**Dexamethasone as an Adjunct to Peripheral Nerve Block for Extended Analgesia**

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**Structured Abstract**

**Background**

A total shoulder arthroplasty (TSA) is a common orthopedic procedure that is associated with severe postoperative pain. An interscalene block (ISB) is the standard peripheral nerve block (PNB) for this surgery as it results in regional anesthesia for the shoulder and upper arm; however, emerging data revealed that an ISB provides only 8 hours of adequate analgesia. The addition of either perineural or intravenous (IV) dexamethasone to the local anesthetic is an opioid sparing technique that has been shown to significantly prolong the duration of various PNBs including an ISB in recent years.

A 64-year-old female presented for a right reverse TSA secondary to osteoarthritis. Her pertinent medical history included anxiety, depression, chronic back pain, fibromyalgia, multiple sclerosis (MS), and peripheral neuropathy for which she was taking diclofenac gel, fluoxetine, meloxicam, and pregabalin daily. She also reported familial complications with inhalational anesthetic (son-malignant hyperthermia) so volatile gases were avoided. The plan of care for her included a total intravenous anesthesia along with an ISB.

An ultrasound guided ISB was placed using 30 mL of 0.5% ropivacaine with perineural dexamethasone, 10 mg as an adjunct for extended analgesia. A prolonged block was critical to ensure satisfactory postoperative pain control since she had a history of chronic musculoskeletal and neuropathic pain as well as risks for CP450 enzyme induction given her daily medications. A longer duration of analgesia was also desired to avoid narcotic induced respiratory depression since the patient had MS and was morbidly obese (44 kg/m² BMI).

**Clinical Question**

1) What is the effect of dexamethasone on pain? 2) How does perineural compare to intravenous (IV) dexamethasone? 3) Is perineural dexamethasone superior, equivalent, or inferior to other adjuncts? and 4) What is the optimal dosage and administration regimen?

**Evidence Based Discussion**

A single dose (4-10 mg) of IV dexamethasone is associated with decreased postoperative pain, opioid consumption, and length of stay in the post anesthesia care unit (PACU) as well as increased duration of analgesia after surgery. One study reported that patients who received IV dexamethasone experienced 6 hours longer of sensory blockade compared to patients who received only a placebo. Pain scores were
significantly reduced by a mean of 0.48 and 1.26 while opioid requirements were decreased by 2.3 mg and 6.58 mg at 12 and 24 hours, respectively.

Dexamethasone administered via the perineural route can lengthened analgesia by 4 hours, motor blockade by 3 hours, and sensory blockade by 2 hours when compared to the intravenous route. A dose of 0.5% ropivacaine when combined with 0.8, 0.96, 1.80, and 340 mg of perineural dexamethasone can extend the duration of analgesia by 1, 2, 3, and 4 hours, respectively. The length of analgesia can be prolonged by an additional 8 hours when perineural dexamethasone is paired with a long-acting local anesthetic. However, doses > 4 mg, by either route, did not significantly increased the duration.

Perineural dexamethasone also significantly prolonged the duration of analgesia more effectively when compared to other adjuncts. It prolonged analgesia by 23 minutes when compared to perineural magnesium sulfate and by 2.5 hours when compared to perineural dexmedetomidine without resulting in marked sedation or hypotension. However, magnesium sulfate and buprenorphine as an adjunct was shown to reduce analgesics requirement by -5 mg and -19 mg, respectively, more than dexamethasone.

**Translation to Practice**
The results of the literature review demonstrate that both perineural and IV dexamethasone as an adjunct to PNBs resulted in significant decreased postoperative pain, analgesic requirements, opioid consumptions, and length of stay in the PACU compared to a placebo and other common adjuncts. However, when compared directly, perineural dexamethasone is statistically more effective than its IV counterpart but the clinical difference appears to be minimal. Adverse outcomes such as delayed healing, infection, and elevated blood glucose were also not clinically significant between the two routes. A protocol utilizing perineural dexamethasone (4 mg) as an analgesic adjunct to PNB for extended analgesia will be developed based on current evidence and professional guidelines to facilitate enhanced recovery after surgery.

*Keywords*: dexamethasone, intravenous vs. perineural, analgesic adjunct, peripheral nerve block, postoperative pain

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