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Bilateral Superficial Cervical Plexus Block with Conscious Sedation in Comparison to General Anaesthesia for Thyroid Surgery

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Abstract: *Thyroidectomy is the one of the most common endocrine surgical procedure being carried out throughout the globe. General anaesthesia (GA) is commonly used for thyroid surgery. Bilateral cervical plexus block (BCPB) is adequate to produce anaesthesia for procedures on anterolateral aspect of neck.Objective:The present study is To evaluate the effect of bilateral superficial cervical plexus block with conscious sedation over conventional general anaesthesia for thyroid surgery.Methodology:This study was carried out for one year during the period from January 2018 to December 2018, six months of which was the data collection period. The study was conducted department of Anaesthesia, Bangabandhu Sheikh Mujib Medical University. A total of sixty (60) patients admitted for thyroidectomy on the basis of inclusion and exclusion criteria were selected for the study. The patients were divided into two groups (Group-A and Group-B), each group consisting of thirty (30) patients.Results:In our study it was observed that bleeding score was less in group A(BSCPB) and provide better surgical condition in comparison to group B (general anaethesia). Among group A50% mild bleeding 1, 33% mild bleeding 2 and 12% mild bleeding 3.we found 19 (66.7%) on the contrary 15% of patients in group B (general anaesthesia) showed moderate bleeding during operation. BSCPB reduces blood loss and provide better surgical condition in comparison to general anaesthesia.Conclusion:It is concluded that Bilateral Superficial Cervical Plexus Block with conscious sedation in comparison to general anaesthesia provides better outcome in terms of per operative haemodynamics, reduce per operative surgical site bleeding for patients undergoing thyroidectomy.*

Keywords: ***Cervical Plexus Block,Conscious Sedation,General Anaesthesia, Thyroid Surgery.***

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I. Introduction:

In the pre-anaesthesia era, surgery was a horrible and terrifying experience. Anaesthesia had a particularly significantimpact on thyroid surgery. Before general anaesthesia was available, there was little to make the patient comfortable during the procedure. Patients were told not to move and were even tied down to the operating table. Chemicals such as ether had been in use for years, but not necessarily in a controlled way. Successful management of the difficult airway was very important, especially for patients with large goiters pressing and causing deviation and stenosis of the trachea. Under these circumstances, it was thought that local anaesthesia was the preferred method of anaesthesia.[1]

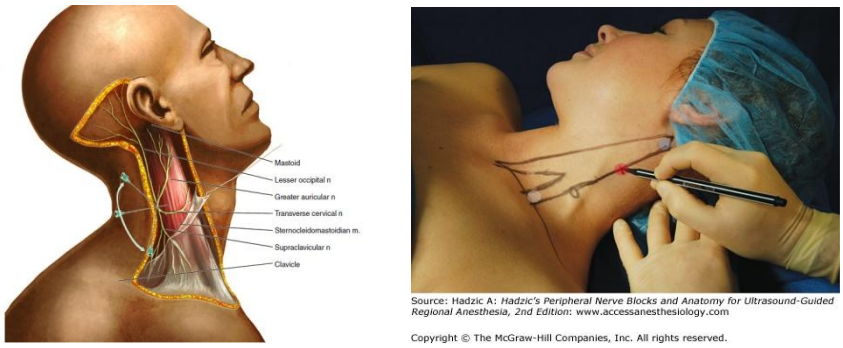

Figure 1a and 1b: Superficial cervical plexus block &Landmark Identification

Thyroidectomy is the one of the most common endocrine surgical procedure being carried out throughout the globe.[2, 3]General anaesthesia (GA) is commonly used for thyroid surgery. Bilateral cervical plexus block (BCPB) is adequate to produce anaesthesia for procedures on anterolateral aspect of neck. The disadvantages of GA are possible prolonged post-anaesthesia recovery as well as the adverse effects of endotracheal intubation and the anaesthetic agents. GA also has the potential to result in subsequent nausea and vomiting afterward. The advantages of local anaesthesia (LA) with monitored anaesthesia care (MAC) are faster post-anaesthesia recovery, no throat or vocal cord irritation and potential avoidance of the adverse effects of GA. An effective cervical plexus block produces anaesthesia over the neck, occipital, shoulder and upper pectoral region. The cervical plexus is formed from C1 throughC4 nerve roots. Here are five main components of the cervical plexus. The superficial cutaneous branches are the lesser occipital, greater auricular, transverse cervical, and supraclavicular. Deep branches are phrenic nerve and direct muscular branches. Infiltration of these roots can produce adequate anaesthesia on the anterolateral aspect of the neck.

The present study is design to evaluate the changes in bilateral superficial cervical plexus block with conscious sedation in comparison to general anaesthesia for thyroid surgery by studying the related patients.

II. Objectives:

General objective:

To evaluate the effect of bilateral superficial cervical plexus block with conscious sedation over conventional general anaesthesia for thyroid surgery.

Specific objectives:

- To compare per operative bleeding between two groups.
- To compare per operative haemodynamics between two groups.
- To compare surgeon's satisfaction between two groups.
- To assess the effectiveness of Superficial cervical plexus block.

III. Methodology:

The study type was non-randomized purposeful clinical trial

This study was carried out for one year during the period from January 2018 to December 2018, six months of which was the data collection period. The study was conducted department of Anaesthesia, Bangabandhu Sheikh Mujib Medical University. A total of sixty (60) patients admitted for thyroidectomy on the basis of inclusion and exclusion criteria were selected for the study. The patients were divided into two groups (Group-A and Group-B), each group consisting of thirty (30) patients.

Sample Size Determination:

The consecutive sampling technique was used to complete this study. The simplest, approximate sample size formula for binary outcomes, assuming α =0·05, power=0·80, and equal sample sizes in the two groups.

$$n = \frac{7.85[(R+1) - p_2(R^2+1)]}{p_2(1-R)^2}$$

n= the sample size in each of the groups

p_1= event rate (post-operative nausea/vomiting %) in the treatment group (when R and p_2 are estimated)

p_2 = event rate (post-operative nausea/vomiting %) in the control group

R = Risk ratio(p_1/p_2)

Power (1-β) 80% = 7.85
To determine the sample size, the formula is used;
A 73.5% post-operative nausea and vomiting in the control group (p_2=0·735) (Akhavanakbari et al. 2013) and determine that the clinically important difference to detect is 40.0% reduction of post-operative nausea and vomiting (R=0.544) with bilateral superficial cervical plexus block (local anaesthesia) with 0.5% bupivacaine and conscious sedation with Propofol 1% and Fentanyl compared to placebo control at α=0·05 and power=0·80. (Note: R=0.544 equates to an event rate in the new treatment group of p_1=0·40, i.e., R=40.0%/73.5%)
p_1=0.40
p_2=0.735
R= 0.544

$$n = \frac{7.85[(0.544+1) - 0.735(0.544^2+1)]}{0.735(1-0.544)^2}$$

n=30.4 (estimated sample size)
=30 in each group
Therefore total estimated sample size is 30 X 2=60

Inclusion criteria:
The patients were included in the study based on the following characteristics:
- ✓ Patients ranging 19- 45 years of age
- ✓ Patient with euthyroid state
- ✓ Both male and female patients

Exclusion criteria
- Patient with obstructive airway disease
- Patient with large goiter with retrosternal extension
- Patient classified as ASA III and ASA IV
- Thyroid malignancy.
- Patients who refuse to the procedure.

Test Procedure:
By blocking only, the superficial branches of the plexus, (C2, C3, and C4), the phrenic nerve is spared, while the anaesthesia is effected in the neck. The cutaneous (superficial branches) of the plexus are: greater occipital, greater auricular, transverse cervical and supraclavicular nerves. Among the standard haemodynamic monitoring system SBP, DBP, MAP and HR was monitored at 5 minutes interval by using pulse oximetry and sphygmomanometer. Data were recorded at 15 minutes interval for statistical analysis. In the recovery period all the patients of both groups were assessed by Modified Aldrete Scale, Patients recall and any other observation.

IV. Results:

Demographic data of the patients are described extensively in Table-I.

Table-I: Comparison of socio-demographic characteristics of the study patients between two groups (n=60)

Variables	Group A (n=30) No. (%)	Group B (n=30) No. (%)	p value
Age group			
20-25 yrs	8(26.7%)	8(26.7%)	
26-30 yrs	14(46.7%)	12(40.0%)	0.842^{ns}
> 30 yrs	8(26.7%)	10(33.3%)	
Mean±SD	27.9±3.90	28.1±3.85	
Sex			
Male	1 (3.3%)	2(6.7%)	
Female	29(96.7%)	28(93.3%)	0.554^{ns}
BMI			
Normal weight (18.5-24.9kg/m^2)	7 (23.3%)	7 (23.3%)	
Overweight (30-39.9kg/m^2)	23(76.7%)	23(76.7%)	1.000^{ns}
Occupation			
Housewife	26(86.7%)	28(93.3%)	
Service	4(13.3%)	2(6.7%)	0.389^{ns}

Socioeconomic status Lower class Middle class	 0(0.0%) 30(100.0%)	 0(0.0%) 30(100.0%)	 --
ASA class Class I Class II	 29(96.7%) 1 (3.3%)	 25(83.3%) 5(16.7%)	 0.085^{ns}
Data were expressed as frequency and percentage and mean±SD **Chi-square** was performed to see the association between two groups, ns = not significant			
Unpaired student t-test was performed to compare mean age between two groups *significant, ns = not significant			

Table- II show the detailed records of Systolic blood pressure (SBP), Diastolic blood pressure (DBP), Mean arterial blood pressure (MAP),Percent saturation of oxygen (SpO2), and Heart rate (HR) of all patients at baseline. Additionally, figure-2, figure-3, figure-4, figure-5, and figure-6, show the changes in the abovementioned criteria of patients over time.

Table- II: Comparison of preoperative haemodynamic findings between two groups (N=60)

Preoperartivehaemodynamicsfindings	Variables	Group A (n=30) Mean±SD	Group B (n=30) Mean±SD	P value
Baseline	SBP	118.7±6.8	118.3±6.3	0.845 ^{ns}
	DBP	78.8±3.0	78.8±3.0	1.000^{ns}
	MAP	92.1±3.7	92.0±3.5	0.906 ^{ns}
	HR	74.8±4.4	74.9±4.4	0.930 ^{ns}
	SPO2	97.0±.00	97.0±.00	1.000 ^{ns}
15 minutes before	SBP	123.5±5.8	122.7±5.9	0.585 ^{ns}
	DBP	84.5±2.0	84.5±2.0	1.000^{ns}
	MAP	97.5±2.8	97.2±2.7	0.697 ^{ns}
	HR	79.2±4.3	79.5±4.1	0.759 ^{ns}
	SPO2	97.0±.00	97.0±.00	1.000 ^{ns}
Just before induction	SBP	125.7±4.5	125.6±4.4	0.167 ^{ns}
	DBP	84.8±3.9	84.5±3.8	1.000^{ns}
	MAP	98.4±2.9	98.2±2.8	0.751 ^{ns}
	HR	76.6±8.1	76.2±8.0	0.861^{ns}
	SPO2	98.5±0.5	98.5±0.5	1.000^{ns}
Data were expressed as frequency and percentage and mean±SD **Unpaired student t-test** was performed to compare between two groups *significant, ns = not significant				

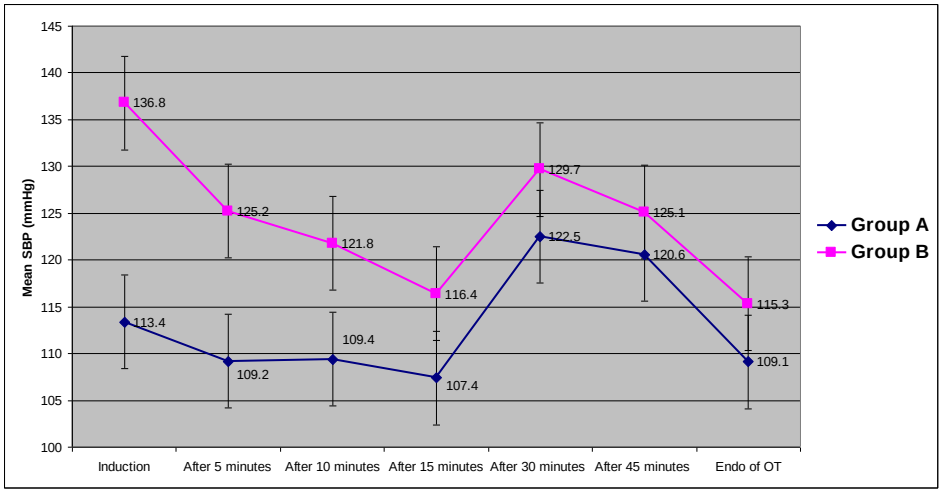

Figure-2: Line diagram showing the peroperative SBP in different time in two groups

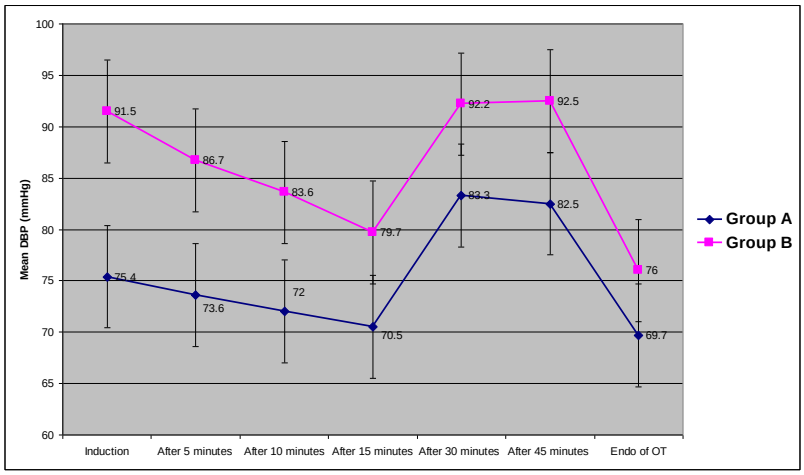

Figure-3: Line diagram showing the peroperative DBP in different time in two groups

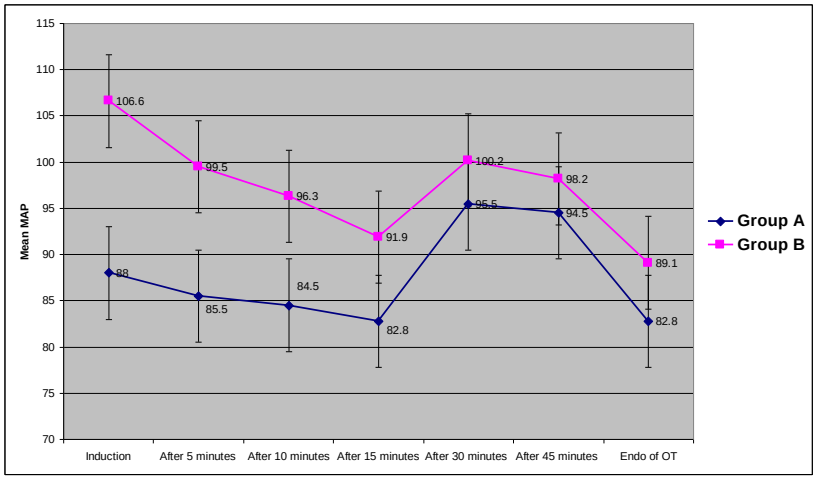

Figure-4: Line diagram showing the peroperative MAP in different time in two groups

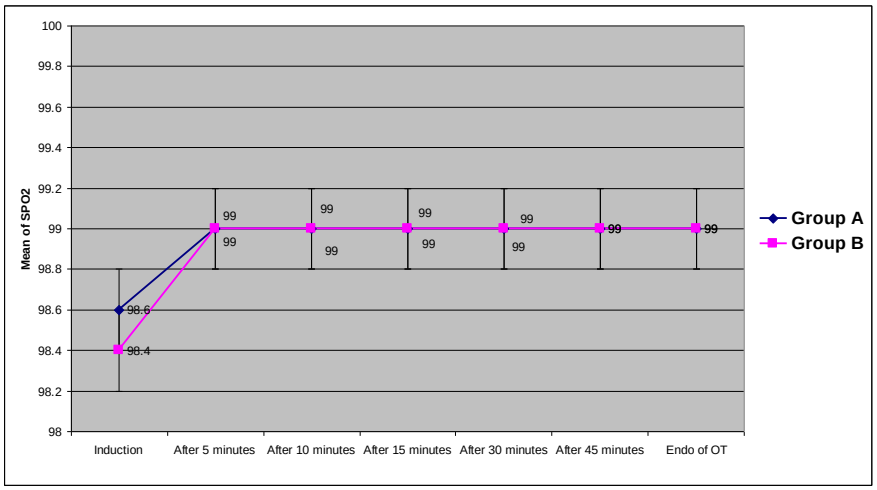

Figure-5: Line diagram showing the peroperative SPO_2 in different time in two groups

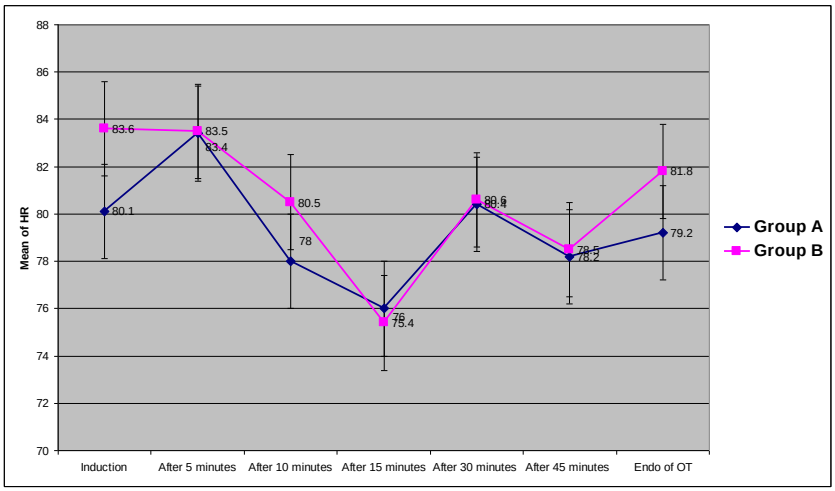

Figure-6: Line diagram showing the peroperative HR in different time in two groups

Table-III shows the postoperative haemodynamic status of the patients on the same criteria as SBP, DBP, and MAP in detail. Next, the table-IV show the Heart Rate and the SPO2 of the 60 patients in detailed format.

Table-III: Comparison of postoperative (Recovery room) haemodynamics(SBP,DBP and MAP) between two groups (N=60).

Postoperative (Recovery room) haemodynamics	Variables	Group A (n=30) Mean±SD	Group B (n=30) Mean±SD	P value
Just after recovery	SBP	115.5±15.8	131.5±14.6	<0.001*
	DBP	73.8±7.5	80.2±5.3	<0.001*
	MAP	87.7±9.9	97.3±7.6	<0.001*
After 15 minutes	SBP	112.9±15.9	125.6±13.3	<0.001*
	DBP	71.0±8.6	78.0±5.4	<0.001*
	MAP	85.0±10.1	93.9±7.3	<0.001*
After 30 minutes	SBP	114.0±10.6	123.9±10.3	<0.001*
	DBP	70.6±6.5	75.3±3.1	<0.001*
	MAP	85.1±7.0	91.5±4.8	<0.001*
After 45 minutes	SBP	119.0±11.8	127.5±13.6	0.012*
	DBP	72.7±8.5	80.2±4.9	<0.001*
	MAP	88.2±8.9	96.1±7.3	<0.001*
After 60 minutes	SBP	118.5±12.5	128.5±12.8	0.003*
	DBP	71.6±8.0	80.6±6.6	<0.001*
	MAP	87.2±8.8	96.6±8.3	<0.001*
Data were expressed as frequency and percentage and mean±SD **Unpaired student t-test** was performed to compare between two groups *significant, ns = not significant				

Table-IV: Comparison of postoperative (Recovery room) HR and SPO2 between two groups (N=60)

Postoperative (Recovery room) haemodynamics	Variables	Group A (n=30) Mean±SD	Group B (n=30) Mean±SD	P value
Just after recovery	HR	78.6±7.2	82.5±5.1	0.020*
	SPO2	98.0±0.0	98.0±0.0	1.000 ns
After 15 minutes	HR	75.8±6.3	80.3±3.8	0.001*
	SPO2	98.8±0.4	98.6±0.5	0.157 ns
After 30 minutes	HR	76.2±5.5	79.8±4.5	0.007*
	SPO2	98.2±0.4	98.4±0.5	0.157 ns
After 45 minutes	HR	74.6±2.5	75.9±3.2	0.102 ns
	SPO2	99.0±0.0	99.0±0.0	1.000 ns
After 60 minutes	HR	72.0±5.5	73.1±7.3	0.537 ns
	SPO2	98.8±0.4	98.6±0.5	0.157 ns
Data were expressed as frequency and percentage and mean±SD **Unpaired student t-test** was performed to compare between two groups *significant, ns = not significant				

Table-V shows the bleeding score and sedation score of the patients and table-6 details the recovery status of the patients.

Table-V: Comparison of VAS, bleeding score and Ramsay scale between two groups (N=60)

Variables	Group A (n=30) Mean±SD	Group B (n=30) Mean±SD	P value
VAS	3.23±1.65	4.13±1.47	0.030*
Bleeding score	2.1±0.76	2.63±0.85	0.013*
Ramsay sedation score	6.0±0.0	not evaluated	
Data were expressed as frequency and percentage and mean±SD **Unpaired student t-test** was performed to compare between two groups *significant, ns = not significant			

Table-VIII: Comparison of recovery status between two groups

Tools	Group A	Group B
Modified Aldrete Score	9.9 (average)	8.4 (average)
Recall (number of patients)	3	2
Other adverse effect	2	5

V. Discussion

In this study, it was observed that the mean age in group A and in group B was almost alike between two groups. Similarly, Santosh et al., 2015 showed the mean age was near to same between two groups.[4]They showed little higher mean age may be due to geographical variations, racial, ethnic differences, genetic causes, different lifestyle, and increased life expectancy may have significant influence on disease.

In this current study, it was observed that, almost 96.7 % patients in group A and 83.3 % in group B classified as ASA Grade I which was almost same between two groups. In our study preoperative haemodynamics was measured at baseline, 15 minutes before induction and just before induction and it was not statistically significant may be due to patient was well hydrated in both groups. During induction different SBP was measured in group A and in group B and it was statistically significance. Intubation reflex may be the cause of high SBP and DBP during induction in group B and at the same time group A patient showed reduced SBP and DBP due the effect of BSCPB and conscious sedation. Moreover we observed SBP and DBP after 5 minutes, after 15 minutes, after 30 minutes, after 45 minutes and at the End of operation in group A and in group B. All the times SBP and DBP were reduced in group A than in group B and the change was statistically significant. Regarding the MAP This study shows very minimum or no change in MAP in group A patients and more fluctuation in group B patients and this change is statistically significance. During recovery time SBP, DBP and MAP was measured just after recovery, 15 minutes after recovery, 30 minutes after recovery, 45 minutes after recovery and 60 minutes after recovery. In all this stage SBP, DBP and MAP was minimally change or stable in group A patients and significantly fluctuate in group B patients. This may be due to postoperative pain and discomfort which was minimize in group A patients. Same type of observation was found by Santosh U P et al. 2015.[4]

In our study it was observed that bleeding score was less in group A(BSCPB) and provide better surgical condition in comparison to group B (for general anaethesia). Among group A, 50% mild bleeding 1, 33% mild bleeding 2 and 12% mild bleeding 3.we found 19 (66.7%) on the contrary 15% of patients in group B (general anaesthesia) showed moderate bleeding during operation. BSCPB reduce blood loss and provide better surgical condition in comparison to general anaesthesia.

Regarding VAS (Visual Analogue Scale) for post-operative pain assessment our study shows 80% score 1 in group A. On the other hand 80% score 5 in group B. This indicates BSCPB reduces post-operative pain more effectively than the group B of general anaesthesia. Dieudonne et al 2001 observed similar type of observation. V. K. Shukla, S. Narayan, V. S. Chauhan, D. K. Singh, Departments of General Surgery and Anaesthesiology observed in their study.[5] Hemodynamic parameters showed remarkable and significantly changed in bilateral superficial cervical plexus block with conscious sedation group.

CONCLUSION

It is concluded that Bilateral Superficial Cervical Plexus Block with conscious sedation in comparison to general anaesthesia provides better outcome in terms of peroperativehaemodynamics, reduce per operative surgical site bleeding for patients undergoing thyroidectomy.

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