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Original Research Article

Maternal and fetal outcome in primigravida with unengaged head at term in labour

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ABSTRACT

Background: Unengaged head in a primigravida at term gestation at the onset of labor is considered as an obstetric risk factor for dysfunctional labor. Careful monitoring of the progress of labor and timely medical intervention reduced the risk of dysfunctional labor and Cesarean delivery. This study was to assess the effect of unengaged head on course of labor, duration of labor, its maternal and fetal outcome in primigravida at term in labor.

Methods: This prospective cross-sectional study was conducted in 100 primigravida with term gestation, unengaged head with spontaneous onset of labor meeting the inclusion criteria admitted to labor ward, Department of Obstetrics & Gynecology, ESIC-MC & PGIMS Hospital, Bengaluru during January 2019 to June 2020. After detailed clinical evaluation, labor monitored partographically and CTG for fetal surveillance and when necessary, interventions like augmentation of labor and operative vaginal or cesarean delivery performed.

Results: Among 100 primigravidae, 19% had floating head, 53% at -3 and 28% at -2 station at the time of onset of labor. The mean duration of 1st, 2nd stage and total duration of labor was higher in freely floating head compared to -3 and -2 station. The need for augmentation of labor was 100% with freely floating head than with -3 and -2 station. 77% delivered vaginally and 23% by LSCS, arrest disorders being the main indication. There was no significant difference in maternal morbidity or APGAR score at 5 min. 88% of the babies delivered with good APGAR and 12% required NICU admission

Conclusions: Our study demonstrates that higher the fetal head station at the onset of labor, greater the duration of labor and the need for augmentation. Unengaged head per se is not an indication for LSCS as 77% of them delivered vaginally with partographically monitored labor.

Keywords: Unengaged head, Primigravida, Fetal head station, Labor

INTRODUCTION

The cardinal observation to be made in a gravid uterus at term in labor is engagement of head which is the initial step in the mechanism of labor. The term “engagement” in normal labor denotes that the greatest diameter of fetal head has passed through the brim of the pelvis. In primigravida, engagement occurs usually during the last few weeks of pregnancy while in multipara it occurs after the commencement of labor.¹ Engaged head in a primigravida at term in early labor is a sign of pelvic adequacy.

Unengaged head at the onset of labor is associated with increase in duration of labor and incidence of dysfunctional labor pattern. Thus, undue prolongation of labor leads to increased risk of caesarean section and its associated maternal and perinatal morbidity and mortality. The increased rate of caesarean delivery for unengaged head is under critical review which calls for a careful evaluation of cephalopelvic inter-relationship during labor and possible causes. The adequacy of the pelvis, the efficacy of uterine contractions, the capacity of fetal head to mold and the temperamental resilience of the patient contribute more to

the outcome of labor. Hence, the dynamics of labor is equally important with mechanics as it improves the adaptation of fetal head to the pelvic cavity and its passage through it supported by primary and secondary forces of labor. Careful monitoring of progress of labor and timely medical intervention in these cases can reduce the incidence of caesarean deliveries. This study is to assess the effect of unengaged head on course of labor, duration of labor, its maternal and fetal outcome in primigravida at term in labor.

METHODS

Source of data

Hundred Primigravida with term gestation with unengaged head at spontaneous onset of labor admitted to labor ward in the department of Obstetrics and Gynecology, at ESIC Medical College & PGIMS, Model hospital, Rajajinagar, Bengaluru between January 2019 to June 2020 were included in the study.

Study design and sample size

Current study was a prospective cross-sectional study. With power of test at 80%, confidence interval set at 95%, relative precision taken as 9%, proportion as 30% and design effect as 1, sample size of 100 was obtained.

Inclusion and exclusion criteria

Primigravida in the age group 20-34 years with singleton live fetus with term gestation (38- 41 weeks) in labor with cervical dilatation <4 cm with clinically adequate pelvis, reassuring fetal status and vertex above the level of ischial spines were included. Any pregnant women with multiple gestation, Intra Uterine Death (IUD), Cephalopelvic disproportion, associated medical disorders like gestational hypertension & diabetes, placenta previa, polyhydramnios and fetal anomalies were excluded from the study.

Method of collection of data

Primigravida in labor satisfying the inclusion criteria were enrolled for the study after obtaining informed written consent. Patients were clinically evaluated with detailed obstetric, menstrual history and medical history. Gestational age was calculated by her Last Menstrual Period (LMP) applying the Naegele's rule & first trimester dating ultrasound. General physical examination and systemic examination was performed.

Obstetric examination

Abdominal examination Fundal height, lie, presentation, attitude of the fetal head and amount of liquor was assessed. Crichton's rule of fifth was adopted to assess the engagement of head by abdominal method as mentioned below: With head 5/5 to 3/5, it was considered to be unengaged. With the head 2/5, 1/5 and 0/5 head was said

to be engaged. Fetal heart rate (120-160b/m) was auscultated. Admission NST was recorded to ensure the reassuring fetal status.

Vaginal examination

After ensuring the bladder was emptied, the woman was placed in dorsal position with the buttocks placed at the edge of the table and vaginal examination was performed under aseptic measures.

Cervical effacement was expressed in terms of the length of the cervical canal. Cervical dilatation was expressed in centimeters. Position of the cervical OS was categorized as anterior, mid-position or posterior. Status of membranes ruptured or unruptured was noted. Station of fetal head in relation to ischial spine was assessed as follows: The long axis of the birth canal above and below the ischial spine is arbitrarily divided into thirds. The vertex at the level of pelvic inlet, was considered as "-3 station". Vertex at one third distance from pelvic inlet to ischial spine, as "-2 station". Two third distance from inlet to ischial spine, as "-1 station" and "0" station at "ischial spines". One third distance between ischial spine and pelvic outlet, as "+1 station". Two third distance between ischial spine and pelvic outlet as "+2 station" and "+3 station" at perineum. At or below "0 station", head is said to be engaged. Cephalopelvic disproportion was assessed by Munro-Kerr-Muller (bimanual examination).² Modified WHO partograph was used for monitoring labor. Partograph was started at cervical dilatation of 4cm. Cervical dilatation and descent of the fetal head against time was plotted. Uterine contractions and fetal heart rate was monitored throughout the labor. Time of rupture of membranes, quantity and colour of liquor was noted.

During the course of labor, if inadequate uterine contractions, labor was augmented by artificial rupture of membranes/oxytocin or in combination. Arrest disorders were diagnosed if no dilatation of cervix for 2 hours or no descent of fetal head for 1 hour after 6 cm cervical dilatation with membrane ruptured and adequate uterine contractions augmented with oxytocin drip. Mode of delivery whether vaginal/ instrumental vaginal or Caesarean section was noted. If delivered vaginally, duration of 1st and 2nd stage were documented. If delivered by caesarean section, indication was documented. Associated complications if any, like postpartum haemorrhage, perineal and cervical tear were noted and treated accordingly. Thus, maternal outcome was assessed with respect to course of labor, duration of labor, need for augmentation, mode of delivery and labor complications. Neonatal outcome was assessed with respect to APGAR score, birth weight and NICU admissions.

SPSS (statistical package for social sciences) version 20. IBM SPSS statistics (IBM corp. Armonk, NY, USA released 2011) was used to perform the statistical analysis. Descriptive statistics of the explanatory and outcome variables were calculated by frequency and percentage for

qualitative data; mean and standard deviation for quantitative data. Chi square was applied to test the statistical association between qualitative variables. ANOVA test was applied to test the statistical difference between more than two groups for quantitative data. The level of significance was set at 5% (p value=0.05).

RESULTS

The mean age in the study was 24.09±2.387years. The mean height in the study was 151.73±3.213cm. The mean gestational age in the study was 39.62±0.708 week. Among 100 cases, the station of fetal head at the onset of labor, were free floating in 19%, 53% at -3 and 28% at -2 station (Figure 1). The mean duration of first stage of labor in freely floating head, at -3 station and at -2 station was 13.38±3.305 hours, 11.42±2.777 hours and 9.5±3.558 hours respectively. P value being 0.002, which is statistically significant, infers higher the fetal head station, longer the duration of first stage of labor. The mean duration of second stage of labor in freely floating head, at -3 and at -2 station was 43.85±26.073 min, 32.11±13.538 min and 27.31±11.767 min respectively. Significant p value of 0.011, hence higher the fetal head station, longer the duration of 2nd stage of labor. Mean total duration of labor in freely floating head, at -3 station and at -2 station was 14.15±3.46 hrs, 12.18±2.884 hrs and 10.08±3.654 hrs respectively. P value being 0.001, statistically significant, higher the fetal head station, longer the mean total duration of labor (Table 1).

Table 1: Mean total duration of labor and fetal head station.

Station	N	Mean (hrs)	SD	F value	P value
FF	13	14.15	3.46	7.295	0.001
-3	38	12.18	2.884		
-2	26	10.08	3.654		
Total	77	11.81	3.517		

Table 2: Correlation of augmentation of labor and fetal head station.

Augmen-tation	Station			Total
	FF	-3	-2	
No	0	3	8	11
	0.00%	5.70%	28.60%	11.00%
ARM	2	7	7	16
	10.50%	13.20%	25.00%	16.00%
Oxytocin	5	12	7	24
	26.30%	22.60%	25.00%	24.00%
Oxytocin + ARM	12	31	6	49
	63.20%	58.50%	21.40%	49.00%
Total	19	53	28	100
	100.00 %	100.00 %	100.00 %	100.00 %

Yate's Chi square=19.545, p value=0.003

100% of freely floating head required augmentation either by ARM, oxytocin or oxytocin and ARM. P value being 0.003, statistically significant infers higher the station of fetal head greater the necessity for augmentation of labor (Table 2).

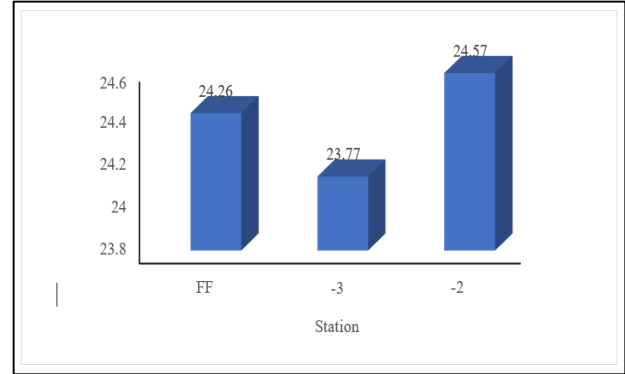


Figure 1: Distribution of the study subjects according to fetal head station.

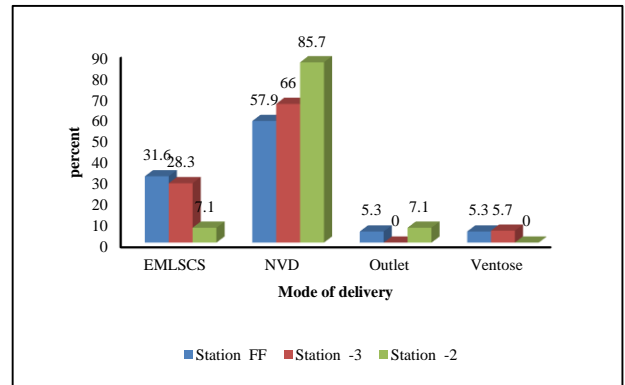


Figure 2: Comparison of mode of delivery and fetal head station.

Table 3: Distribution of the study subjects according to indication for LSCS with respect to fetal head station.

Indication	Station			Total
	FF	-3	-2	
Nil	13	38	26	77
	68.40%	71.70%	92.90%	77.00%
Arrest of descent	0	6	0	6
	0.00%	11.30%	0.00%	6.00%
Arrest of dilatation	3	0	1	4
	15.80%	0.00%	3.60%	4.00%
Second stage arrest	1	4	0	5
	5.30%	7.50%	0.00%	5.00%
Non reassuring fetal status	2	5	1	8
	10.50%	9.40%	3.60%	8.00%
Total	19	53	28	100
	100%	100%	100%	100%

Yate's Chi square=18.410, p value=0.018

Among 100 cases, 70% had vaginal delivery, 7% operative vaginal delivery (3 outlet forceps and 4 ventouse) and Cesarean section in 23% of cases. Mode of delivery is not affected by station of fetal head even though the total duration of labor is prolonged with higher station (Figure 2). 21.1% of cases in freely floating group, 18.8% at -3 station and 3.6% at -2 station underwent Cesarean section for arrest disorders. p value (0.018) being statistically significant, higher the fetal head station, greater the chances of arrest disorders. Arrest of descent/ arrest of dilatation were the main indication for cesarean section (Table 3). There was one case of cervical tear at -3 station, three cases of perineal tear, one each with freely floating head, at -3 and -2 station. 31.6% with freely floating head, 20.8% at -3 station and 35.7% at -2 station had PPH. There was no significant association between maternal complications and fetal head station (p value- 0.885), inferring maternal complications were not influenced by fetal head station (Figure 3)

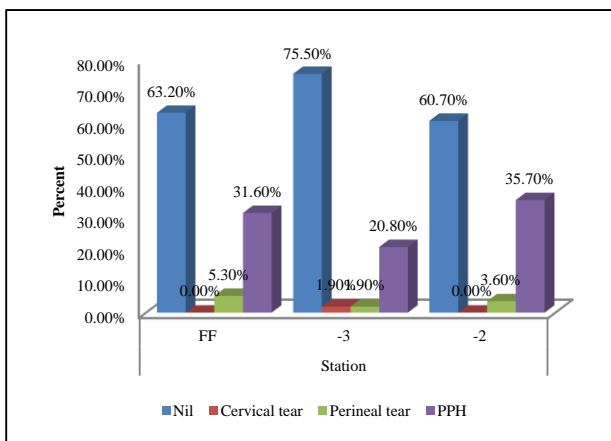


Figure 3: Correlation between maternal complications and fetal head station.

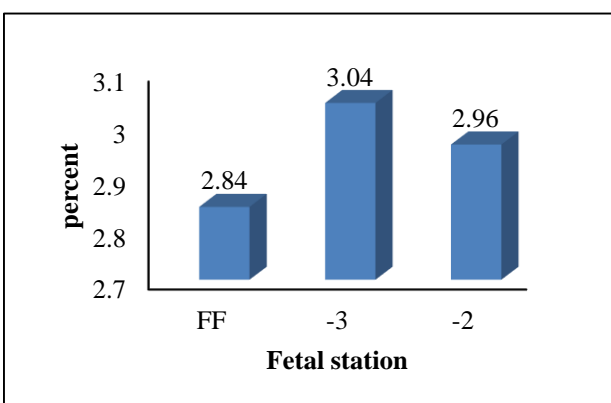


Figure 4: Comparison of fetal head station and birth weight.

Mean birth weight was 2.84±0.375 Kg with freely floating head, 3.04±0.338 Kg at -3 station and 2.96±0.331 kg at -2 station. No significance was found between fetal head station and birth weight inferring birth weight did not have an influence on fetal head station (Figure 4).

There total 12 babies who had APGAR <7 at 5 min. 15.8% with freely floating head, 11.3% at -3 station and 10.7% in -2 station had APGAR <7 at 5 min. There was no significant association found between higher fetal head station and APGAR at 5 min inferring high fetal head station did not influence APGAR at 5 min (Figure 5). Out of 100 babies delivered, 12 % required NICU admission and among them 2% required neonatal intubation for birth asphyxia and meconium aspiration with APGAR less than 4 at 5 min. 10 babies were kept for observation in view of Transient Tachypnea of Newborn and handed over to mother within 24 hours (Figure 6).

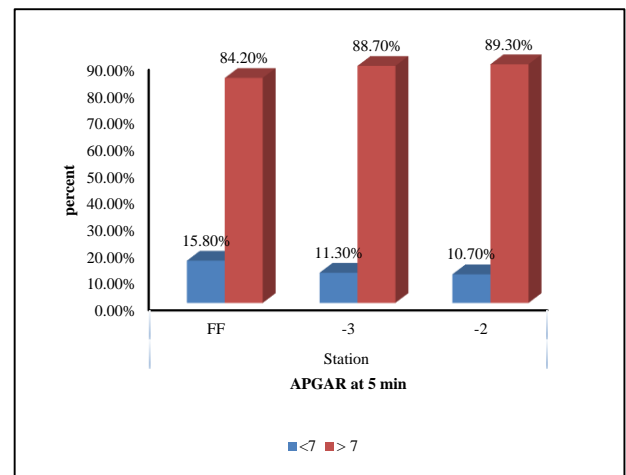


Figure 5: Comparison of APGAR at 5 min and fetal head station.

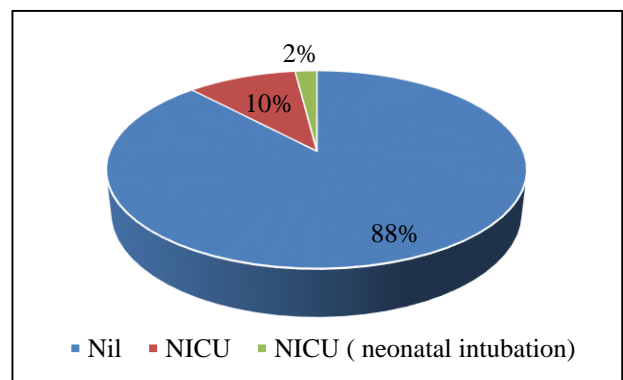


Figure 6: Distribution of the study subjects according to perinatal morbidity.

DISCUSSION

In the present study, the mean age was 24.09±2.387 years. Well matched with the study conducted by Pahwa et al with the mean age 24.95±3.01 yrs, Ravalji et al with mean age of 24.5±3.59 yrs and Sudhir et al with mean age of 23.43 yrs.³⁻⁵ The mean height was 151±3.213 cm which is in accordance with the study conducted by Pahwa et al (2018)³ with a mean height of 151±3.41 cm and Chaudhary et al with a mean height of 152±3.09 cm.⁶ The mean GA was 39⁺⁶±0.708 weeks which is in accordance with study

done by Arunarekha et al with mean GA of $39^{+5}\pm 0.82$ weeks.⁷ In the present study, in 19% of patients, fetal head station was freely floating, at -3 station in 53% and at -2 station in 28%. Well matched with the study done by Pahwa et al where in 21% of patients, fetal head station was freely floating.³ At -3 station in 53% and at -2 station in 28%.^{5,4} More than 75% of unengaged head were at -3 and -2 station. In the present study, the mean duration of first stage and second stage of labor was 11.1 ± 3.386 hours and 31.88 ± 15.219 min respectively. This is comparable to study done by Sudhir S et al (2016)⁵ with mean first stage and second stage duration of 12.06 ± 0.50 hrs and 36.3 ± 15.2 min respectively. In a study done by Chaudhary et al the mean duration of first stage of labor was 11.04 ± 2.04 hrs and that of second stage of labor was 37.8 ± 20.3 min which was comparable to our study.⁶

In our study, the mean duration of first stage of labor in freely floating head, at -3 station and at -2 station was 13.38 ± 3.305 hrs, 11.42 ± 2.777 hrs and 9.5 ± 3.558 hrs respectively. There was significant association found between fetal head station and mean duration of first stage of labor inferring higher the fetal head station, longer the duration of labor (p value=0.002). The mean duration of second stage of labor was 43.85 ± 26.073 min with freely floating head, 32.11 ± 13.538 min at -3 station and 27 ± 11.767 min at -2 station. (p value – 0.011) Statistical significance was found between mean duration of Second stage of labor and fetal head station. Higher the fetal head station, longer is the duration of 2nd stage of labor. Mean total duration of labor in freely floating head, at -3 station and at -2 station was 14.15 ± 3.46 hrs, 12.18 ± 2.884 hrs and 10.08 ± 3.654 hrs respectively. The mean total duration of labor in free floating head, at -3 station was higher compared to -2 station and similar results were seen in studies done by Pahwa et al and Mahendra et al.^{3,8} In our study, p value being 0.001, statistically significant, higher the fetal head station, longer the mean total duration of labor. In our study 89% of cases required augmentation of labour. ARM (16%), oxytocin (24%) and both ARM and Oxytocin (49%). This is comparable to study by Unnisa et al Badra et al and Arunarekha et al where labor was augmented in 80%, 75% and 74% of cases respectively.^{7,9,10} 100% cases of freely floating head required augmentation in the present study which is consistent with study by Shivamurthy et al and Arunarekha et al.^{7,11} In our study, p value being 0.003 which is statistically significant infers higher the station of fetal head, greater is the necessity for augmentation. In our present study, 77% had vaginal delivery (normal vaginal delivery in 70% and instrumental delivery in 7%) and 23% had Cesarean section. This is similar to studies by Khurshid et al with vaginal delivery in 67% and Cesarean section in 33% and Sudhir et al with vaginal delivery in 65% and Cesarean section in 35% of patients.^{5,12} Pahwa et al had higher incidence of Cesarean section rate (56%) as they included cases with induction of labor.³

In the present study, 21.1% with freely floating head, 18.8% at -3 station and 3.6% at -2 station underwent C section for arrest disorders. P value (0.018) being

statistically significant, higher the station, greater the chances of arrest disorders. Arrest of descent and arrest of dilatation were the main indication of Cesarean section. In a study by Pahwa et al 47.61% with freely floating head, 27.27% at -3 station and 5.88% at -2 station underwent Cesarean section for arrest disorders.³ In this study, they have included cases with induction of labor, hence arrest disorders are comparatively higher than our study. Arrest of progress, either arrest of descent or dilatation was the most common indication for Cesarean section in studies conducted by Sudhir et al, Ravalji et al, Modi et al and Arunarekha et al.^{4,5,7,13}

In the present study, the mean birth weight in freely floating head was 2.84 ± 0.375 Kg, 3.04 ± 0.338 Kg at -3 station and 2.96 ± 0.331 Kg at -2 station which was statistically insignificant. This is comparable to study done by Mahendra et al mean birth weight in freely floating group was 2.37 ± 0.74 Kg, 2.17 ± 0.68 Kg at -3 station and 2.1 ± 0.62 Kg at -2 station which was statistically insignificant.⁸ In our study, one case of cervical tear was seen at -3 station. Three cases of perineal tear, one each with freely floating, at -3 station and -2 station. 6 cases with freely floating head, 11 cases at -3 station and 10 cases at -2 station had PPH. Fetal head station did not have any impact on maternal morbidity. With p value 0.885, which is statistically insignificant. This is similar to a study conducted by Pahwa et al 4 patients had cervical tear, one patient with freely floating head and 3 patients at -3 station.³ One patient with -3 station had perineal tear. Seven patients with freely floating head, 9 patients with -3 station and 2 patients at -2 station had PPH. Fetal station does not have any impact on maternal morbidity. In our study, PPH occurred in 27%, third degree perineal tear in 3% and cervical tear in 1%.

In Pahwa et al, 19% had PPH, 1% had third degree perineal tear and 4% had cervical tear.³ In the present study there were 12 babies with APGAR < 7 at 5 min, 15.8% with freely floating head, 11.3% at -3 station and 10.7% at -2 station, p value (0.85) was not significant, higher fetal head station did not influence neonatal morbidity and 12% required NICU admission, similar to a study conducted by Arunarekha et al 11.7% with freely floating head, 13.33% at -3 station and 20% with -2 station had APGAR less than 7 at 5 min.⁷ All 17 babies were admitted to NICU, p value (0.15) was not significant. In the present study, two babies required intubation. The first baby was intubated in view of birth asphyxia with APGAR less than 4 and needed ventilator support for 48 hours, developed one episode of seizure for which it was started on antiepileptics. After 48 hours it was weaned of the ventilator and maintained saturation with oxygen by prongs. Breast feeding was initiated by day 5 and on day 7 shifted to mother side after assuring the mother was confident of taking care of baby. Another baby was intubated with meconium aspiration with APGAR <4. It was on ventilator support for 48 hours and later weaned off. The saturation was maintained with Oxygen by prongs for 12 hours. Breast feeding was initiated on day 4 and given to mother on day 5. The strength of our study was selection criteria of primigravida

with unengaged head in the age group between 20 to 34 years with adequate pelvis, spontaneous onset of labour with watchful expectancy after excluding the confounding factors has reduced the incidence of cesarean deliveries. Small sample size and study conducted for a short duration were the limitations of the study.

CONCLUSION

Unengaged head at the onset of labor in a term primigravida though a risk factor is not always an indication for Cesarean delivery. Partographically monitored labor with a watchful expectancy, appropriate intervention like augmentation of labor with oxytocin / ARM or indicated forceps/vacuum delivery in second stage of labor reduced the incidence of primary cesarean section. There is no significant fetal morbidity as 88% of them delivered babies with a good APGAR score.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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