

# To assess the incidence of shivering in lower segment caesarean section (LSCS) patients receiving spinal anesthesia with and without fentanyl and bupivacaine

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**Abstract** - Shivering is a normal thermoregulatory mechanism in patients undergoing central neuraxial anaesthesia. Shivering is common in women undergoing caesarian section under spinal anaesthesia and can interfere with patients monitoring. It can cause discomfort to patient and also increases tissue oxygen demand. The goal of the study was to evaluate the incidence of shivering using bupivacaine with and without fentanyl in patients undergoing LSCS under spinal anaesthesia. A total of 60 healthy women belonging to ASA grade I and II were enrolled in our study that were scheduled for both elective as well as emergency caesarian section under spinal anaesthesia. They were randomly divided into 2 groups. Group C with 30 patients were given 0.5% hyperbaric bupivacaine (3ml) and group F with 30 patients were given 0.5% hyperbaric bupivacaine (3ml) with 20 mcg fentanyl. The overall incidence of shivering in group F was lower (5 out of 30 patients) as compared to group C (13 out of 30 patients). There was significant difference in the incidence of shivering between group F and group C, (16.66% in group F ; 43.33% in group C ,  $P < 0.012$ ). The severity of shivering was also reported less in group F as compared to group C. At last from our study and findings I was concluded that the Patients who received 20 mcg fentanyl with bupivacaine had less incidence and severity of shivering than those who did not receive fentanyl with bupivacaine.

**KEYWORDS:** Shivering, Patients, Spinal Anaesthesia, Bupivacaine, Fentanyl, LSCS, Incidence, Group.

## I. INTRODUCTION

Shivering is a skeletal muscular action that occurs involuntarily. It is a common postoperative complication. It is a physiological response to hypothermic condition that aims to elevate basic metabolic heat production [1]. In about 55% of women undergoing caesarian section under spinal anaesthesia the incidence of shivering has been reported. It has various adverse effects and causes disturbances in early child mother relationship. It is therefore important that

initially some measures should be taken either by using medications or by physical methods to control shivering [2, 14]. The shivering mechanism under spinal anaesthesia is difficult to dictate but it may be due to dip in core temperature due to widening of blood vessels within the body, raised passage of blood via skin, frequent loss of heat through skin, cold conditions in the room or sometimes due to cold anaesthetic solutions that affects the thermosensitive receptors located in the spinal cord [3]. Shivering may cause the alterations with anaesthesia monitoring like electrocardiogram (ECG) and Pulse oximetry (SpO<sub>2</sub>). It is related with various patients complications like oxygen consumption may be increased up to 600% and carbon dioxide production is also elevated, increase in HR and BP and elevation in production of lactic acid. Intracranial pressure, intraocular pressure and wound pain is also increased due to shivering [4].

**BUPIVACAINE:** Bupivacaine is amide local anaesthetic drug frequently used in anaesthetic practice. For spinal anaesthesia it is used in the concentration of 0.5% (Heavy). For painless labor and pain relief in postoperative period it is drug of choice [5].

**FENTANYL:** Fentanyl is a powerful synthetic narcotic drug. As compared to morphine fentanyl is 100 times more powerful. Fentanyl like other opioids also acts on  $\mu$  receptors present in brain, spinal cord and other tissues. Like other opioids it also causes various complications such as nausea, vomiting, sedation, fatigue, dizziness, respiratory depression, decrease in heart rate and unconsciousness. For intra operative analgesia fentanyl launched more than 50 years ago has become most frequently used opioid [6]. It has been reported that the incidence of shivering is decreased due to fentanyl because of its sedative action on brain. A small fentanyl dose of 10-25 mcg is found to be very beneficial for caesarian 3 patients both intra operatively and post operatively when injected directly into the cerebrospinal fluid in reducing discomfort in patients without elevating major side effects [7,9].

The objective of this study was to assess the incidence of shivering in LSCS patients under SA using bupivacaine with and without fentanyl. And To study effect of intrathecal fentanyl 20 mcg in Caesarian patients on incidence of intraoperative and postoperative shivering.

## II. MATERIAL AND METHOD

A comparative study was carried out at Shree Guru Gobind Singh tricentenary (SGT) university Budhera, Gurugram, Haryana. After obtaining permission from the ethical committee the study was done. A total of 60 Lower Segment Caesarian Section patients (LSCS) belonging to ASA category I and II were enrolled in study and they were in the age group between 19- 40 yrs. Before including patients in the study informed consent was taken from them. The patients were randomized into two groups and 30 patients were kept in each group.

### INCLUSION CRITERIA:

1. Patients belonging to ASA Category I and II.
2. Patients in the age group between 19-40 yrs.
3. Patients of both Elective and Emergency procedures.
4. Patients with BMI up to 35.

### EXCLUSION CRITERIA:

1. Patients with allergy to Bupivacaine or Fentanyl.
2. Patients with Fetal distress.
3. Less than 35 weeks pregnancy.
4. Febrile Patients.

Group F (Fentanyl group): n=30; were given 0.5% hyperbaric Bupivacaine 3ml with 20 mcg Fentanyl

Group C (Control group): n=30; were given 0.5% hyperbaric Bupivacaine 3ml without Fentanyl

All the patients were cannulated and Ringer's Lactate 10-15 ml /kg (500-1000 ml) was administered preoperatively. All the intravenous fluids administered was stored at room temperature. Patients were taken to the operation room (OR) and before giving spinal various vital parameters were noted via monitors (SpO<sub>2</sub>, BP, HR). The ambient temperature in the OR was adjusted in between 22-25°C. Under strict aseptic guidelines the SA was given to patients in the sitting position by using Quincke's needle (25G) into the L3-L5 space. Local anaesthetic (as per group F & C) was injected in subarachnoid space after observing free flow of CSF through spinal needle. The patients were kept in supine position after performing spinal block. Patients were given oxygen at flow rate of 4-5 L /min.

Prior to surgery, sensory block was accessed by pin prick and motor blockade was evaluated by Bromage scale. Crossley and Mahajan scale was used to evaluate severity and incidence of shivering in patients in which scores are as;

0= No shivering

1= No visible muscle activity but piloerection, peripheral vasoconstriction or both are present

2= Muscular activity in only one muscle group

3= Moderate muscular activity in more than one muscle group but not generalized shaking

4= Violent muscular activity that involves whole

Severity and incidence of shivering was recorded at every 30 mins intraoperatively and postoperatively for 1.5 hrs. The body temperature in all the patients was measured via probe kept under axilla. 0.6 mg atropine injection was used to treat bradycardia (HR < 90 mmHg).

Sedation and other post-operative complications in the patients during post-operative period were examined by Brussels sedation scale and modified Aldrete scoring system.

Brussels sedation scale:

- 1 = Unroutable
- 2 = Responds to pain stimulation but not to auditory stimulation
- 3 = Responds to auditory stimulation
- 4 = Awake and calm
- 5 = Agitated

Demographic data, shivering incidence and severity, temperature etc was recorded, tabulated and analyzed statistically

**Statistical analysis**

The data was coded and entered into MS excel and statistically Analysed by using SPSS software version 20. The results obtained from both the groups were compared by using repeated measures ANOVA.

Chi-square test was used for qualitative data and quantitative data. chi-square test and t-test was used respectively when comparison was made in between two groups.

III. RESULTS

In the current study the occurrence of shivering in LSCS patients under SA with bupivacaine or with addition of 20 mcg fentanyl with bupivacaine was compared and evaluated in 60 patients. Patients were in the age group of 19-40 and were splitted into 2 groups each with 30 patients.

Table 1- Patients Data

	Mean ± SD (Group C)	Mean ± SD (Group F)	t-value	p-value
Age (in Years)	24.77 ± 3.62	26.33 ± 3.31	1.75	0.086
Weight (in Kgs)	69.53 ± 7.26	76.13 ± 5.41	3.99	0.001**
Gestational Age (in Weeks)	38.37 ± 1.45	38.23 ± 1.55	0.344	0.732

\*\*=p<0.01 i.e., significant

In our study, in age, gestational age & ASA grading there was no static significant difference seen among the groups however statistically body weight was found significant, though clinically it was insignificant.

Graph 1: -

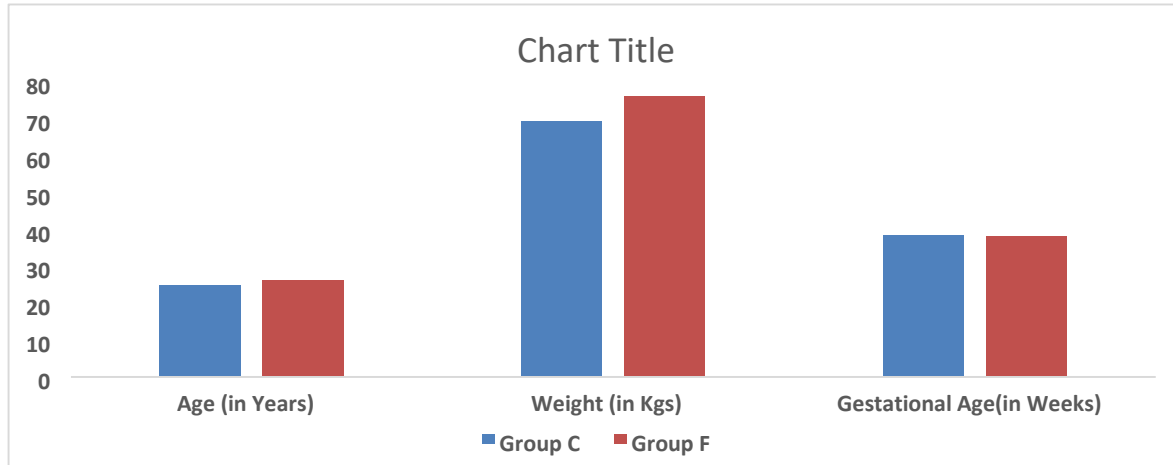


Table 2:-Parameters GROUP C

	Preop (Mean ± SD)	Intraop (Mean ± SD)	Post-op (Mean ± SD)	F-value	p-value
<b>Temperature</b>	98.43 ± 0.19	98.29 ± 0.30	98.29 ± 0.25	4.01	0.023*
<b>SPo2</b>	98.10 ± 1.03	97.87 ± 1.22	98.20 ± 1.21	0.674	0.514
<b>RR</b>	17.73 ± 2.73	18.10 ± 2.06	17.60 ± 2.03	0.646	0.528
<b>HR</b>	81.73 ± 4.70	81.03 ± 8.04	83.96 ± 5.83	2.628	0.081
<b>BP Systolic</b>	122.17 ± 11.28	121.70 ± 13.80	123.77 ± 10.49	0.462	0.632
<b>BP Diastolic</b>	77.87 ± 6.34	78.27 ± 10.93	79.37 ± 7.48	0.405	0.669

\*=p<0.05 i.e., significant

Current study revealed that patient vital parameters like BP, HR, RR was not statistically significant at every interval in control group. Temperature was seen significant statistically.

Table 3:-Parameters GROUP F

	Preop (Mean $\pm$ SD)	Intraop (Mean $\pm$ SD)	Post-op (Mean $\pm$ SD)	F-value	p-value
Temperature	98.43 $\pm$ 0.22	98.34 $\pm$ 0.39	98.42 $\pm$ 0.27	1.33	0.272
SPo2	98.17 $\pm$ 0.79	97.60 $\pm$ 1.35	98.13 $\pm$ 1.14	2.49	0.092
RR	15.53 $\pm$ 1.83	16.63 $\pm$ 2.72	15.17 $\pm$ 1.70	4.55	0.015*
HR	79.00 $\pm$ 3.62	82.57 $\pm$ 9.86	78.30 $\pm$ 5.40	4.93	0.011*
BP Systolic	123.67 $\pm$ 6.64	121.77 $\pm$ 17.44	119.40 $\pm$ 10.05	2.4	0.099
BP Diastolic	78.77 $\pm$ 5.19	77.63 $\pm$ 11.09	76.33 $\pm$ 5.76	1.54	0.224

\*=p<0.05 i.e., significant

Current study revealed that patient vital parameters like heart rate and respiratory rate were statistically significant while blood pressure, spo2 and body temperature were not statistically significant at every interval in fentanyl group.

Table 4:- Adverse effects

Adverse effects	Group F (n=30)	Group C (n=30)	p value
Nausea	3 (10%)	2 (6.66%)	0.512
Vomiting	2 (6.66%)	1 (3.33%)	0.399
Hypotension	5 (16.66%)	3 (10%)	0.343
Bradycardia	2 (6.66%)	1 (3.33%)	0.399
Shivering	5 (16.66%)	13 (43.33%)	0.012*
Respiratory depression	2 (6.66%)	1 (3.33%)	0.399
Sedation	8 (26.66%)	2 (6.66%)	0.010*

\*=p<0.05 i.e., significant

Our study manifested that the adverse effects like bradycardia, nausea, low BP, respiratory depression and vomiting was not statistically significant in two groups. However sedation and shivering was seen significant statistically between two groups.

Graph 2:

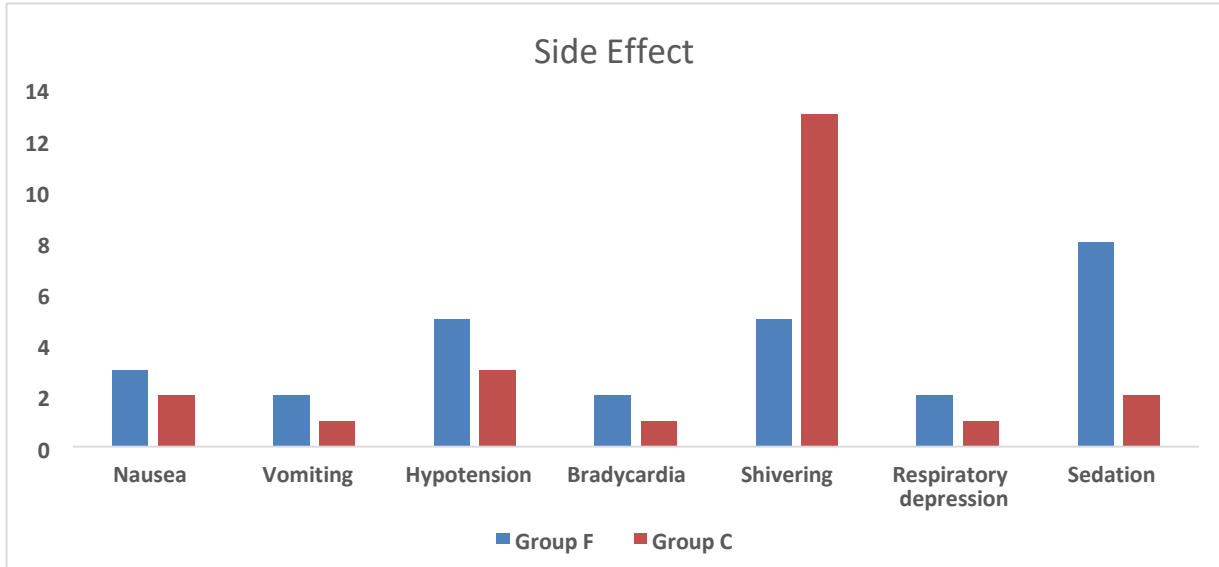


Table 5: Incidence of shivering.

	Group F (n=30)	Group C (n=30)	p value
<b>Incidence (%)</b>	5 (16.66%)	13 (43.33%)	0.012*
<b>Intra-operatively</b>	3 (10.00%)	8 (26.66%)	0.043*
<b>First 30 min</b>	2 (6.66%)	5 (16.66%)	0.130
<b>Second 30 min</b>	1 (3.33%)	3 (10.00%)	0.175
<b>Post-operatively</b>	2 (6.66%)	5 (16.66%)	0.130
<b>First 30 min</b>	1 (3.33%)	3 (10.00%)	0.175
<b>Second 30 min</b>	1 (3.33%)	1 (3.33%)	1.000
<b>Third 30 min</b>	0 (0.00%)	1 (3.33%)	0.052

\*=p<0.05 i.e., significant

In our study in group F, 5 out of 30 patients (16.66%) reported shivering out of which 3 patients reported shivering intraoperatively and 2 patients postoperatively. In group C 13 patients reported shivering out of which 8 reported intraoperatively and 5 postoperatively. The overall shivering occurrence was significant statistically in two groups.

Table 6: SEVERITY OF SHIVERING AS PER CROSSLEY AND MAHAJAN SCORING – 0/1/2/3/4

Severity	Group F (n=30)	Group C (n=30)	p value
Grade 0	25 (83.3%)	17 (56.7%)	0.110
Grade 1	1 (3.33%)	3 (10%)	0.175
Grade 2	2 (6.66%)	5 (16.66%)	0.130
Grade 3	2 (6.66%)	5 (16.66%)	0.130
Grade 4	0 (0%)	0 (0%)	-

\*=p<0.05 i.e., significant shivering severity was not significant in two groups.

Graph 3: \_

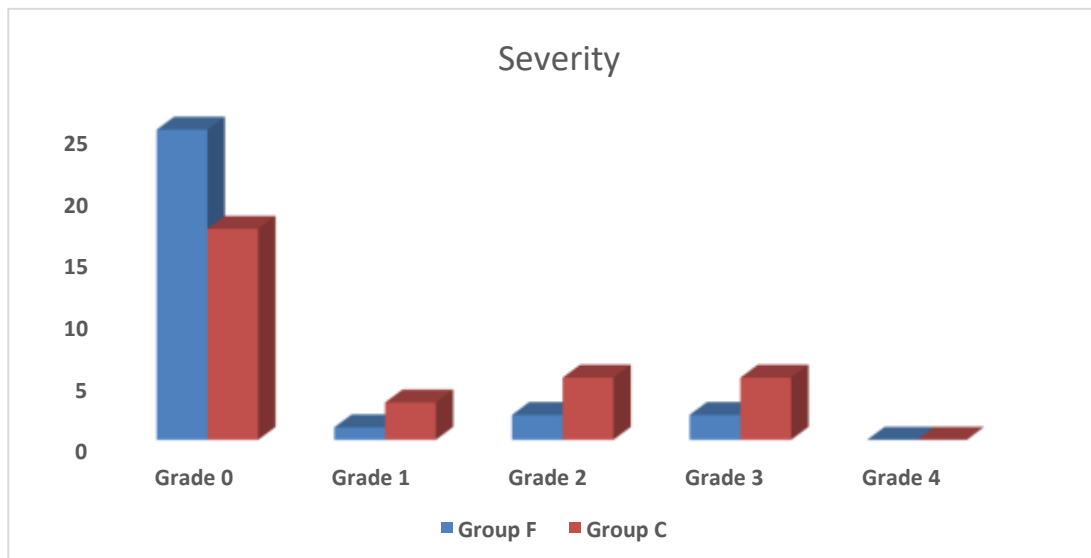


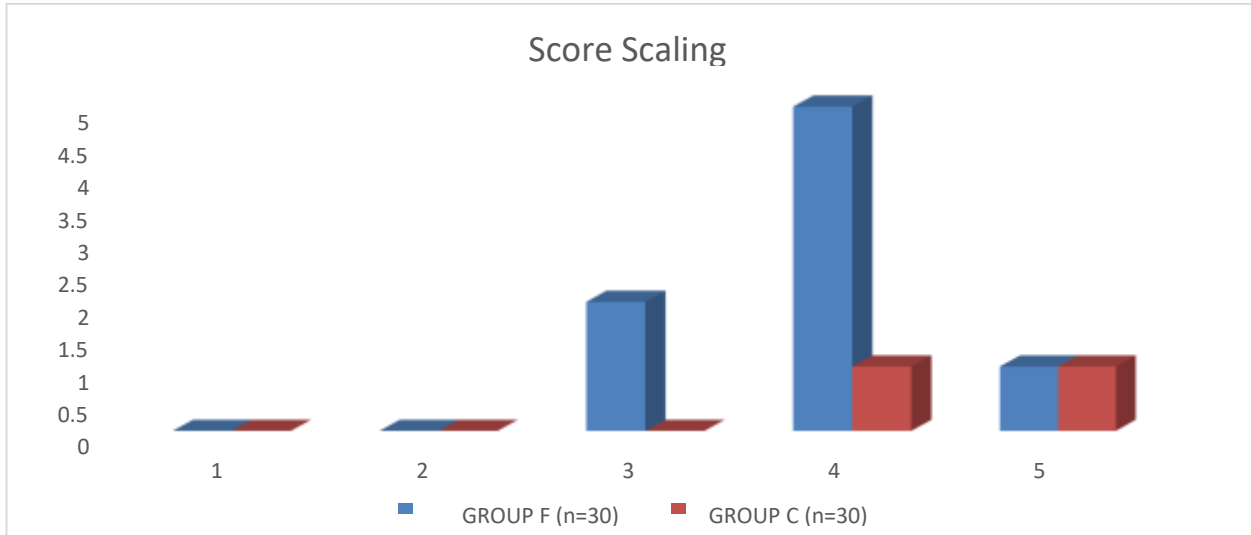
Table 7: Sedation (Brussels sedation scale)

Sedation (Brussels sedation scale)			
SCORE	GROUP F (n=30)	GROUP C (n=30)	p value
1	0(0.00%)	0 (0.00%)	-
2	0(0.00%)	0 (0.00%)	-
3	2(7.00%)	0(0.00%)	0.03*
4	5(17.00%)	1(3.00%)	0.02*
5	1(3.00%)	1(3.00%)	1.00

P<0.5 i,e=significant

In our study the sedation between two groups was statistically significant.

Graph 4:-



#### IV. DISCUSSION

For LSCS surgeries spinal anaesthesia is favored over general anaesthesia because it is simple, easy to perform and has less risk of fetal respiratory suppression and aspiration pneumonia. Till today the shivering mechanism is not fully understood after giving spinal anaesthesia.

Our study results revealed that the incidence as well as severity of shivering was reduced after the addition of 20 mcg fentanyl to 0.5% bupivacaine in LSCS patients under SA. Our study manifests almost same result of incidence and shivering when compared with other studies. However our study showed that significantly sedation was elevated in group F as contrast to group C. For other side effects like hypotension, nausea, vomiting, bradycardia the significant difference was less in two groups.

Ali sadegh et al study manifested that in caesarean patients under spinal anaesthesia the shivering occurrence was comparatively less when 25mcg of fentanyl was added with 0.5% hyperbaric bupivacaine[9]. In another study Anchaleetechnivate et al concluded that the postoperative and intraoperative chances of shivering was less when 20mcg fentanyl was added to hyperbaric bupivacaine in women undergoing caesarean section under spinal anaesthesia[8].

Mitra Gul Mohammadi et al study on incidence of shivering during caesarian section in patients under spinal anaesthesia with or without fentanyl showed that the patients administered with fentanyl reported less shivering incidence intraoperatively and postoperatively [15]. In another randomized study by Drsaritagothiya et al on intrathecal fentanyl in prevention of intraoperative shivering, their results manifests that 25 mcg addition of fentanyl with bupivacaine minimizes the chances and incidence of shivering [13].

Manne VS et al in his study manifested that perioperative shivering was controlled more with fentanyl when compared to butarphanol and time taken to control shivering was also less with fentanyl. Recurrence of shivering, vomiting, sedation and nausea was more with butarphanol[7]. In caesarean deliveries under spinal anaesthesia, Jayaraj A et al in his study concluded that the onset time, incidence and severity of shivering was decreased with intravenous injection of fentanyl, mepiridine and tramadol, However tramadol in low dose 0.5mg/kg prevents shivering and has low sedation effects [18].



In another study by Shakya S et al it was concluded by them that the incidence of shivering was significantly reduced with prophylactic low dose ketamine and ondansetron without elevating side effects in patients who were given spinal anaesthesia. At each time interval decline in temperature was seen less in ketamine group as comparable to saline and ondansetron groups [19].

In caesarean patients under spinal anaesthesia Bajaj et al study manifested that the dexmedetomidine administered intrathecally was more efficient and safe in controlling postspinal shivering than intrathecal fentanyl [20]. Mohamed Taznim et al concluded that intraoperative shivering in patients under spinal anaesthesia is effectively controlled by pethidine as compared to tramadol however sedation was seen higher with pethidine than tramadol [21].

## V. CONCLUSION

From our results it was concluded that the patients who were administered with bupivacaine with addition of 20 mcg fentanyl (Group F) had less incidence of shivering than those who were only administered with bupivacaine (Group C). The severity of shivering was also reported less in group F as comparison with group C.

Sedation was seen more with group F as comparison with group C. There was less comparable difference in side effects like nausea, vomiting and bradycardia between two groups.

## VI. ETHICAL APPROVAL

This study was conducted and approved at SGT Medical College, Hospital and Research Institute Gurugram Haryana and prior to commencement of this research written consent was taken from each patient.

## VII. ACKNOWLEDGMENTS

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