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Research Article

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Comparison between Plain Bupivacaine Alone and Plain Bupivacaine with Dexamethasone Regarding the Duration of Epidural Anesthesia and Postoperative Analgesia in Orthopedic Surgery

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Abstract: **Background**: Several additives have been trialled to prolong the duration of single injection epidural anesthesia and analgesia, adding glucocorticoids to local anesthetics for regional anesthesia is an emerging strategy. Aim: To evaluate the effect of the addition of dexamethasone to epidural bupivacaine on the duration of epidural anesthesia and postoperative analgesia. **Method**: A prospective, randomized, double-blind, clinical trial study was conducted in Ghazi Al-Hariri Hospital for Surgical Specialties / Iraq during the period from 1st of October 2021 to 1st of October 2022. A total of 100 patients who underwent orthopedic surgery for hip or knee replacement under epidural anesthesia were included and were allocated into the intervention group (included 50 patients received 15 ml epidural plain bupivacaine (0.5%) plus 8 mg (2 ml) dexamethasone and the control group (included 50 patients who received 15 ml epidural plain bupivacaine (0.5%) plus 2 ml normal saline. **Results**: There was no significant difference between the study group regarding the onset of the anesthesia (P-value=0.086). There was significantly lower number of patients who need a second dose in the intervention group compared to the control group (P-value=0.001). The duration of anesthesia was significantly longer in the intervention group compared to the control group (P-value=0.001). The mean visual analogue score was significantly lower in the intervention group at 8, 12, 16, 20, and 24 hours. In addition, the mean time to the first analgesic request was significantly longer in the intervention group compared to the control group (P-value =0.001). **Conclusion**: The addition of dexamethasone to epidural bupivacaine increased the duration of epidural anesthesia and decreased postoperative pain and the need for analgesic drugs compared to epidural bupivacaine alone.

Keywords: Bupivacaine, Dexamethasone, Epidural, Analgesia, Anesthesia.

INTRODUCTION

Regional anesthesia is often used for surgery on an extremity (arm, leg, hand, or foot), for abdominal operations, for female reproductive surgery (gynecological procedures and cesarean section) or male reproductive surgery, for operations on the bladder and urinary tract, and less commonly, thoracic procedures in addition to postoperative analgesia following these procedures. (Korula, S. *et al*., 2011)

Epidural analgesia is widely recognized and used as an effective method of pain relief in labour. It provides almost complete labour pain relief (in 90%–95% of cases) if administered early and has been shown not to impede the progress of the first stage of labour. (Ezeonu, P. O. *et al*., 2017)

Multiple solutions are injected into the epidural space including local anesthetic, steroids, and clonidine. Local anesthetics have been utilized in performing epidural injections since 1901.[3] Bupivacaine is a long-acting epidural anesthetic with unique characteristics from the amide group of local anesthetics.[4] Epidural bupivacaine is a commonly used technique for anesthesia and postoperative analgesia. (Korula, S. *et al*., 2011)

Several additives have been trialed to prolong the duration of single-injection peripheral nerve blocks and analgesia by inducing local vasoconstriction and delaying the diffusion of local anesthetic away from the site of injection, adding glucocorticoids to local anesthetics for regional anesthesia is an emerging strategy. (Tandoc, M. N. *et al*., 2011)

The main suggested mechanisms included 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 leading to decreased postoperative pain. (Oliveira, J. M. 2015)

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AIMS OF THE STUDY

- To evaluate the effect of the addition of dexamethasone to epidural bupivacaine on the duration of epidural anesthesia.
- To evaluate the effect of the addition of dexamethasone to epidural bupivacaine on the postoperative analgesia.

PATIENTS AND METHOD

A prospective, randomized, double-blind, clinical trial study was conducted in Ghazi Al-Hariri Hospital for Surgical Specialties in Baghdad / Iraq during the period from 1st of October 2021 to 1st of October 2022.

Approval was obtained from the Scientific Council of Anesthesia and Intensive Care of the Iraqi Board of Medical Specializations and consent were taken from all the patients included in the study.

A total of 100 patients who underwent orthopedic surgery for hip or knee replacement under epidural anesthesia and met the inclusion criteria were included in this study. With a randomized, double-blinded clinical study, those patients were allocated into two groups:

- Intervention group: Included 50 patients received 15 ml epidural plain bupivacaine (0.5%) plus 8 mg (2 ml) dexamethasone.
- Control group: Included 50 patients who received 15 ml epidural plain bupivacaine (0.5%) plus 2 ml normal saline.

Inclusion Criteria:

- Adult patients.
- Patients were classified according to the American Society of Anesthesiologists (ASA) as I or II.
- Patients who underwent elective hip or knee replacement under epidural anesthesia.

A structured questionnaire was prepared by the researcher with revision of the supervisor to gather data through direct interviews and examination. The age, weight, height, and past medical and surgical history were obtained for each patient before the operation.

Upon arrival at the operating room, a non-invasive blood pressure cuff, pulse oximeter, and electrocardiogram were conducted on the patients with continuous monitoring of them during the operation. In addition, two intravenous cannulas are put and patients were preloaded with 1000 ml of normal saline.

The patients were put in the sitting position for epidural puncture. The skin was prepared with an antiseptic solution and left to dry. Then, 2 ml of 2 % lidocaine local anesthesia was injected subcutaneously to decrease the pain associated with the procedure.

The epidural anesthesia was given in L3–L4 or L4–L5 inter-vertebral space using a midline approach with an 18 G Touhy needle and loss of resistance technique for localization of epidural space and then the epidural catheter was threaded through the needle.

The test dose was prepared with a separate syringe from the main dose; it contained 3 ml of 2% lidocaine and 15 mcg of epinephrine which was diluted with normal saline (1:200,000). The test dose was administered first and followed by the main dose after three minutes.

The main dose of epidural anesthesia was given after preparation by another experiment (other than the researcher or advisor) and coded with the patient's code, which included Marcaine 0.5% plus 8mg dexamethasone or normal saline. The researcher did not know whether it contained dexamethasone or normal saline.

The sensory block was assessed using the ice pack method two minutes interval for 20 minutes in a cephalic to caudal fashion along the left anterior axillary line by a blinded observer, and the loss of sensation to the ice pack was tested at two minutes intervals. The time of maximum cephalic spread was defined as the time from the onset of analgesia up to the highest level of achieved sensory analgesia. In addition, the onset of the sensory block is defined by one of the following two criteria:

1. Patients reported subjective feelings of increased tingling with paresthesia in the lower limb
2. Difference in cold sensation between the chest and lower limb as elicited by the researcher and The Modified Bromage scale was used to assess motor blockade(Shahi, V. *et al*., 2014):

No Motor Block.
1: Inability to rise extended leg, able to move knee and feet.
2: Inability to rise extended leg and move knee, able to feet.
3: Complete block of the motor limb.

During the operation, the following data were reported:

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1. Time to the onset of anesthesia.
2. Duration of anesthesia

After the Operation, the Following Data Were Recorded:

• Time of operation

• Postoperative pain evaluation during rest by visual analogue scale. The score was recorded every 4 hours in the first 24 hours postoperative.

• Time to first request for analgesia which included Nefopam.

The data was entered and analyzed by the Statistical Package of Social Science, version 22. Categorial data were presented as frequencies and were applied to explain the characteristics of participants while continuous data were presented as mean (±standard deviation (SD)). The study groups were compared by t-test and Chi-Square test for statistical difference. A P-value less than 0.05 was considered statistically significant.

RESULTS

A total of 100 patients were enrolled in the current study, there were no significant differences between the study groups regarding age, gender, BMI, and ASA score (P-values were 0.523, 0.071, 0.682, and 0.840, respectively). As shown in table 1.

Table 1: Distribution of the age, gender, body mass index, and ASA score.

Characteristics		Intervention group N (%)	Control group N (%)	P-value
Age group	50-59	32 (64.0)	35 (70.0)	0.523
	≥60	18 (36.0)	15 (30.0)	
Gender	Male	22 (44.0)	31 (62.0)	0.071
	Female	28 56.0)	19 (38.0)	
Body mass index	Normal weight	19 (38.0)	21 (42.0)	0.682
	Overweight	26 (52.0)	22 (44.0)	
	Obese	5 (10.0)	7 (14.0)	
ASA score	I	29 (58.0)	28 (56.0)	0.840
	II	21 (42.0)	22 (44.0)	

There were no significant differences between the study groups regarding the type and duration of operation (P-values were 0.523 and 0.425, respectively), as shown in table 2.

Table 2: Type and duration of operation.

Type and duration of operation		Intervention group N (%)	Control group N (%)	P-value
Type	Hip replacement	32 (64.0)	35 (70.0)	0.523
	Knee replacement	18 (36.0)	15 (30.0)	
		Intervention group Mean (±SD)	Control group Mean (±SD)	
Duration of operation (minutes)		153.1 (±8.1)	154.7 (±11.1)	0.425

There was no significant difference between the study groups regarding the onset of the anesthesia (P-value=0.086) (Figure 1)

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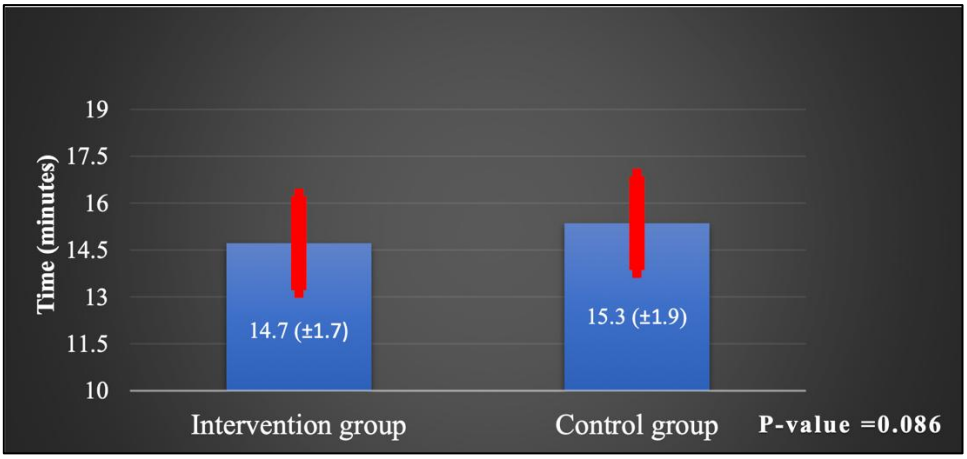

Figure 1: Onset of the anesthesia.

There was a significantly lower number of patients who need a second dose of analgesic drugs in the intervention group compared to the control group (P-value=0.001) (Figure 2).

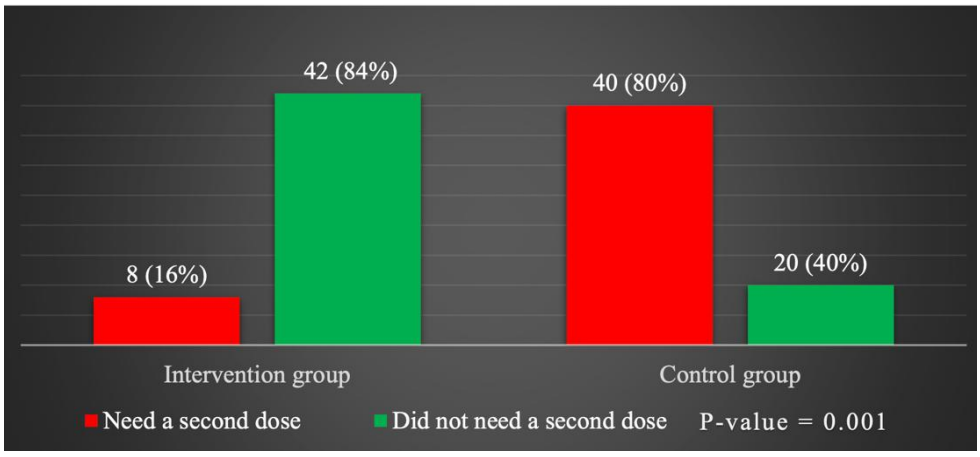

Figure 2: Percentage of patients who need a second anesthetic dose.

The duration of anesthesia was significantly longer in the intervention group compared to the control group (P-value=0.001) (Figure 3)

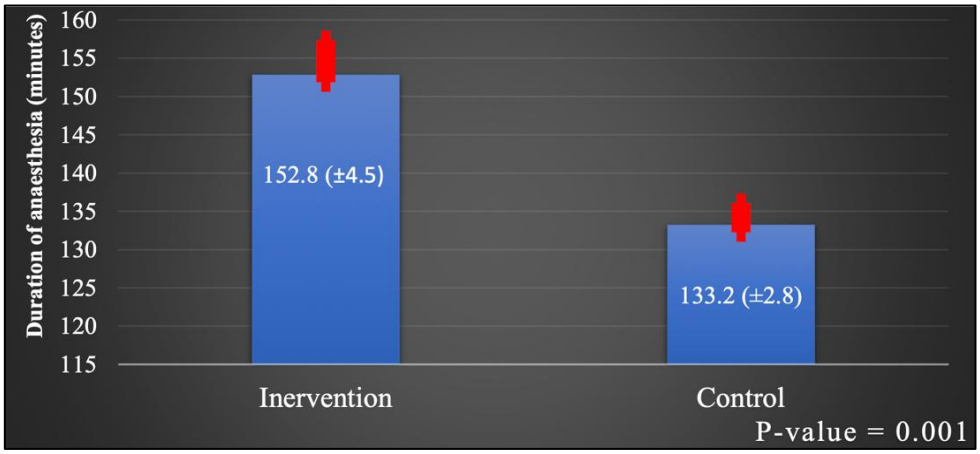

Figure 3: Duration of anesthesia.

No significant difference was obtained between the study groups regarding the visual analogue scale means at 4 hours postoperatively (P-value=0.846). The mean visual analogue scale was significantly lower in the intervention group at 8 hours, 12 hours, 16 hours, 20 hours, and 24 hours. In addition, the mean time to the first analgesic request was significantly longer in the intervention group compared to the control group (P-value =0.001). As shown in table 3 and figure 4.

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Table 3: Distribution of the visual analogue scale and time for the first analgesic request according to the study groups.

Visual analogue scale	Intervention group Mean (±SD)	Control group Mean (±SD)	P-value
At 4 hours	0.56 (±0.50)	0.54 (±0.50)	0.846
At 8 hours	1.56 (±0.57)	2.20 (±0.78)	**<0.001**
At 12 hours	2.02 (±0.58)	2.48 (±0.73)	**<0.001**
At 16 hours	2.76 (±0.71)	3.86 (±0.78)	**<0.001**
At 20 hours	3.58 (±0.73)	5.74 (±0.800	**<0.001**
At 24 hors	5.60 (±0.49)	5.98 (±0.71)	**<0.001**
Time to first analgesic request (hours)	14 (±2.3)	9 (±3.1)	**<0.001**

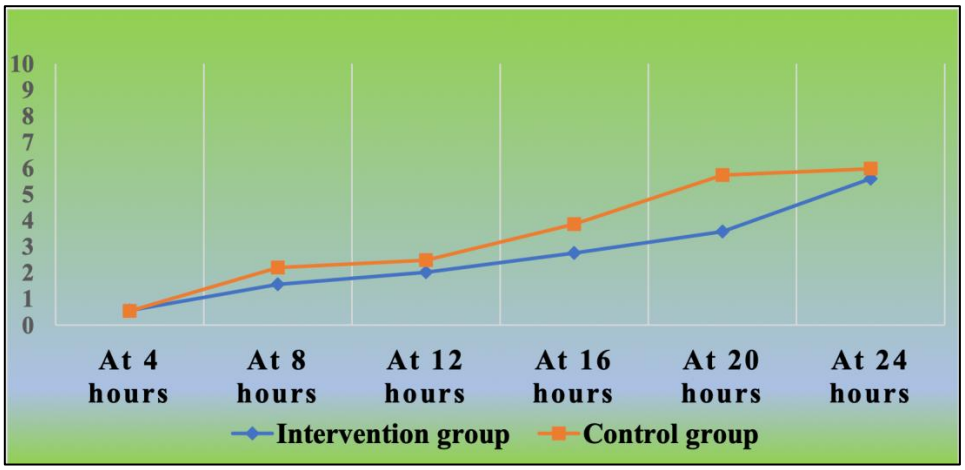

Figure 4: Trend of the postoperative visual analogue scale in the study groups.

DISCUSSION

Uncontrolled postoperative pain may produce a range of harmful effects.

Attenuation of postoperative pain may decrease perioperative mortality and morbidity Epidural is a safe and effective method for control of postoperative pain.

Prolonging the duration of local anesthesia is often desirable because it produces analgesia in the postoperative period. (Razavizadeh, M. R. *et al*., 2017) Various adjuvants have been used to prolong epidural anesthesia; this study was one among others that tried to assess the benefits of dexamethasone addition to in increased the duration of anesthesia and improvement of postoperative analgesia.

There was no significant difference between the study groups regarding the onset of epidural anesthesia. In agreement, the same results were obtained in another study that was done in Iran by Bani-Hashem *et al*. as no significant difference between the dexamethasone group and the control group regarding the onset of epidural anesthesia. (Bani-Hashem, N. *et al*., 2011)

In contrast, another study that was done in Iran by Razavizadeh *et al*. revealed that the onset of anesthesia was significantly more rapid in the dexamethasone group (7.64 (±2.74) minutes) than in the control group (12.09 (±2.79) minutes) during the operation of unilateral inguinal herniorrhaphy. (Razavizadeh, M. R. *et al*., 2017)

The main finding of the current study was that the addition of dexamethasone was associated with a significant increase in the duration of epidural anesthesia and a decrease in the number of patients who needed a second dose. In comparison, the same results were obtained in another study that was done by Cummings *et al*. in the United States. (Cummings III, K. C. *et al*., 2011) In agreement, Bani-Hashem *et al*. revealed that the duration of anesthesia was significantly longer with dexamethasone addition (119 (±10.69) minutes)

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compared to bupivacaine alone (89.44 (±8.37) minutes). (Bani-Hashem, N. *et al*., 2011)

Regarding postoperative analgesia, the pain sensation was significantly lower in the intervention group compared to the control group according to the visual analogue scale. In addition, the time to the first request of analgesia was significantly longer in the intervention group compared to the control group. In comparison, the same results were obtained in another study that was done by Adel-Aziz *et al*. in Egypt and revealed the addition of dexamethasone to epidural bupivacaine prolonged the duration of postoperative analgesia, delayed the time of the first analgesic request, and decreased the consumption of postoperative opioids and analgesics consumption postoperatively in patients who were undergoing lower limb orthopedic surgeries. (Adel-Aziz, M. R. *et al*., 2019) In agreement, Cummings *et al*. concluded that dexamethasone prolonged analgesia from interscalene blocks using ropivacaine or bupivacaine. (Cummings III, K. C. *et al*., 2011) In Iran, a study was done there by Bani-Hashem *et al* revealed that pain sensation according to the visual analogue scale and the first analgesic dose prescription in the intervention group with dexamethasone addition was significantly longer than that in the control group ($P<0.001$).[9] This agreed with Hong *et al*. who concluded that epidural dexamethasone was effective for reducing postoperative pain. (Hong, J. M. *et al*., 2017) Thomas and Beevi reported that preoperative epidural administration of dexamethasone 5 mg, with or without bupivacaine, reduces postoperative pain and morphine consumption following laparoscopic cholecystectomy. (Thomas, S., & Beevi, S. 2006)

In the current study, the time to the first analgesic request was significantly longer in the intervention group. In comparison, the same results were obtained in another study that was done by Adel-Aziz in Egypt as the duration of postoperative analgesia was significantly longer with the addition of the dexamethasone (15.2 ± 2.03 hours) than in the control group (3.38 ± 0.72 hours). (Adel-Aziz, M. R. *et al*., 2019)

CONCLUSION

- The addition of dexamethasone to epidural bupivacaine increased the duration of epidural anesthesia.
- The combination of dexamethasone and epidural bupivacaine was associated with decreased postoperative pain and the need for analgesic drugs compared to epidural bupivacaine alone.

REFERENCES

1. Korula, S., George, G. M., Ipe, S., & Abraham, S. P. "Epidural anesthesia and post-operative analgesia for bilateral inguinal mesh hernioplasty: Comparison of equipotent doses of ropivacaine and bupivacaine." *Saudi Journal of Anaesthesia* 5.3 (2011): 277-281.
2. Ezeonu, P. O., Anozie, O. B., Onu, F. A., Esike, C. U., Mamah, J. E., Lawani, L. O., ... & Anozie, R. O. "Perceptions and practice of epidural analgesia among women attending antenatal clinic in FETHA." *International journal of women's health* (2017): 905-911.
3. Manchikanti, L., Knezevic, N. N., Parr, A., Kaye, A. D., Sanapati, M., & Hirsch, J. A. "Does epidural bupivacaine with or without steroids provide long-term relief? A systematic review and meta-analysis." *Current Pain and Headache Reports* 24.6 (2020): 26.
4. Shafiei, F. T., McAllister, R. K., Lopez, J. "Bupivacaine. StatPearls. Treasure Island (FL): StatPearls Publishing Copyright © 2022, StatPearls Publishing LLC." (2022).
5. Tandoc, M. N., Fan, L., Kolesnikov, S., Kruglov, A., & Nader, N. D. "Adjuvant dexamethasone with bupivacaine prolongs the duration of interscalene block: a prospective randomized trial." *Journal of anesthesia* 25.5 (2011): 704-709.
6. Oliveira, J. M. "Does the addition of dexamethasone to local anesthetic used for peripheral nerve block prolong analgesia in the surgical patient?." (2015).
7. Shahi, V., Verma, A. K., Agarwal, A., & Singh, C. S. "A comparative study of magnesium sulfate vs dexmedetomidine as an adjunct to epidural bupivacaine." *Journal of Anaesthesiology Clinical Pharmacology* 30.4 (2014): 538-542.
8. Razavizadeh, M. R., Fazel, M. R., Heydarian, N., & Atoof, F. "Epidural dexamethasone for postoperative analgesia in patients undergoing unilateral inguinal herniorrhaphy: a comparative study." *Pain Research and Management* 2017.1 (2017): 7649458.
9. Bani-Hashem, N., Hassan-Nasab, B., Pour, E. A., Maleh, P. A., Nabavi, A., & Jabbari, A. "Addition of intrathecal dexamethasone to bupivacaine for spinal anesthesia in orthopedic surgery." *Saudi journal of anaesthesia* 5.4 (2011): 382-386.

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10. Adel-Aziz, M. R., Abdelrahim, M. G., & Nagiub, G. M. "The effects of adding dexamethasone to epidural bupivacaine for lower limb orthopedic surgery." *Journal of Current Medical Research and Practice* 4.2 (2019): 192-195.
11. Cummings III, K. C., Napierkowski, D. E., Parra-Sanchez, I., Kurz, A., Dalton, J. E., Brems, J. J., & Sessler, D. I. "Effect of dexamethasone on the duration of interscalene nerve blocks with ropivacaine or bupivacaine." *British journal of anaesthesia* 107.3 (2011): 446-453.
12. Hong, J. M., Kim, K. H., Lee, H. J., Kwon, J. Y., Kim, H. K., Kim, H. J., ... & Kim, H. S. "Epidural dexamethasone influences postoperative analgesia after major abdominal surgery." *Pain Physician* 20.4 (2017): 261-269.
13. Thomas, S., & Beevi, S. "Epidural dexamethasone reduces postoperative pain and analgesic requirements." *Canadian Journal of Anesthesia* 53.9 (2006): 899-905.

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