Intravenous dexamethasone 4 mg is equivalent to 10 mg in increasing the analgesic duration of a single-shot interscalene block with ropivacaine after arthroscopic shoulder surgery: a prospective, randomized, placebo-controlled study

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Background and Goal of Study

Postoperative pain after shoulder arthroscopic surgery can be severe¹. Single shot interscalene block (ISB) with ropivacaine provides excellent but time-limited analgesia². Intravenous (iv) dexamethasone prolongs this analgesic duration³ but a dose-related effect remains uncertain^{4,5}. This study measured the impact of iv dexamethasone 4 mg and 10 mg on the analgesic duration of a single-shot ISB for shoulder arthroscopic surgery, compared to placebo. Our hypothesis was that both doses would have a similar effect.

Methods

This study was approved by our local ethic committee and all patients gave written informed consent. We conducted a prospective, double blind, randomized, placebo-controlled study in patients presenting for elective arthroscopic shoulder surgery under regional anesthesia with ISB (20 mL of ropivacaine 0,5 %). Patients either received: dexamethasone 4 mg iv (D4), dexamethasone 10 mg iv (D10), or a placebo (normal saline (NS)) at the time of block completion. The primary outcome was the duration of analgesia, defined as the time between onset of ISB sensory blockade and the first analgesic request. Interference of pain with sleep and opioid use in the first 48 hours were also collected. Our primary outcome was analysed with a one-way ANOVA and a Student's t-test was used to compare treatment groups. A Kruskal-Wallis test was used for secondary outcomes.

Results

Seventy-five patients were randomized and 69 completed the study (figure 1). Demographic characteristics were comparable between groups.

Mean duration of analgesia was significantly different between the three groups (D4: 22.2h [CI95 % 17.5; 26.9], D10: 20.1h [CI95 % 15.0; 25.3], and NS: 11.5h [CI95 % 10.2; 12.9], p = 0.001). This difference was statistically significant for D4 and D10 compared to NS (p< 0.000 and p = 0.002, respectively) but not between D4 and D10 (p = 0.54) (figure 2). Compared to placebo, groups receiving dexamethasone experienced less interference of pain with sleep on the first postoperative night (table 1) and opioid consumption was significantly different between groups during postoperative day 0 (table 2 and figure 3).

TABLE 1. Interference of pain with sleep during the two first postoperative nights, according to study group, score from 0 to 10 (0/10 = no interference, 10/10 = maximal interference)

	NS	D4	D10	p
First night	6.5 [5;8]	1.5 [0;5.25]	2.5 [0;5.5]	0.000
Second night	3 [1;5]	3 [1;6]	2 [0;6]	0.956

Data are presented as median [percentile 25; 75].

TABLE 2. Total daily opioid consumption during the 2 first postoperative days in oral hydromorphone equivalents (mg), according to study group

	NS	D4	D10	p
Day 0	0 [0; 1.75]	0 [0; 0]	0 [0; 0]	0.03
Day 1	5 [2; 8]	2 [0; 6]	2 [1; 5.25]	0.12
Day 2	3,5 [0.25; 6.75]	2 [0; 5]	1 [0; 3.25]	0.11

Data are presented as median [percentile 25; 75].

Conclusions

- Intravenous dexamethasone significantly prolongs the analgesic duration of single-shot ISB after arthroscopic shoulder surgery and 4 mg is equivalent to 10 mg in increasing that analgesic duration.
- Dexamethasone is associated with significantly less interference of pain with sleep during the first postoperative night.
- Dexamethasone is associated with a statistically significant difference in opioid consumption on postoperative day 0 and with a clear trend toward a lesser opioid consumption on postoperative days 1 and 2.

References

1. Fredrickson MJ, Krishnan S, Chen CY. Postoperative analgesia for shoulder surgery: a critical appraisal and review of current techniques. *Anaesthesia* 2010; 65:608-624.
2. Fredrickson MJ, Abeysekera A, White R. Randomize study of the effect of local anesthetic volume and concentration on the duration of peripheral nerve blockade. *Regional anesthesia and pain medicine* 2012; 37:495-501.
3. Desmet M, Braems H, Reynvoet M et al. IV and perineural dexamethasone are equivalent in increasing the analgesic duration of a single-shot interscalene block with ropivacaine for shoulder surgery: a prospective, randomized, placebo-controlled study. *Br J Anaesth* 2013; 111:445-452.
4. Desmet M, Vanneste B, Reynvoet M et al. A randomised controlled trial of intravenous dexamethasone combined with interscalene brachial plexus blockade for shoulder surgery. *Anaesthesia* 2015; 70:1180-1185.
5. Kawanishi R, Yamamoto K, Tobetto Y et al. Perineural but not systemic low- dose dexamethasone prolongs the duration of interscalene block with ropivacaine: a prospective randomized. *Local and Regional Anesthesia* 2014; 7:5-9