Perineural Dexamethasone for Peripheral Nerve Blocks: A Structured Review of Analgesic Duration, Dosing, and Route of Administration

Jennifer Llana BSc, Andrew H. Ford MD, Reda Ahmed HBSc,, Margarita Chekhova BSc, Ayush Patel BSc, Nader Nader MD, PhD

FIU Herbert Wertheim College of Medicine

ASRA PAIN MEDICINE
25th Annual Pain Medicine Meeting
November 5-7, 2026 | Tampa, Florida
#ASRAFALL26

INTRODUCTION

- Postoperative pain after shoulder surgery often requires opioid analgesia that causes adverse effects such as respiratory depression, somnolence, nausea, vomiting, and pruritus[1, 2].
- Interscalene nerve blocks are used to provide effective local analgesia while reducing reliance on opioids and its side effects. However, these blocks are limited by the short duration of the local anesthetic used[1].
- Perineural dexamethasone has emerged as an adjunct to prolong block duration, but its effect on postoperative opioid consumption remains unclear.
- This meta-analysis evaluated whether adding perineural dexamethasone to interscalene peripheral nerve blocks extends analgesic duration and reduces postoperative opioid requirements.

METHODS

A PRISMA-guided systematic review of randomized controlled trials and meta-analyses evaluated perineural dexamethasone versus local anesthetic alone or placebo in adults undergoing interscalene nerve blocks.

Outcomes Assessed:
Duration of analgesia (primary), duration of sensory blockade (secondary), total postoperative opioid consumption (tertiary), converted to oral MME.

Dose-Response Studies:
Highest effective dexamethasone dose selected.

Studies Reporting Median and IQR:
Means and SDs estimated from medians, IQRs, or 95% CIs when needed.

Meta-analysis was performed in RevMan using random-effects models and mean differences, with Wald confidence intervals, REML τ^2 estimation, I^2 for heterogeneity, subgroup analyses by local anesthetic type, and risk of bias assessment using Cochrane RoB 2.

REFERENCES

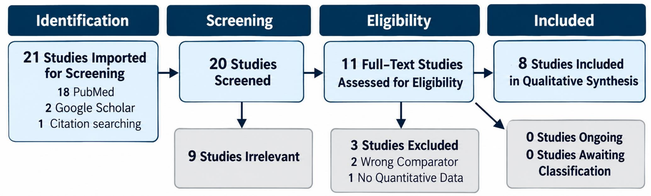


Figure 1. Effect of perineural dexamethasone versus control on duration of analgesia after interscalene brachial plexus block.

Study or Subgroup	Mean Difference IV, Random, 95% CI [Hours]
1.1.1 Ropivacaine	
Albrecht 2019	4.63 [1.55, 7.71]
Cummings 2011-R	11.10 [8.85, 13.35]
Desmet 2013	10.10 [7.50, 12.70]
Rosenfeld 2016	3.10 [1.14, 5.06]
Sakae 2017	9.90 [1.34, 18.46]
Tandoc 2011	11.90 [11.13, 12.67]
Subtotal (Wald[a])	**8.38 [5.16, 11.61]**
Test for overall effect: Z = 5.10 (P < 0.00001)	
Heterogeneity: Tau² (REML[b]) = 13.45; Chi² = 81.86, df = 5 (P < 0.00001); I² = 92%	
1.1.2 Bupivacaine	
Cummings 2011-B	9.20 [7.07, 11.33]
Morita 2020	9.80 [5.68, 13.92]
Vasconcelos 2020	2.89 [2.01, 3.77]
Subtotal (Wald[a])	**7.04 [2.53, 11.56]**
Test for overall effect: Z = 3.06 (P = 0.002)	
Heterogeneity: Tau² (REML[b]) = 14.20; Chi² = 36.71, df = 2 (P < 0.00001); I² = 93%	
Total (Wald[a])	**7.91 [5.39, 10.42]**
Test for overall effect: Z = 6.16 (P < 0.00001)	
Test for subgroup differences: Chi² = 0.22, df = 1 (P = 0.64), I² = 0%	
Heterogeneity: Tau² (REML[b]) = 12.45; Chi² = 267.57, df = 8 (P < 0.00001); I² = 94%	

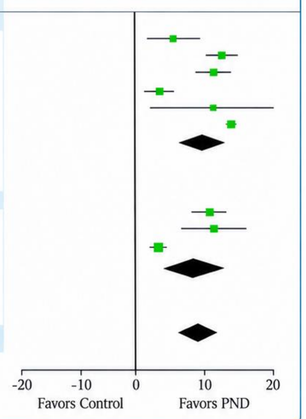


Figure 2. Effect of perineural dexamethasone versus control on duration of sensory blockade after interscalene brachial plexus block.

Study or Subgroup	Mean Difference IV, Random, 95% CI [Hours]
Desmet 2013	10.10 [7.50, 12.70]
Morita 2020	9.80 [5.68, 13.92]
Rosenfeld 2016	3.10 [1.14, 5.06]
Sakae 2017	9.90 [1.34, 18.46]
Tandoc 2011	11.90 [11.13, 12.67]
Vasconcelos 2020	2.89 [2.01, 3.77]
Total (Wald[a])	**7.68 [4.19, 11.17]**
Test for overall effect: Z = 4.31 (P < 0.0001)	
Heterogeneity: Tau² (REML[b]) = 16.04; Chi² = 253.66, df = 5 (P < 0.00001); I² = 96%	

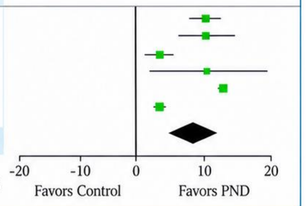


Figure 3. Postoperative opioid consumption and analgesic requirements with versus without perineural dexamethasone in interscalene brachial plexus block.

Study or Subgroup	Mean Difference IV, Random, 95% CI [MME]
Cummings 2011-B	-21.00 [-46.92, 4.92]
Cummings 2011-R	-24.30 [-60.03, 11.43]
Rosenfeld 2016	-11.90 [-17.10, -6.70]
Tandoc 2011	-32.50 [-35.90, -29.10]
Total (Wald[a])	**-22.36 [-35.29, -9.43]**
Test for overall effect: Z = 3.39 (P = 0.0007)	
Heterogeneity: Tau² (REML[b]) = 111.16; Chi² = 42.38, df = 3 (P < 0.00001); I² = 89%	

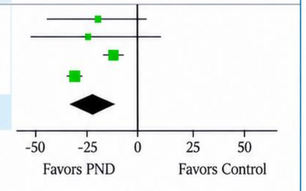
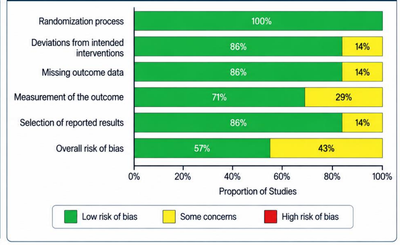


Figure 4. Risk of bias assessment for included studies using Cochrane RoB 2.

Study	Randomization Process	Deviations from Intended Interventions	Missing Outcome Data	Measurement of the Outcome	Selection of Reported Results
Cummings 2011 (Bupivacaine)	Low	Low	Low	Low	Low
Cummings 2011 (Ropivacaine)	Low	Low	Low	Low	Low
Desmet 2013	Low	Low	High	Low	Low
Francelove 2016	Low	Low	Low	High	Some concerns
Sakae 2017	Low	Low	Low	Low	Low
Tandoc 2011	Low	Some concerns	Low	High	Low
Vasconcelos 2020	Low	Low	Low	Low	Low

Low risk of bias | Some concerns | High risk of bias

Figure 5. Summary of risk of bias across all included studies by domain (Cochrane RoB 2).



RESULTS & DISCUSSION

This meta-analysis demonstrates that perineural dexamethasone significantly prolongs analgesia and reduces postoperative opioid use following peripheral nerve blocks.

Duration of Analgesia: Mean increase of 7.91 hours (95% CI 5.39 to 10.42).
Subgroup Analysis:
- Ropivacaine: 8.38 hours (95% CI 5.16 to 11.61)
- Bupivacaine: 7.04 hours (95% CI 2.53 to 11.56)
- No significant difference between subgroups

Sensory Blockade: Mean increase of 7.68 hours (95% CI 4.19 to 11.17).
Opioid Consumption: Reduced by 22.36 MME (95% CI 38.81 to 5.91), supporting an opioid-sparing effect.
Limitations: High heterogeneity across studies (I^2 = 94%, 96%, and 89%) likely due to differences in study methods, block techniques, anesthetic type, dexamethasone dosing, outcome definitions, and small evidence base.
Clinical Implications: Delays the need for rescue analgesia, improves early postoperative pain control, and enhances patient comfort (ambulatory and orthopedic settings).

CONCLUSION

- Overall, perineural dexamethasone appears to be an effective adjunct to long-acting local anesthetics for prolonging analgesia, increasing sensory block duration, and reducing postoperative opioid requirements.
- Across studies, analgesia was prolonged by approximately 3-10 hours, with the magnitude of benefit varying according to block location, local anesthetic type, and volume. Evidence supports a ceiling dose of approximately 4 mg, with limited additional benefit at higher doses. Although perineural administration may provide some advantage over intravenous dexamethasone, the observed difference was modest, generally ranging from 0-2 hours. Importantly, no increase in neurologic complications was identified across more than 1,600 reported perineural exposures.
- These findings support perineural dexamethasone as an effective adjunct for extending peripheral nerve block analgesia, while the clinical significance of its advantage over intravenous administration warrants further investigation.