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Does The Addition Of Dexamethasone To Local Anesthetic Used For Peripheral Nerve Block Prolong Analgesia In The Surgical Patient?

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Abstract

Pain after orthopedic surgery can be intense. Many anesthesia providers and orthopedic surgeons support the use of peripheral nerve blockade to assist in decreasing the amount of pain a patient may experience post operatively. Select medication adjuncts are being added to peripheral nerve blocks to prolong analgesia. The research presented here focuses on the addition of dexamethasone to peripheral nerve blocks to prolong analgesia.

Dexamethasone is a synthetic glucocorticoid that acts as an anti-inflammatory. It has been shown to inhibit the release of inflammatory mediators such as, interleukins and cytokines, facilitating the release of anti-inflammatory mediators, decreasing postoperative pain. Recent evidence demonstrates a potential role of dexamethasone in postoperative pain management, both as a systemic analgesic and as an adjunct to local anesthetics for perineural use.

A single preoperative dose of dexamethasone has been shown to be an effective adjunct to reduce postoperative pain and opioid consumption after surgery. This may be explained by various methods. When combined with local anesthetics, analgesia is prolonged either by inducing vasoconstriction and reducing the absorption of local anesthetic or by increasing the activity of inhibitory potassium channels on nociceptive c-fibers, decreasing their activity and prolonging sensory and motor blockade.

There is need for further research on intravenous dexamethasone and perineural dexamethasone administration to determine if there is any difference in the length of post op analgesia when administered via these routes.

Keywords: Dexamethasone, Local Anesthetic, Peripheral Nerve Block

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Glucocorticoids, like dexamethasone, are characterized by exerting potent anti-inflammatory and immunosuppressive actions by inhibiting cytokine-mediated pathways. Dexamethasone works by binding in the cytoplasm and combining with glucocorticoid receptors; from here it moves into the nucleus. In the nucleus, it binds to specific DNA sequences to regulate gene transcription involved in the function of inflammatory response mediators. This results in the induction and repression of genes related to inflammatory processes. Dexamethasone is one of the most effective ligands for glucocorticoid receptor activation. It has a strong anti-inflammatory effect, with thirty times the potency of cortisol and six times the potency of hydrocortisone, making it a very effective anti-inflammatory drug (Savage and Levy, 2013, Table 1).

Dexamethasone and Regional Anesthesia

Prolonging surgical anesthesia and analgesia is of significant interest in regional anesthesia; in order to increase the duration of local anesthetic action and improve the quality of peripheral nerve blocks, adjuvant medications are added. The addition of a glucocorticoid, specifically dexamethasone, has been studied with high quality outcome. Theories have been postulated from various studies and will be discussed in the literature review. It has been concluded that dexamethasone reduces stimulus transmission in unmyelinated c-fibers, known to carry nociceptive information by inhibiting the activity of the potassium channels on these fibers. This will decrease the amount of pain sensed by a patient. Secondly, it is thought that dexamethasone causes a degree of vasoconstriction to the tissues and local anesthetic will have a slower uptake and absorption thus, prolonging its duration and amount of comfort felt by the

patient. Thirdly, dexamethasone exhibits a potent anti-inflammatory effect and inhibits the release of inflammatory mediators like interleukins and cytokines; it promotes the release of anti-inflammatory mediators leading to decreased postoperative pain.

Investigation continues as to the exact science and mechanism of action of dexamethasone and its prolongation of analgesia when used as an adjunct to local anesthetic in peripheral nerve block. A review of the literature supports the use of dexamethasone, as an adjunct to local anesthetic in peripheral nerve blocks, prolonging analgesia in the surgical patient.

Review of the Literature

Cummings et al., (2011) studied the effect of dexamethasone as an adjunct to ropivacaine or bupivacaine in interscalene nerve blocks. The study was a double-blinded trial. Patients received single-injection interscalene block and were randomized to one of four groups. The groups were: 0.5% ropivicaine, 0.5% bupivacaine, 0.5% ropivacaine mixed with dexamethasone eight milligrams, and bupivacaine 0.5% mixed with dexamethasone eight milligrams. The time to first analgesic request after discharge from the post-anesthesia care unit (PACU) was the primary outcome used in this study. Patients were followed either at home by telephone or inpatient by a blinded observer. Patients were assessed for block duration. Block duration consisted of the time of initial sensory block to the administration of supplemental analgesic medication after PACU discharge. Secondary outcomes were also utilized in this study. The outcomes were: elapsed time until the patient had a significant increase in shoulder discomfort, opioid consumption, and maximum verbal response score with rest and movement. Results found that dexamethasone significantly prolonged the duration of analgesia of both ropivacaine ($P<0.001$) and bupivacaine ($P<0.001$). Overall, analgesia was more prolonged with plain

bupivacaine than ropivacaine. The blocks were placed either by ultrasound technique or nerve stimulation technique. This was left to the discretion of the anesthesia provider and the technique they were most comfortable with. There were no differences noted in block duration when comparing ultrasound placement versus nerve stimulation technique placement. If there had been a large difference in the number of failed blocks, results would have been biased. The small number of failed blocks (ultrasound 3/147 and nerve stimulation 4/71) are consistent with accepted success rates (Cummings et al., 2011)

Dexamethasone was found to prolong analgesia when combined with ropivacaine or bupivacaine for single-injection interscalene block. Block duration was shown to be longer with plain bupivacaine. Although dexamethasone prolonged analgesia when added to ropivacaine or bupivacaine, plain bupivacaine provided nearly the same amount of analgesia (mean twenty-two hours).

Many of the patients were discharged by the third postoperative day thus, the measure of opioid use by day was limited in this study. Comparison of seventy-two hour opioid use by the groups was attainable. Also, because most patients are discharged home on the same day of surgery, resolution of weakness to the extremity became completely subjective. Having the ability to directly evaluate each patient provides for a more accurate report of length of duration of block and would strengthen outcomes to the study.

In this study, dexamethasone was found to prolong analgesia in interscalene blocks with ropivacaine or bupivacaine. The combination of dexamethasone with the local anesthetic provided nearly the same (twenty-two hours) of analgesia.

A randomized, double-blinded investigation by Vieira et al., (2010) studied dexamethasone with bupivacaine in ultrasound guided interscalene brachial plexus blockade for

outpatient shoulder arthroscopy. Eighty-eight individuals undergoing shoulder arthroscopy received interscalene brachial plexus block using twenty milliliters bupivacaine 0.5% with epinephrine 1:200,000 and randomly assigned patients to receive dexamethasone eight milligrams or 0.9% normal saline (NS) as an adjunct to the local anesthetic. After discharge home, patients recorded pain scores, analgesic consumption, and estimated time at which they felt the sensory block had resolved (based on pain, recovery of sensation, and strength in the arm).

Dexamethasone was found to prolong median sensory (1457 vs. 833 minutes, $P<0.0001$) and motor (1374 vs. 827 minutes, $P< 0.0001$) compared with the control. At twenty-four hours the dexamethasone group had lower verbal pain score as compared to the control (3/10 vs. 6/10) thus, a reduction in the use of opioid for pain control. At forty-eight hours, pain scores were similar (4/10 vs. 5/10) in both the dexamethasone group and the control group. The addition of dexamethasone to bupivacaine 0.5% for interscalene block for shoulder arthroscopy was found to prolong sensory block and reduce opioid use in these patients. All of the blocks were placed with ultrasound guidance, and patients recorded outcome data at home. Again, in this study, the resolution of sensory block becomes completely subjective. Results and study outcome could be strengthened by collecting objective data on the return of sensation, and strength in the arm.

In a prospective, randomized, double-blinded study, Movafegh, Razazian, Hajimaohamadi, and Meysamie (2006), evaluated the addition of dexamethasone to lidocaine for prolonging the duration of block when used in axillary brachial plexus blockade. This study consisted of sixty patients. These patients were scheduled for elective hand and forearm surgery under axillary brachial plexus block. The patients were randomly selected to receive either thirty-four milliliters of lidocaine 1.5% with two milliliters isotonic saline or thirty-four milliliters

lidocaine 1.5% with two milliliters of dexamethasone (eight milligrams). All of the blocks were placed using a nerve stimulator and multiple stimulation technique. Assessment of the radial, median, musculocutaneous, and ulnar nerves took place at five, fifteen, and thirty minutes. Duration of sensory and motor blocks was the time interval between administration of local anesthetic and the first postoperative pain and complete recovery of motor function (Movafegh et al., 2006).

There was no significant difference found in the onset of sensory and motor block between the two groups. The duration of sensory blockade was two hundred forty-two minutes in the dexamethasone group versus ninety-eight minutes in the control group. Motor blockade was three hundred ten minutes in the dexamethasone group versus one-hundred thirty in the control group. Blockade was shown to be significantly longer in the dexamethasone group than in the control group ($P<0.01$). This study proves that the addition of dexamethasone to lidocaine 1.5% solution in axillary brachial plexus block adequately prolongs the duration of sensory and motor blockade. It is not known if the prolongation of analgesia is from local or systemic effects; this warrants further investigation.

The authors hypothesize that the addition of dexamethasone may be very useful in cases and/or situations where epinephrine must be used with caution or not at all. This would be in situations of a hypertensive patient, known ischemic heart disease, or wrist, digit, ankle, and foot blocks.

Lidocaine is shorter acting than ropivacaine or bupivacaine. Lidocaine has also been shown to have less cardiovascular toxicity than bupivacaine. This study could be repeated with the use of longer acting agents such as ropivacaine or bupivacaine with the addition of

dexamethasone. The effect of dexamethasone on duration of sensory and motor blockade could be assessed and then compared to the shorter acting agent.

In two prospective, randomized, double-blind, placebo-controlled trials by Fredrickson, Danesh-Clough, and White (2013), dexamethasone eight milligrams, was used as an adjunct to bupivacaine in sciatic and ankle block. Their purpose was to assess for prolonged block duration and improved postoperative analgesia with the addition of dexamethasone. One hundred twenty-six patients presenting for elective foot and ankle surgery were divided into two groups. Sixty-six received sciatic nerve block and sixty received ankle block. Thirty milliliters of bupivacaine 0.5% with eight milligrams of dexamethasone or two milliliters of normal saline were injected for each block. The patients were assessed at twenty-four and forty-eight hours for onset of pain, numerical rating of their pain, and supplementary pain medication required.

Patients receiving sciatic nerve block with dexamethasone reported less pain at twenty-four hours (13% versus 47%, P = 0.01). There was no significant benefit found at forty-eight hours. For the patients receiving an ankle nerve block, there was no assessment of improved or prolonged analgesia with the addition of dexamethasone to the local anesthetic solution.

It can be concluded from this study that the addition of dexamethasone to bupivacaine 0.5%, in peripheral nerve block of the lower extremity, has only a minor analgesic enhancing effect. The effects that were observed in this study were exclusively related to the sciatic nerve block. There were no positive effects observed with the addition of dexamethasone to the ankle blocks.

In a randomized, control trial by Desmet, Braems, and Reynvoet (2013), a study was performed on intravenous dexamethasone and its equivalency to perineural dexamethasone in prolonging the analgesic duration of a single-shot interscalene block with ropivacaine. One

hundred fifty patients presenting for arthroscopic shoulder surgery, and undergoing interscalene brachial plexus block, were randomized into three groups: ropivacaine 0.5%, ropivacaine 0.5% with dexamethasone ten milligrams, and ropivacaine 0.5% with ten milligrams intravenous dexamethasone. The time of block placement until the first request for pain medication was defined as the duration of analgesia in this study and was used as the primary outcome.

The median time of a sensory block was equivalent for perineural and intravenous dexamethasone; 1405 minutes and 1275 minutes ropivacaine with perineural dexamethasone and ropivacaine with intravenous dexamethasone. The median time in the plain ropivacaine group was 757 minutes.

It can be concluded from this study that intravenous dexamethasone is equivalent to perineural dexamethasone in prolonging analgesia. Intravenous dexamethasone at a dose of 0.1-0.2 milligrams/kilogram could have a comparable analgesic effect and eliminate the need for perineural dexamethasone injection. The researchers here concluded that intravenous dexamethasone is useful in reducing postoperative pain without significant side effects and perineural administration of dexamethasone has not been shown necessary to further decrease pain in the postoperative period. Further studies should be performed to strengthen this hypothesis. The assumption or conclusion from a single study, that perineural and intravenous dexamethasone are equivalent, should not be made.

In a prospective, randomized, placebo-controlled study by Kawanishi et al. (2014), patients presenting for arthroscopic shoulder surgery with interscalene block were studied for duration of block when dexamethasone was added to ropivacaine 0.75% for perineural injection versus low-dose systemic dexamethasone (four milligrams intravenously). Patients between the ages of twenty and seventy-five, undergoing arthroscopic shoulder surgery, were randomized

into three groups. The first group received twenty milliliters of ropivacaine 0.75%. The second group received twenty milliliters of ropivacaine 0.75% plus dexamethasone four milligrams that was injected perineural. The third group received perineural injection of twenty milliliters of ropivacaine 0.75% and the addition of intravenous dexamethasone four milligrams. Interscalene blocks were placed immediately post operatively, in the operating room, with the use of ultrasound guidance. All of these patients underwent their surgical procedure under general anesthesia with the use of an oral endotracheal tube. Narcotic administration for pain throughout the procedure was remifentanil infusion 0.1-0.3 mcg/kg/minute. All patients received morphine five milligrams intravenous, after induction, to minimize minor postoperative pain such as sore throat and back pain.

After block placement and extubation, patients were transferred to the post anesthesia care unit for at least one hour. Discharge criteria from the post anesthesia care unit included: stable vital signs, absence of nausea and vomiting, and control of pain with no further request for pain medications.

On the first day post-op, patients were assessed for pain by the numeric rating scale (NRS), motor block, and overall satisfaction. The timing and dosage of analgesics and quality of sleep were recorded. For quality of sleep one equaled no sleep disturbance because of pain and two equaled sleep disturbance because of pain. Overall patient satisfaction was graded from one, strong dissatisfaction to five, strongly satisfied and would recommend to others. Telephone interviews were performed twenty-eight days post-operatively to assess patients for any adverse events such as, neuropathy, redness, or interscalene injection site infection.

Again, the primary outcome was length of sensory block. Secondary outcomes were the numeric rating scale on the morning of the first post-operative day, need for pain medication, sleep disturbance, and overall satisfaction score.

Thirty-nine relatively healthy patients (American Society of Anesthesiologists physical status one or two) were entered into the study. Four patients were excluded from the study. Three had unsuccessful blocks, complaining of shoulder pain upon arrival to the recovery room and one due to conversion of an open surgery versus arthroscopic. Twelve patients were placed in the plain ropivacaine group, receiving an injection of ropivacaine 0.75% and twelve in the ropivacaine plus perineural dexamethasone, receiving ropivacaine 0.75% with dexamethasone 4mg injected perineural. Ten patients were placed in the ropivacaine and intravenous dexamethasone group, receiving ropivacaine 0.75% perineural and dexamethasone four milligrams intravenous. It was found that perineural dexamethasone four milligrams significantly prolonged the duration of analgesia. The median duration of anesthesia was eighteen hours. This compared to plain ropivacaine lasting eleven hours, and ropivacaine with intravenous dexamethasone as fourteen hours. There was also statistical significance found in the NRS the morning after surgery. During the first night forty-two percent of patients in the plain ropivacaine group experienced sleep disturbance due to pain, compared to zero in the group receiving ropivacaine with dexamethasone perineural. Overall satisfaction scores of four to five were reported by forty-nine percent of patients, compared to thirty-nine percent who responded neutrally and fourteen percent with satisfaction scores of one to two.

Patients were contacted four weeks after surgery via telephone. One patient in the ropivacaine with intravenous dexamethasone complained of redness at the injection site. The redness did disappear gradually, and the patient required no further therapy or treatment.

Limitations are found in this study. One is the duration of sensory block. The patients were not assessed using repeated neurological examinations. Therefore, the marker of sensory block becomes completely subjective and is determined by time of first analgesic request. It is also undetermined if prolonged analgesia was associated with prolongation of the sensory block. Regardless, for patients undergoing surgical procedures, having little to no pain improves satisfaction after surgery.

A second limitation is related to the success rate of the block. Nineteen percent of patients required opioids, despite the interscalene block being successful. Most patients assessed as having a failed block were unable to move their fingers and reported numbness in their thumbs. Twenty milliliters of local anesthetic was injected perineural. In other studies that have been reviewed, thirty milliliters or more of local anesthetic was injected perineural.

A third limitation is a small sample size. In order to achieve eighty percent for three pair-wise comparisons, fifteen patients would be required per group; this study has fewer per group. Therefore, the power of this study is less than eighty percent.

It can be concluded that perineural administration of dexamethasone, at a dose of four milligrams, significantly prolongs the duration of effective postoperative analgesia.

Parrington et al. (2010), hypothesized that the addition of dexamethasone to mepivacaine in ultrasound-guided supraclavicular brachial plexus block would prolong analgesia in patients undergoing upper-limb surgery. Their study consisted of forty-five adult patients undergoing elective hand or forearm surgery under supraclavicular brachial plexus blockade.

Patients were randomized to receive either thirty milliliters mepivacaine 1.5% plus dexamethasone eight milligrams or thirty milliliters mepivacaine 1.5% plus 2 milliliters of normal saline. The authors of this study were most interested in the duration of analgesia.

Secondary outcomes included: length of sensory and motor block, pain satisfaction scores, analgesic requirements, and block-related complications.

It was found that the median duration of analgesia was significantly prolonged in the dexamethasone group, 332 minutes compared with the normal saline group of 228 minutes. The onset times of sensory and motor blockade were similar between the groups. At two weeks postoperatively, there were no complications or side effects reported in relation to the block.

The authors concluded that the addition of dexamethasone to mepivacaine 1.5% prolongs the duration of analgesia in patients undergoing elective upper-limb surgery using ultrasound-guided supraclavicular brachial plexus block. There was no reduction shown to the onset time of sensory and motor block when dexamethasone was utilized compared to the use of plain mepivacaine (See Table 2 for an overview of studies presented here).

Concerns exist about safety for the use of dexamethasone in peripheral nerve blocks due to possible neurotoxicity and are cited in the literature. It is well known that local anesthetics can be neurotoxic. There has been no trial to date, reporting neurotoxicity related to the utilization of dexamethasone as an adjunct to peripheral nerve blocks. The literature suggests that animal studies have been conducted and have shown neurotoxicity with the use of dexamethasone as a perineural adjunct to local anesthetics. A study in 2010 by Ma et al. showed a protective effect of dexamethasone on mice neurons that had been exposed to bupivacaine and lidocaine. It was found that pretreatment of neuroblastoma cells with dexamethasone had a protective effect on bupivacaine and lidocaine-induced neuronal cell injury. This warrants further investigation into the toxicity profile of dexamethasone. Large studies are necessary to demonstrate the safety of perineural use of dexamethasone.

It is well known that glucocorticoids, like dexamethasone, have a long history of safe use in the epidural space for the treatment of nerve root irritation. Animal studies that have been performed have not shown long-term changes in the nerve structure or function after local steroid administration (Bailard, Ortiz, Flores, 2014). Studies have shown that nerve injury is a rare complication of dexamethasone injection. Injury that occurs is most often caused by needle trauma versus the medication that is injected.

Adding a glucocorticoid, steroid medication, to all local anesthetics may not be warranted for every patient. For example, diabetic patients may experience hyperglycemia. Glucocorticoids in the periphery decrease glucose utilization, increase protein break down, and activate lipolysis, as a mechanism of protection of glucose-dependent tissues from starvation. A single perioperative dose of dexamethasone has been shown to elevate intraoperative glucose for approximately four hours.

It has also been thought that patients with an infectious process may be adversely affected by the anti-inflammatory effects of steroid medication. This was studied in a meta-analysis by Waldron et al., 2013, evaluating the impact of perioperative single dose systemic dexamethasone for postoperative pain. Patients treated with dexamethasone did not demonstrate a significantly increased risk of infection or wound healing.

Fourteen studies (1449 patients) examined the incidence of wound infection. From those, eleven found no reported infection related to the use of dexamethasone or use of placebo in treated patients. In the three remaining studies (two-hundred thirty five patients), there was no increase of infection in patients receiving dexamethasone. Nine studies (1020 patients) examining the incidence of wound healing found no difference in either dexamethasone-treated or placebo-treated patients.

It is known in clinical practice that glucocorticoid-mediated effects are multifactorial and prevent the early inflammatory phase, essential for wound repair. It has been found that a single perioperative dose of dexamethasone, as opposed to long term use, has not been associated with delayed wound healing and increased risk of infection (Parra-Sanchez, Parada, Cummings, 2013).

Another area of concern, and need for investigation, is the amount of dexamethasone that should be added to peripheral nerve blocks to be efficacious in prolonging analgesia. Dose-finding studies are needed to define the dose, effect (is there prolongation of analgesia), and side-effect when dexamethasone is added to local anesthetic for peripheral nerve blockade. In review of the literature, doses of four, eight, and ten milligrams of dexamethasone have all been effective in prolonging analgesia. Particular attention and study needs to be given to dexamethasone dosing less than four milligrams and greater than ten milligrams in conjunction with the local anesthetic to determine if there is an average dose that should be utilized for optimal prolongation of analgesia.

It is important to know that dexamethasone has not been approved for use in conjunction with local anesthetic medications thus, as a result, it is an “off-label” use of the medication. In addition to potential neurological toxicity, “off-label” use of analgesic drugs in regional anesthesia can expose the patient to neurotoxic properties (Martinez and Fletcher, 2014). Regardless of the research that has taken place, as clinicians, we must be aware that perineural dexamethasone is an off-label use. This does not mean that it should not be used; it simply warrants the use of solutions that are free of neurotoxic preservatives. Although the safety profile of perineural dexamethasone is encouraging, one study has shown that an intravenous dose of dexamethasone 0.1-0.2 milligrams/kilogram could have a comparable analgesic effect and

eliminate the need for perineural injection. Further comparative evaluation of these routes for administration is warranted.

The research presented here supports perineural dexamethasone administration in conjunction with local anesthetics. The addition of dexamethasone prolongs the duration of analgesia and motor blockade from short, medium, and long acting local anesthetics. Dexamethasone is associated with a reduction in pain scores during the intermediate (eight to twelve hours) and late (twenty-four hours) postoperatively. At twenty-four hours, cumulative narcotic consumption was reduced in the patients that had the addition of dexamethasone to the local anesthetic block. Dexamethasone was found to slightly reduce the onset time of sensory and motor blockade. Clinically, this is not of significance due to the fact that the peripheral nerve block is placed to aid more in postoperative analgesia than surgical analgesia.

There is no report of neurological complication or infection with the adjunct of dexamethasone to local anesthetic in peripheral nerve blocks. In fact, a study performed on mice is consistent with having protective neuronal effects. A single study found an increase in blood glucose levels in patients receiving dexamethasone. Hyperglycemia lasts, on average, for four hours after injection of the dexamethasone and has not been shown to be detrimental.

The evaluation of the relationship between the dose of dexamethasone and duration of analgesia is inconclusive. Most anesthesia practitioners are using a dose of eight milligrams although, it has not been found that dexamethasone four milligrams was less effective than eight or ten milligrams. Studies are needed on dosing to define the optimal balance between dose, effect, and side-effect.

Some limitations are found in the literature that is presented. The duration of analgesia, duration of sensory blockade, and the time to first analgesic request are not synonymous. These

are used as markers of a pain-free period post operatively. These were measured by the patient, most often after discharge, making the reporting completely subjective. There is variability in anesthetic strategies used in the studies. For example, the method of nerve location varied. Anatomical landmarks, nerve stimulation, or ultrasound-guided location were used as the sole identifier or in combination of each other. There is also variability in the volume of local anesthetic solution that is placed with each of the blocks.

This writer's experience has been that both anesthesia practitioners and surgeons like patients to receive peripheral nerve blocks when appropriate to help decrease the amount of postoperative pain they may endure. In watching, assisting with, and placing nerve blocks with various anesthesia providers, I have found that, in the best interest of the patient, the majority use some adjunct to their local anesthetic to help prolong the duration of analgesia into the postoperative period. Most often, dexamethasone eight milligrams, is added to the local anesthetic prior to placement of the peripheral nerve block. In review of the studies presented here, it is known that the addition of dexamethasone to local anesthetics in peripheral nerve blocks prolongs analgesia for patients. Doses of four milligrams to ten milligrams have been used safely and effectively. Thus, the eight milligrams that many of the anesthesia providers are utilizing, is evidenced based and a safe dose to be administered.

In summary, perineural dexamethasone prolongs the duration of analgesia when combined with local anesthetic blockade. There have not been any reported serious adverse effects. Dexamethasone is an efficacious adjunct to local anesthetics, but clinicians should be aware that there is a need for dose-ranging studies. I fully support the use of dexamethasone in peripheral nerve blocks, as appropriate to the patient and surgical procedure to be completed. As anesthesia providers, our ultimate responsibility is that in the best interest of the patient. After

patient specific considerations (health history), we should always consider dexamethasone as an adjunct to local anesthetic for peripheral nerve block. A patient with reduced pain and a reduced need for additional analgesics post operatively is always a satisfied customer.

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Tables

Table 1

Glucocorticoid equivalencies

Glucocorticoid	Equivalent dose (milligrams)	Glucocorticoid potency	Plasma half-life (min)	Biologic half-life (hr.)
Short-acting				
Cortisol	20.0	1.0	90	8-12
Cortisone	25.0	0.8	80-118	8-12
Intermediate-acting				
Prednisone	5.0	4.0	60	18-36
Prednisolone	5.0	5.0	115-200	18-36
Triamcinolone	4.0	5.0	30	18-36
Methylprednisolone	4.0	5.0	180	18-36
Long acting				
Dexamethasone	0.75	30	200	36-54
Betamethasone	0.6	25-40	300	36-54

Note: Table 1 shows an estimate of potency and half-life of common short, intermediate, and long-acting glucocorticoids.

Nerve Block (Number of Patients)	Outcome Measure	Treatment	Outcome Value (Median Value)
Interscalene (218)	Time to first analgesic request	Ropivacaine 0.5%	11.8 hours
		Ropivacaine 0.5% + perineural dexamethasone 8 milligrams	22.2 hours
		Bupivacaine 0.5%	14.8 hours
		Bupivacaine 0.5% + perineural dexamethasone 8 milligrams	22.4 hours
Axillary (60)	Time to first report of pain	Lidocaine 1.5%	98 minutes
		Lidocaine 1.5% + perineural dexamethasone 8 milligrams	242 minutes
Interscalene (150)	Time to first analgesic request	Ropivacaine 0.5%	757 minutes
		Ropivacaine 0.5% + perineural dexamethasone 10 milligrams	1405 minutes
		Ropivacaine 0.5% + iv dexamethasone 10 milligrams	1275 minutes
Interscalene (88)	Time to first report of pain, sensation, and strength in arm	Bupivacaine 0.5%	833 minutes
		Bupivacaine 0.5% + dexamethasone 8 milligrams	1457 minutes

Sciatic and ankle (126)	Time to first report of pain and supplemental narcotic use	Bupivacaine 0.5% + dexamethasone 8 milligrams Bupivacaine 0.5% + normal saline 2ml's	Sciatic study: fewer dexamethasone group patients experienced pain 13% versus 47% Ankle study: No benefit existed at 24 or 48 hours with the addition of dexamethasone
Interscalene (34)	Time between performance of block and first request for analgesic	Bupivacaine 0.75% + dexamethasone 4 milligrams perineural Bupivacaine 0.75% + dexamethasone 4 milligrams iv Bupivacaine 0.75% plain	18 hours 14 hours 11.2 hours
Supraclavicular (45)	Duration of analgesia	Mepivacaine 1.5% + dexamethasone 8 milligrams Mepivacaine 1.5% + 2ml's normal saline	332 minutes 228 minutes

Table 2 *Summary of Data from Studies using Dexamethasone as a Perineural Additive*.