corticosteroid (n = 30), and combined treatment (n = 32). Groups did not differ significantly in age, sex, body mass index, ASA class, or frequency of diabetes (p = 0.62, 0.88, 0.79, 0.97, and 0.89, respectively); baseline characteristics were comparable. Operative time, estimated blood loss, and tourniquet time were also similar (p = 0.73, 0.56, and 0.45), and all patients received tranexamic acid. Length of hospital stay was markedly shorter in the combined group, 2.8 ± 0.8 days versus 3.4 ± 0.9 in the ACB group and 3.6 ± 1.0 in the corticosteroid group (p = 0.03) (Table 1).

Table 1
Baseline, perioperative, and safety characteristics of the study groups

Variable	ACB (n = 28)	Steroid (n = 30)	Combined (n = 32)	P value
Baseline characteristics				
Age (years)	67.4 ± 7.2	66.1 ± 6.9	65.9 ± 7.5	0.62
Female sex, n (%)	20 (71%)	22 (73%)	24 (75%)	0.88
Body mass index (kg/m²)	29.8 ± 4.3	30.2 ± 4.5	29.7 ± 4.1	0.79
ASA physical status ≥ III, n (%)	9 (32%)	10 (33%)	11 (34%)	0.97
Diabetes mellitus, n (%)	6 (21%)	7 (23%)	6 (19%)	0.89
Perioperative characteristics				
Operative time (min)	94 ± 15	96 ± 17	93 ± 14	0.73
Estimated blood loss (mL)	320 ± 85	335 ± 92	310 ± 88	0.56
Tourniquet time (min)	78 ± 12	80 ± 14	76 ± 11	0.45
Tranexamic acid use, n (%)	28 (100%)	30 (100%)	32 (100%)	—
Length of hospital stay (days)	3.4 ± 0.9	3.6 ± 1.0	2.8 ± 0.8□□	0.03
Safety outcomes				
Perioperative blood glucose (mg/dL)	112 ± 18	128 ± 22□	125 ± 20□	0.008
Delayed wound healing, n (%)	0 (0%)	0 (0%)	0 (0%)	—
Surgical site infection, n (%)	0 (0%)	0 (0%)	0 (0%)	—
Thromboembolic events (DVT/PE), n (%)	0 (0%)	0 (0%)	0 (0%)	—

Data are expressed as mean ± SD or n (%); □ P < 0.05 versus ACB and □ P < 0.05 versus Steroid (Bonferroni-corrected post hoc test); "—" indicates not applicable. ACB, adductor canal block; ASA, American Society of Anesthesiologists; DVT, deep vein thrombosis; PE, pulmonary embolism; SD, standard deviation.

Perioperative blood glucose was higher in the two groups that received dexamethasone. Values of 128 ± 22 mg/dL in the corticosteroid group and 125 ± 20 mg/dL in the combined group were significantly elevated against 112 ± 18 mg/dL in the ACB group (p = 0.008). No wound healing problem, surgical site infection, or thromboembolic event occurred in any group throughout admission (Table 1).

Postoperative pain

Rest pain was lowest in the combined group at all measurement times. Values at the sixth, twelfth, twenty-fourth, and forty-eighth hours of 3.7 ± 1.1, 3.3 ± 1.0, 3.0 ± 1.0, and 2.5 ± 0.8 were significantly lower than in both the ACB and corticosteroid groups ($p < 0.001$, 0.002, 0.002, and 0.003). Movement-evoked pain followed the same trend, recorded at the twenty-fourth hour as 3.9 ± 1.1 in the combined group, 5.2 ± 1.3 in the ACB group, and 5.5 ± 1.4 in the corticosteroid group ($p < 0.001$). The ACB and corticosteroid groups ran close together over this period (Table 2).

Table 2
Postoperative pain, opioid consumption, and early functional recovery outcomes

Variable	ACB (n = 28)	Steroid (n = 30)	Combined (n = 32)	P value
Pain, visual analogue scale				
VAS at rest, 6 h	4.8 ± 1.3	5.2 ± 1.4	3.7 ± 1.1□□	< 0.001
VAS at rest, 12 h	4.3 ± 1.2	4.7 ± 1.3	3.3 ± 1.0□□	0.002
VAS at rest, 24 h	4.1 ± 1.2	4.6 ± 1.4	3.0 ± 1.0□□	0.002
VAS at rest, 48 h	3.5 ± 1.0	3.8 ± 1.1	2.5 ± 0.8□□	0.003
VAS on movement, 24 h	5.2 ± 1.3	5.5 ± 1.4	3.9 ± 1.1□□	< 0.001
Opioid consumption (morphine equivalents)				
Mean opioid dose among recipients (mg)*	18.4 ± 6.1	21.2 ± 7.3	7.5 ± 3.2*□□	Reanalysis required
Patients requiring opioids, n (%)	26 (93%)	28 (93%)	15 (47%)□□	< 0.001
Patients not requiring opioids, n (%)	2 (7%)	2 (7%)	17 (53%)□□	< 0.001
Rescue analgesia required, n (%)	15 (54%)	18 (60%)	6 (19%)□□	0.002
Time to first analgesic request (h)	6.2 ± 2.1	5.8 ± 1.9	11.5 ± 3.4□□	< 0.001
Postoperative nausea and vomiting				
PONV, n (%)	9 (32%)	5 (17%)	2 (6%)□	0.01
Antiemetic use, n (%)	8 (29%)	4 (13%)	1 (3%)□	0.01
Early functional recovery				
Time to first mobilization (h)	21.6 ± 5.1	23.1 ± 6.3	17.9 ± 4.2□□	0.01
Time to independent ambulation (h)	29.4 ± 6.7	31.2 ± 7.1	24.6 ± 5.5□□	0.01

Data are expressed as mean ± SD or n (%); □ P < 0.05 versus ACB and □ P < 0.05 versus Steroid (Bonferroni-corrected post hoc test). ACB, adductor canal block; CRP, C-reactive protein; IL-6, interleukin-6; PONV, postoperative nausea and vomiting; SD, standard deviation; VAS, visual analogue scale. *The combined-group value 7.5 ± 3.2 mg is calculated among 15 opioid recipients only. Denominators for the two comparator-group dose means are unconfirmed; between-group opioid-dose p value and significance markers must be recalculated from source records. Do not interpret these conditional means as whole-group means.

Variable	ACB (n = 28)	Steroid (n = 30)	Combined (n = 32)	P value
Knee flexion, postoperative day 1 (°)	76.8 ± 11.4	72.5 ± 12.3	84.1 ± 10.2□□	0.02
Inflammatory and patient-reported outcomes				
C-reactive protein, 24 h (mg/L)	45.2 ± 12.4	32.1 ± 9.8□	28.5 ± 8.5□	< 0.001
Interleukin-6, 24 h (pg/mL)	65.4 ± 15.2	42.3 ± 11.5□	38.6 ± 10.2□	< 0.001
Patient satisfaction (0–10)	7.2 ± 1.1	6.9 ± 1.3	8.8 ± 0.9□□	< 0.001

Data are expressed as mean ± SD or n (%); □ P < 0.05 versus ACB and □ P < 0.05 versus Steroid (Bonferroni-corrected post hoc test). ACB, adductor canal block; CRP, C-reactive protein; IL-6, interleukin-6; PONV, postoperative nausea and vomiting; SD, standard deviation; VAS, visual analogue scale. *The combined-group value 7.5 ± 3.2 mg is calculated among 15 opioid recipients only. Denominators for the two comparator-group dose means are unconfirmed; between-group opioid-dose p value and significance markers must be recalculated from source records. Do not interpret these conditional means as whole-group means.

Opioid consumption

The most clinically notable finding was the lower proportion requiring postoperative opioids in the combined group: 15/32 (46.9%), compared with 26/28 (92.9%) in the injection-only group and 28/30 (93.3%) in the dexamethasone-only group. Conversely, 17/32 (53.1%) of combined-group patients required no opioid, compared with 2/28 (7.1%) and 2/30 (6.7%). Among the 15 combined-group patients who did receive opioids, mean morphine-equivalent consumption was 7.5 ± 3.2 mg; this conditional mean must not be interpreted as the average across the full group. The reported 18.4 ± 6.1 mg and 21.2 ± 7.3 mg values for the comparator groups cannot be directly compared until their denominators are verified. The previously reported opioid-dose p value therefore requires reanalysis (Table 2).

Nausea and vomiting

PONV was lowest in the combined group at 6%, significantly below the 32% in the ACB group (corticosteroid 17%; p = 0.01). Antiemetic requirement moved in the same direction, recorded as 3% in the combined group, 13% in the corticosteroid group, and 29% in the ACB group (p = 0.01) (Table 2).

Early functional recovery

Time to first mobilization was shortest in the combined group at 17.9 ± 4.2 hours (ACB 21.6 ± 5.1, corticosteroid 23.1 ± 6.3; p = 0.01). Independent ambulation was likewise achieved earlier in this group (24.6 ± 5.5 hours; p = 0.01). Knee flexion angle on the first day was highest in the combined group at

84.1 ± 10.2 degrees, against 76.8 ± 11.4 in the ACB group and 72.5 ± 12.3 in the corticosteroid group (p = 0.02). On all three measures the combined group separated significantly from the other two (Table 2).

Inflammatory markers and patient satisfaction

Inflammatory markers were lower in the groups that received dexamethasone. At the twenty-fourth hour, CRP fell to 32.1 ± 9.8 mg/L in the corticosteroid group and 28.5 ± 8.5 mg/L in the combined group, against 45.2 ± 12.4 mg/L in the ACB group (p < 0.001). IL-6 showed the same pattern, with the two steroid-containing groups falling significantly below the ACB group value of 65.4 ± 15.2 pg/mL (p < 0.001). Patient satisfaction reached its highest in the combined group at 8.8 ± 0.9 (ACB 7.2 ± 1.1, corticosteroid 6.9 ± 1.3; p < 0.001) (Table 2).

Independent determinants and statistical power

The original multivariable analysis suggested an association between combined analgesia and lower pain scores (reported standardized β=−0.48; p = 0.001). However, the reported adjusted odds ratio for opioid use (OR = 0.32) has not been independently reconciled with the observed event counts and model coding. It should not be treated as verified evidence until the regression is reproduced from patient-level records (Table 3).

Table 3
Multivariable regression analyses and post hoc power analysis

Variable	β / OR / effect size	SE / 95% CI	P value	Power (%)
Panel A. Multivariable linear regression for postoperative pain				
Combined analgesia	−0.48	0.12	0.001	—
Age	0.11	0.08	0.12	—
Body mass index	0.08	0.07	0.21	—
Female sex	0.05	0.09	0.38	—
Operative time	0.03	0.06	0.45	—
Panel B. Logistic regression for postoperative opioid use				
Combined analgesia	Not verified†	Pending verification	Pending verification	Pending verification
Age	1.01	0.97–1.04	0.19	—
Body mass index	1.02	0.98–1.06	0.23	—
Female sex	1.08	0.85–1.37	0.52	—
Operative time	1.01	0.99–1.03	0.48	—
Panel C. Post hoc power analysis				
VAS pain score	0.48	—	—	98
Opioid consumption	0.65	—	—	99
Time to first mobilization	0.42	—	—	95

Standardized β coefficients are reported in Panel A; effect sizes in Panel C are Cohen's f; "—" indicates not applicable. All models were adjusted for age, sex, body mass index, and operative time. β, standardized regression coefficient; CI, confidence interval; OR, odds ratio; SE, standard error; VAS, visual analogue scale. †The adjusted opioid-use odds ratio previously reported as 0.32 requires re-estimation and is intentionally withheld pending verification. The original regression p value and CI must also be checked. Post-hoc power estimates are historical reported values, not independently validated.

Discussion

We compared three ways of managing pain after primary total knee arthroplasty in a single patient population: ACB alone, perioperative intravenous corticosteroid, and the two used together. What we

mainly wanted to know was whether the combined approach made a real difference over either method on its own. It did. Patients who received both the block and the steroid reported less pain at rest and with movement, needed far less opioid, stood up earlier, and bent the knee more comfortably. Nausea and vomiting were less frequent in this group, satisfaction higher, hospital stay shorter. Inflammatory markers receded in the steroid-treated patients, and the modest rise in blood glucose led to no wound or infection problem. The combination gave the most balanced result across a wide span, from pain to functional recovery.

In our cohort the combined group reached the lowest rest VAS at every time point (3.7 at the sixth hour, 2.5 at the forty-eighth) and stayed clearly below the ACB and steroid groups for movement pain at 24 hours, at 3.9 ($p < 0.001$). In the multivariable model this advantage held independent of age, sex, and the other variables ($\beta=-0.48$; $p = 0.001$). The results align with the existing "block plus adjuvant" data. When Swain et al. added both dexamethasone and dexmedetomidine to an adductor canal block, rest and movement pain over the first 12 hours were lower than with a single adjuvant [13]. In a randomized trial among patients sensitive to the adverse effects of nonsteroidal anti-inflammatory drugs, Sirivanasandha et al. gave every patient an adductor canal block and periarticular infiltration and added, for the intervention group, a low-concentration sciatic nerve block of 0.125% bupivacaine with 5 mg dexamethasone; rest and especially movement pain fell at 6, 12, and 18 hours, with no loss of motor power [14]. This drop in movement pain matters to us because it is what makes early mobilization possible. The likely mechanism behind our findings fits these studies: dexamethasone suppresses conduction in nociceptive C-fibers and prolongs the action of the local anesthetic, while the regional block directly interrupts peripheral pain transmission [13]. The value of going beyond a single modality is also supported by meta-analyses. Mott et al. found that combining local infiltration with the block lowered rest and movement pain at 24 hours relative to either method alone, yet the same group cautioned that the included studies did not carry a low risk of bias and that firmer conclusions require higher-quality trials [15]. Against that caveat, Agarwal et al., reviewing 130 randomized trials, emphasized that dexamethasone or dexmedetomidine added to the block conferred additional analgesic benefit, with the best results where block and periarticular injection were combined [16]. In keeping with this, Menekşe had shown that intra-articular bupivacaine injection in arthroscopic knee surgery significantly reduced early VAS scores and total analgesic consumption compared with controls [17]. The edge seen with our combined protocol fits this body of work.

The main opioid-sparing signal was the proportion of patients who avoided opioids entirely: 53.1% in the combined group versus approximately 7% in each single-treatment group. Among patients receiving opioids in the combined group, the mean dose was 7.5 ± 3.2 mg, but this is not a whole-group average. The opioid dose denominators in the comparator groups and the corresponding inferential analysis require confirmation before dose-reduction claims can be made. This observational association is clinically promising but may reflect selection, practice-period, and other unmeasured differences between groups. [18] [19] [20] [21]

Early mobilization is one of the decisive steps in recovery after total knee arthroplasty; it lowers thromboembolic risk, helps preserve muscle strength, and speeds rehabilitation. In our cohort the combined group stood out on all three functional measures: first mobilization at 17.9 hours (21.6–23.1 hours in the other groups; p = 0.01) and independent ambulation at 24.6 hours (29.4–31.2 hours; p = 0.01) were the shortest, and first-day knee flexion at 84.1° was the widest (72.5–76.8°; p = 0.02). We attribute this picture to the motor-sparing effect of the adductor canal block, which provides sensory analgesia while preserving quadriceps strength. Han et al. likewise reported that the block significantly improved first-day knee motion, quadriceps strength, and daily mobilization over controls, and surpassed the femoral nerve block in quadriceps strength and daily mobilization [22]. Et et al. showed that adding a second block to the adductor canal block shortened mobilization and discharge times without impairing early movement and increased second-day range of motion [23]. Rajkumar et al. found higher ambulation capacity and knee range of motion with the combined approach but detected no difference in hospital stay between groups [24]; in our case stay was 2.8 days in the combined group versus 3.4–3.6 days, a significant difference (p = 0.03). Corticosteroid may also share in the range-of-motion advantage; Zhuo et al. demonstrated that dexamethasone reduced active and passive motion restriction at 72 hours, supporting rapid recovery [25]. The high satisfaction (8.8/10) and short stay in the combined group can be read as the clinical and economic counterpart of better pain control and early functional gain.

In our two dexamethasone groups, CRP and IL-6 at 24 hours were clearly lower than in the ACB group ($p < 0.001$ for both). This decline in inflammatory markers suggests that the steroid limited the acute-phase response to surgical trauma, offering a plausible mechanism for the lower pain and reduced opioid need in those groups. In a series of 1853 patients, dexamethasone significantly lowered postoperative CRP, while the accompanying transient leukocytosis brought no increase in complications [26]. PONV in our data separated into 6% in the combined group, 17% in the steroid group, and 32% in the ACB group (p = 0.01); antiemetic need shifted in the same direction (p = 0.01). This difference reflects the steroid's own antiemetic action more than an indirect consequence of reduced opioid use. Dexamethasone has previously been reported to cut nausea and vomiting from 40% to 16% in type 2 diabetic patients [27]. Preoperative dexamethasone has also been described as safe and effective for preventing PONV and as shortening hospital stay [28], consistent with the shorter stay in our combined group. The real debate is over glucose. Perioperative glucose was higher in our two dexamethasone groups (128 and 125 versus 112 mg/dL; p = 0.008), yet no patient developed a wound problem, surgical site infection, or thromboembolism during admission. In a large series (5353 knees), dexamethasone significantly raised first-day postoperative glucose in both diabetic and non-diabetic patients, while the rise in infection rate carried no statistical significance [29]. In diabetic patients, by contrast, the steroid did not affect blood glucose or increase early complications, and with preoperative administration mean glucose, glucose variability, and 90-day complications were unchanged [27, 28]. Our results touch both ends: the glucose rise matches the Volkmar data, while the absence of complications indicates it stayed transient and clinically manageable. In practice this indicates that glucose monitoring is necessary, particularly in diabetic patients, but does not by itself justify avoiding the steroid.

The single-center, retrospective design means that gaps in the records and selection-related bias cannot be fully excluded. Group sizes were relatively small, which limits the safety inferences in particular. The adductor canal block was placed by anatomical landmarks rather than ultrasound; while this reflects real practice, it may have introduced variability in block success. Our follow-up centered on the early period, so we cannot speak to long-term pain and function. The strengths are equally clear. Every patient was treated by the same team, under the same anesthesia and the same rehabilitation protocol, which firmed up the between-group comparison. Examining two widely used methods both on their own and in combination, within one otherwise uniformly treated cohort, is what gives the study its weight. These findings would gain from confirmation in multicenter, prospective, randomized work with longer follow-up, with particular value in studies that pin down a safe corticosteroid dose range in diabetic patients. Because the injection was performed under direct surgical exposure without imaging confirmation, its anatomical spread and equivalence to a conventional ultrasound-guided adductor canal block cannot be established. Opioid dose analyses and adjusted opioid-use regression require validation. Group allocation reflected clinical practice rather than randomization, and calendar-period confounding is possible.

Conclusions

In this single-center retrospective TKA cohort, an intraoperative open-field adductor canal injection combined with intravenous dexamethasone was associated with markedly fewer patients requiring postoperative opioids than either intervention alone. The technique and results merit further prospective evaluation. The observational design does not establish causality, and opioid dose and adjusted-model results require source-data verification.

Abbreviations

ACB
adductor canal block
ASA
American Society of Anesthesiologists
BMI
body mass index
CI
confidence interval
CRP
C-reactive protein
IL-6
interleukin-6
OR
odds ratio
PONV

postoperative nausea and vomiting
TKA
total knee arthroplasty
VAS
visual analog scale.

Declarations

Ethics approval and consent to participate

This retrospective study was approved by the Harran University Non-Interventional Clinical Research Ethics Committee (approval date: 28 April 2026; decision no. HRÜ/26.02.15; protocol no. 00059). The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. The study involved a retrospective review of existing medical records, and no additional interventions or procedures were performed. Individual informed consent to participate was not obtained. The Ethics Committee approved the retrospective study without requesting individual patient consent documentation.

Consent for publication

Written informed consent for publication of the clinical photograph included in this manuscript was obtained from the patient concerned. No other identifiable patient information is presented.

Competing interests

The authors declare that they have no competing interests. This declaration requires confirmation by all four authors before submission.

Use of artificial intelligence

Language and document-preparation assistance was provided using an AI tool. The authors are responsible for all scientific content, references, data analysis and interpretation.

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Author Contribution

VK conceptualized the study, collected clinical data and drafted the manuscript. AL contributed to data analysis and critically reviewed the manuscript. YY reviewed the anesthesiology methods and regional analgesia technique. HEK contributed to interpretation of perioperative analgesia and critical revision of the manuscript. The contribution descriptions require confirmation by each author before submission. All authors must read and approve the final manuscript and agree to be accountable for their contributions.

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Not applicable.

Clinical trial number:

Not applicable.

Data Availability

The datasets generated and/or analyzed during the current study are not publicly available due to patient confidentiality and institutional data protection requirements but may be available from the corresponding author upon reasonable request, subject to applicable ethical and institutional approvals.

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Figures

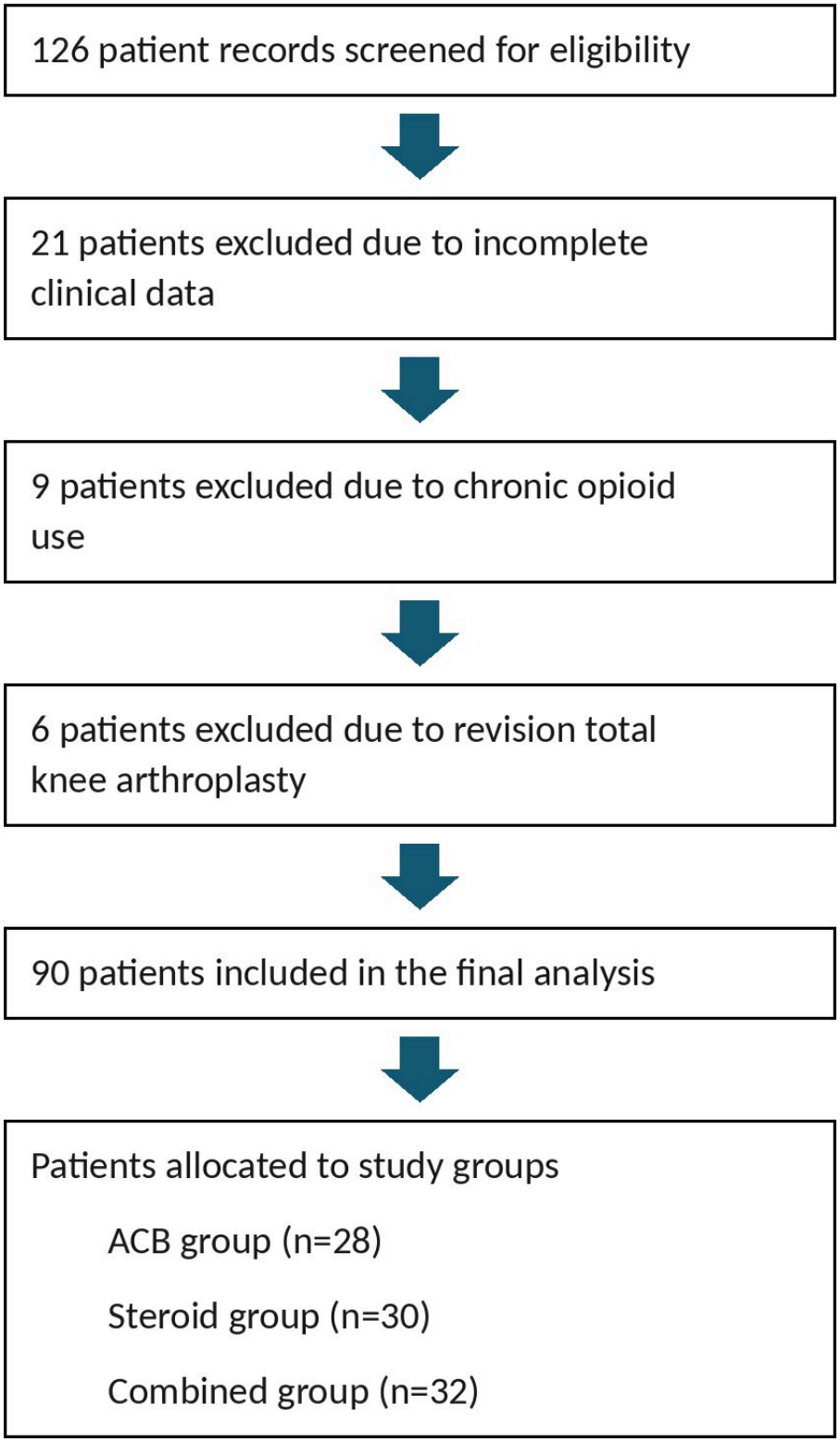

Figure 1

Flow diagram of retrospective record screening and study-group classification. Of 126 screened records, 36 were excluded (21 incomplete clinical data, 9 chronic opioid use, and 6 revision TKA), leaving 90

patients: open-field adductor canal injection (n=28), intravenous dexamethasone (n=30), and combined treatment (n=32).

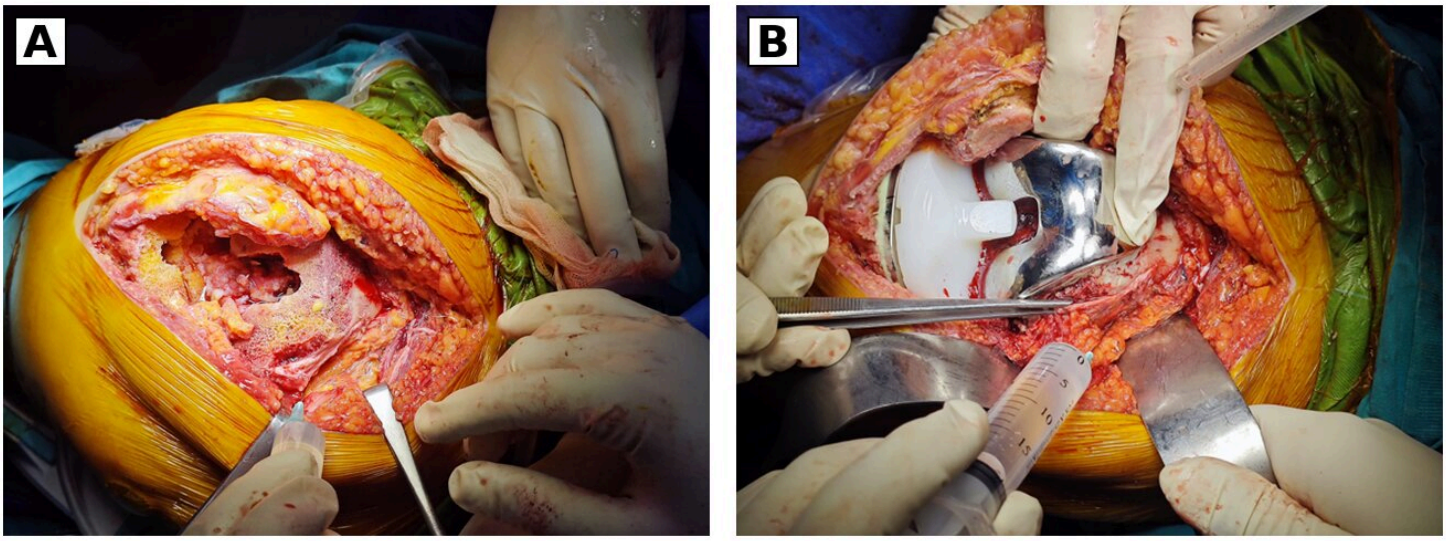

Figure 2

Intraoperative open-field, landmark-guided adductor canal injection during total knee arthroplasty. (A) Anatomical approach through the operative field. (B) Injection near the intended adductor canal region. The photographs illustrate the surgical approach but do not establish injectate spread or equivalence to ultrasound-guided blockade.