



POSTNATAL COILING INDEX AND PERINATAL OUTCOMES

Gynaecology

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ABSTRACT

Aim: To analyze whether postnatal umbilical cord coiling index measurement could predict adverse perinatal outcome.**Materials & Methods:** The study designed was a prospective observational study. Total 100 singleton pregnancies fulfilling inclusion criteria, attending regular Antenatal checkup and willing for institutional deliveries were enrolled. Each case was evaluated for umbilical coiling index at the time of delivery and then correlated with the perinatal outcome.**Results:** In the present study 76% had Normocoiling while 10% had hypocoiling and 14% had hypercoiling of cord. Among gravidas with hypercoiling of cord 8 out of 14 had Meconium stained liquor which was statistically significant ($p=0.00001$). Also in gravidas with abnormal coiling, 15% had LSCS which was statistically significant. Most common indication for caesarean section was Meconium stained liquor and Fetal distress. Also in our study, hypocoiling has association with 22% had IUGR out of which 6% had hypocoiling, indicating significant correlation ($p=0.0006$).**Conclusion:** Measuring Coiling index can help in predicting adverse perinatal outcomes resulting in closer fetal monitoring and improved fetal outcome.

KEYWORDS

Postnatal coiling index, Hypocoiling, Hypercoiling, perinatal outcome.

INTRODUCTION

Umbilical cord, derived from Latin word *Funiculus Umbilicalis*, is a narrow cord of tissue that connects a developing embryo or fetus with the placenta¹. Umbilical cord contains three vessels and it is vulnerable to kinking, torsion and compression which may affect the perinatal outcome. Normally these vessels are protected by Wharton's jelly, amniotic fluid and helical patterns or coiling of blood vessels. This helical fashion of umbilical vessels is called spiral course².

A coil is defined as having completed a 360° spiral course of umbilical vessel around Wharton's jelly. Coiling property of umbilical cord was described by Berengarius in 1521³. In 1954, umbilical coiling was first quantified by Edmonds⁴ who divided the total number of coils by umbilical cord length in centimetres and called it "Index of twist". He assigned positive and negative scores to clockwise and anticlockwise coiling, respectively. Later, Strong et al simplified it by eliminating three directional score and named it "The umbilical cord coiling index", (UCI)⁵. Normal coiling index is approximately 1 coil/5 cm of umbilical cord length⁵. An abnormal umbilical cord coiling index includes both hypocoiled cords (UCI < 10th percentile) and hypercoiled cords (UCI > 90th percentile). An abnormal umbilical coiling index has been reported to correlate with adverse perinatal outcome^{2-4,6}.

MATERIALS AND METHODS

After obtaining consent from patients, this prospective observational study was conducted in Department of Obstetrics and Gynecology at a Tertiary care hospital, Nagpur over a period of 6 months. Total 100 patients with singleton uncomplicated pregnancy and maternal age between 18-35 years were enrolled in the study. Patients with multifetal gestation, malformed fetus, single umbilical artery, pregnancy complicated with maternal diseases like hypertension, infections, diabetes, thrombophilia, patients with smoking and drug abuse and unwilling to participate in the study were excluded from the study.

Patients fulfilling inclusion criteria, attending regular Antenatal checkups and willing for institutional deliveries were evaluated at the time of delivery. UCI was calculated at the time of delivery by dividing the total number of coils by the total umbilical cord length in centimeters.

Perinatal outcomes were assessed in terms of fetal distress, meconium stained liquor, low birth weight delivery, preterm delivery (Gestational age < 37 weeks), APGAR score (Apgar score less than 7 was taken as low Apgar score) and NICU admissions (baby requiring resuscitation

by AMBU bag and NICU care for observation or ventilator support was taken in NICU admission).

Statistical Analysis

Data was analyzed using professional statistics package EPI Info 7.0 version for windows. Descriptive data was represented as mean $\pm$ SD for numeric variables, percentages and proportions for categorical variables. Appropriate tests of significance were used depending on nature and distribution of variables like Chi square test, Fisher exact test for categorical variables. Values of $p < 0.05$ was considered statistically significant.

RESULTS

Out of 100 cases, 76 of the subjects had normal coiling index, 10 had hypocoiling and 14 had hypercoiling of the umbilical cord. 64 cases were Primigravida with 14 showing abnormal coiling index while among 36 multigravidas only 10 had abnormal coiling, (Table 1). This data was rather insignificant making clear that coiling index might not alter with parity. Among 14 patients with hypercoiling pattern, 3 patients had preterm deliveries and of 76 patients with normal coiling, 5 had preterm delivery (p value = 0.07). Thus failing to prove any association between abnormal coiling and Preterm deliveries. Out of 10 patients with hypocoiling 3 had meconium stained amniotic fluid ($p=0.05$) and out of 14 patients with hypercoiling, 8 had meconium stained amniotic fluid (Table 1). This data was statistically significant proving that Hypercoiling can be strongly associated with meconium stained liquor (p value = 0.00001). Total 72 patients delivered vaginally, 28 patients delivered by lower segment caesarean section (p value = 0.000016). Thus proving that abnormal coiling of cord could strongly predict the mode of delivery. Most common indication for caesarean section being Meconium stained liquor and Fetal distress. Different cord insertions observed were: central in 75 placentas, eccentric in 14 and marginal in 11 placentas.

Among total abnormal coiling index cases, 11 patients had Low birth weight (LBW). Out of these 6 had Hypocoiling and 5 had Hypercoiling of cord (Table 1). The present study proves association between hypocoiling and LBW (p value = 0.0006).

Perinatal outcome was evaluated in the form of APGAR score and adverse events developed in neonates. Apgar score of 7-10 at the 1st minute is considered to be normal. There was no difference among the three groups in APGAR score at 1 and 5 minutes as shown in Table 1.

Table 1: Comparison of Perinatal factors among different UCI groups

Parameter	Normocoiled	Hypocoiled	p value	Hypercoiled	p value	Total
Primigravida	50	6	0.71	8	0.53	64
Multigravida	26	4		6		36
LSCS	13	5	0.016	10	0.000018	28
Vaginal	63	5		4		72
MSAF	7	3	0.05	8	0.00001	18
Clear	69	7		6		82
Birth Wt. <2.5kg	11	6	0.0006	5	0.056	22
>2.5kg	65	4		9		78
Preterm	5	2	0.144	3	0.07	10
Full-term	71	8		11		90
Low APGAR at 1min(<7)	3	1	0.39	3	0.015	7
Low APGAR at 5min(<8)	1	1	0.08	1	0.17	3

DISCUSSION

Several trials had been conducted in the past which correlated perinatal outcome with umbilical cord coiling. In the present study, perinatal factors like meconium staining, birth weight, Apgar score at 1 min, mode of delivery, NICU admission, gestational weeks, fetal distress were studied in relation with Umbilical cord coiling index.

Age and gravidity did not correlate with umbilical cord coiling index

A meta-analysis by Gupta et al pointed out that hypo coiling is associated with increased incidence of fetal demise, intra partum fetal heart rate decelerations, operative delivery, fetal distress and chorioamnionitis³. In current study, birth weight was correlated to Umbilical cord coiling. It was found that out of 100 babies delivered, 22 were found to be LBW (low birth weight) ie, <2.5kg, among which 50% had normocoiling, 27.2% had hypocoiling and 22.8% had hypercoiling. Rest 78 babies with normal birth weight showed normocoiling in 83.4%, 5.1% showed hypocoiling and 11.5% showed hypercoiling. P value (0.0006) for this was statistically significant, thus proving that hypocoiling can lead to higher incidences of LBW. Out of the total cases, 18% had meconium stained liquor of which 38.8% had normal coiling, 16.7% had hypocoiling, and 44.5% had hypercoiling. Total 82% had clear liquor of which 84.1% had normal coiling, 8.5% had hypocoiling, and 7.4% had hypercoiling. Thus this finding proving that hypercoiling can be associated with MSAF, (p value=0.00001). Similar results were noted in previous studies^{3,5,7-9}.

Apgar at 1 min and 5 min was not found to be statistically significant. But other similar umbilical cords studies^{3,7, 10} found that hypocoiling was associated with low Apgar scores. Padmanabhan et al¹, studied 130 umbilical cords and found that hypocoiled group was associated with low Apgar scores. In Gupta et al¹, 107 cords were studied and it was found that babies with hypercoiling had less Apgar < 7.35. Indeed, hypercoiling alone, even in the absence of cord stricture, has been documented at autopsy in 23% of fetal deaths¹¹.

CONCLUSIONS

From the results of present study, we concluded that abnormal coiling index can be associated with adverse perinatal outcomes like meconium stained amniotic fluid, low birth wight baby and mode of delivery and by closely monitoring these high risk fetuses, such adverse outcomes can be declined and improve fetal outcome.

Clinical Significance

Postnatal umbilical cord coiling index is a simple parameter which can be studied immediately after delivery. Abnormal UCI may help to identify patients at risk of adverse perinatal outcome such as low Birth Weight and meconium stained liquor.

REFERENCES

- Dyawarepur A. A correlational study to assess the umbilical cord coiling index and perinatal outcomes in selected Hospitals at Bijapur. IOSR Journal of Nursing and Health Science. 2016;5(4):82-87.
- Rana J, Ebert GA, Kappy KA. Adverse perinatal outcome in patients with an abnormal umbilical coiling index. Obstet Gynecol 1995;85:573-77.
- Gupta S., Faridi MMA, Krishnan J., Umbilical Coiling Index. J. Obstet Gynecol India. 2006; 56 (4):315-19.
- Edmonds HW. The spiral twist of normal umbilical cords in twins and singlestone. Am. J. Obstet Gynecol 1954;67:102-20.
- Strong TH, Jarles DL., Vega JS Feldman DB. The umbilical coiling index. Am. J. Obst. Gynecol Part I 1994;170(1):29-32.
- Lacro RV, Jones KL, Benirschke K. The umbilical cord twist: origin, direction, and relevance. Am J Obstet Gynecol 1987;157:833-38.
- Padmanabhan LD, Mhaskar R, Mhaskar A. Umbilical vascular coiling and the perinatal

outcome. J Obstet Gynecol India 2001; 51 (6):43-44.

- Devaru D, Meghna T. Umbilical coiling index & the perinatal outcome. J Obstet Gynecol India 2012;62(1):43-46.
- Nakamura M, Hasegawa J, Matsuoka R. Risk Analysis For The Birth Of A Small For Gestational Age(SGA) Infant. The Internet Journal of Gynecology and Obstetrics 2010;13(2):1-5.
- Monique WM, de Laat, Frank A, Dots ML, Verses GHA, Nikkels GJN. Obstet Gynecol 2006;107(5):1049-55.
- Peng HQ, Levitin-Smith M, Rochelson B, Kahn E. Umbilical cord stricture and over-coiling are common causes of fetal demise. Pediatr Dev Pathol 2006; 9:14-19.