

Study of Perinatal Outcome in Relation to Umbilical Cord Coiling Index at Tertiary Hospital in Rural India

Surabhi HD¹, Chandra Mouli A.²

How to cite this article:

Surabhi HD, Chandra Mouli A. Study of Perinatal Outcome in Relation to Umbilical Cord Coiling Index at Tertiary Hospital in Rural India. Indian J Obstet Gynecol. 2019;7(2):319-322.

¹Assistant Professor, ²Associate Professor, Department of Obstetrics and Gynecology, East Point College of Medical Sciences and Research Center, Bengaluru, Karnataka 560049, India.

Corresponding Author: Chandra Mouli A., Associate Professor, Department of Obstetrics and Gynecology, East Point College of Medical Sciences and Research Center, Bengaluru, Karnataka 560049, India.

E-mail: mouliaruna2@gmail.com

Received on 18.03.2019; Accepted on 03.06.2019

Abstract

Objective: To evaluate the relationship between umbilical cord coiling index with perinatal outcome.

Method: Total of 500 pregnant ladies with singleton term gestation were included in the study done over a period of one year. UCI was calculated and perinatal outcome was analysed. *Results:* Out of the 500 subjects, 390 were normocoiled, 58 were hypocoiled, 52 were hypercoiled. 89% of hypo coiled cord was associated MSAF. IUGR was observed in 80% of hypercoiled cords. NICU admission was high with hypocoiled cords. *Conclusion:* Abnormal umbilical coiling index either hyper or hypo coiled is associated with adverse perinatal outcome.

Keywords: Umbilical cord coiling; IUGR; Meconium stained liquor.

Introduction

An umbilical cord is an intra-amniotic structure which consists of two arteries and a vein surrounded by Wharton's jelly and connects the placenta at one side with fetal umbilicus at the other. It is 40-70 cm long and the length is influenced by amniotic fluid volume and fetal mobility. Umbilical vessels spiral in left - twisting direction through the cord. An umbilical cord has 11 vascular coils in its length

on average [1]. Clinical importance of UCI has been documented by significant relation between adverse perinatal outcome and umbilical vascular coiling index (UCI) in recent studies [2].

The number of vascular coils by total length has been termed as coiling index. Coiling stabilises the cord against external forces such as tension, pressure, stretching or entanglement without any effect on the cord's elasticity [1,3,6]. Poor perinatal outcome is associated with cords which are hypo or hyper coiled [4,5]. Meconium stained liquor, IUGR, preterm labour, low Apgar score, oligohydramnios, umbilical artery low PH and need for NICU admission was reported with hyper coiling, were as meconium stained liquor and still birth was reported with hypo coiling [4,5,7,8]. Coiling can occur at any gestational age, umbilical cords without coiling before 20 weeks may demonstrate coiling later in pregnancy. Coiling to left is more common than coiling towards right. In single umbilical artery no coiling or coiling to the right is common. Hence coiling is independent of the haemodynamic factors inside the cord [9].

The present study is conducted to know the fetal outcome with umbilical cord with hypo coiling, hypercoiling and mode of delivery.

Materials and Methods

A prospective analytical study done in 12 months duration on 500 pregnant patients who have been admitted into the labor ward for delivery.

Immediately after delivery, after separating baby from umbilical cord, the cord will be tied and cut leaving 5 cms by the baby's side. The umbilical cord will be measured from the placental end to entire length and 5 cms of umbilical cord on baby side. The rotation of vessels completely at 360 degrees is complete vascular coiling and the number of coiling is counted from placental end to fetal end and be expressed in centimeters.

Umbilical coiling index (UCI) is determined by dividing total number of vascular coils by length of the umbilical cord in centimeters.

$$\text{Umbilical coiling index (UCI)} = \frac{\text{Total number of complete vascular coiling}}{\text{Total length of cord (cm)}}$$

The coiling index is expressed in terms of hypo coiling, hyper coiling and normo coiling index. If coiling index is less than 10th percentile is hypo coiling, coiling more than 90th percentile is hyper coiling and coiling between 10th and 90th percentile is considered as normo coiling.

The outcome of pregnancy were recorded with respect to meconium stained liquor, IUGR, Apgar score, NICU admission and ponderal index. The relation of the umbilical coiling index and the above mentioned parameters were studied. Statistical Package for Social Science (SPSS) was used for statistical analysis.

p values of less than 0.05 regarded as statistically significant.

Inclusion Criteria

- Intrauterine Singleton live pregnancy.
- Cephalic Presentation.

Exclusion Criteria

- Smoking, Drug abuse.
- Multifetal pregnancies, Malpresentations.
- Hypertensive disorders.
- Preterm labour.
- Oligohydramnios.
- Caesarean section for maternal indication.

Results

Pregnant women who were booked and unbooked admitted for delivery were studied. Out of 500 deliveries studied booked cases were 343 were as unbooked cases were 157. Primigravida were 323 and multigravida were 177. Vaginal delivery were 275, 198 delivered by LSCS, Instrumental deliveries were about 27. Among which forceps delivery were 8 and remaining 19 were vacuum deliveries.

Fetal distress was the indication for instrumental deliveries and LSCS, which were about 225 deliveries. Our study reported 52 hyper coiling cords with UCI more than 90th percentile, 58 hypo coiling cords with UCI less than 10th percentile and 390 normo coiling cords with UCI between 10th and 90th percentile. 106 deliveries reported with meconium stained liquor.

Seventy eight (78) babies had Apgar score of < 4 at 1 min and Apgar score of > 4 at 1 min was reported with 422 babies. 71 babies had Apgar score of < 7 at 5 min and Apgar score of > 7 at 5 min was reported with 429 babies. Birth weight less than 2.5 kg was reported with 55 babies and NICU admission was reported with 88 babies. The twist of the cord to the right was seen in 193 cases and to the left in 307 cases.

Table 1: Correlation of meconium staining with UCI

Meconium stained amniotic fluid	UCI			p value
	Normal	Hypo coiling	Hyper coiling	
Yes	44	52	04	< 0.001
No	346	06	48	

This being statistically significant, it suggests that hypocoiled cords are more associated with meconium staining (Table 1).

Table 2: Correlation of APGAR with UCI

APGAR at 1 min	UCI			p value
	Normal	Hypo coiling	Hyper coiling	
< 4	58	17	03	0.072
>4	332	41	49	

APGAR at 5 min	UCI			p value
	Normal	Hypo coiling	Hyper coiling	
< 7	48	18	05	0.065
>7	342	40	47	

This being statistically significant, it suggests that hypocoiled cords are more associated with low APGAR at 1 and 5 min (Table 2).

Table 3: Correlation of NICU admissions with UCI

NICU Admission	UCI			p value
	Normal	Hypo coiling	Hyper coiling	
Yes	48	25	15	< 0.001
No	342	33	37	

This being statistically significant, it suggests that hypocoiled cords are more associated with NICU admissions (Table 3).

Table 4: Correlation of IUGR with UCI

IUGR	UCI			p value
	Normal	Hypo coiling	Hyper coiling	
Yes	12	02	42	< 0.001
No	378	56	10	

This being statistically significant, it suggests that hypercoiled cords are more associated with IUGR babies (Table 4).

Table 5: Correlation of Ponderal index with UCI

Ponderal index	UCI			p value
	Normal	Hypo coiling	Hyper coiling	
< 2.5	270	37	50	0.022
>2.5	120	21	02	

This being statistically significant, it suggests that hypercoiled cords are more associated with meconium staining (Table 5).

Discussion

Several trials in the past have correlated the relationship between perinatal outcomes and the UCI. In our study, UCI was compared with various parameters. On comparing UCI with parity, it was found that there was no statistical significance between primigravida and multigravida and that there was no statistical significance between the dextral and sinistral twists of cord.

In the present study hypo coiled cords with UCI less than 10th percentile was associated with meconium stained liquor which was statistically significant.

In a study done by Gupta S [12] supported our results with increased incident of meconium stained liquor with hypo coiled cords as compared with normo coiled.

Similar supportive results were documented by Strong TH [5] of increased incidence of meconium stained liquor associated with hypo coiled cords.

In our study low Apgar score at 1 min and 5 min was reported with the umbilical cord with hypo coiling. Similar supportive results were documented by studying 107 umbilical cords by Gupta S [12] and also by Monique WM [9] who have studied 885 cases.

Our study reported IUGR babies with hyper coiled cords. In the study done by Monique WM [9] and also Georgiou AM [10] on 885 patients and 34 patients respectively documented results which supported our study result of hyper coiled cord associated with IUGR babies.

NICU admission of the babies was more with the hypo coiled cords in our study, which was supported by the study done on 885 cases by Monique WM [9] and by the study conducted by Strong TH [6] on 687 cases with statistically significant results.

Low ponderal indices was reported in our study. By studying 107 cords no significant results were documented between hypo or hyper coiled cords by Gupta S [12].

Conclusion

Adverse perinatal outcome is associated with vascular coiling with less than 10th percentile and more than 90th percentile. Vascular coiling more than 90th percentile is termed as hypercoiling and less than 10th percentile is termed as hypo coiling.

More NICU admission, low Apgar score and meconium stained liquor reported with hypo coiling cords. Low ponderal index and IUGR reported with hyper coiling cords. Thus detection of UCI antenatal can help to plan the mode of delivery, time of delivery and place of delivery which can improve perinatal outcome and further management.

References

1. T.H. Strong. Factors that provide optimal umbilical protection during gestation. *ContempObstetGynecol.* 1997;42:82-105.
2. M. Ezimokhai, D.E. Rizk, L. Thomas. Maternal risk factors for abnormal vascular coiling of the umbilical cord. *Am J Perinatol.* 2000;17(8):441-45.
3. P. Maplas, E.M. Symonds. Observation on the Structure of the human umbilical cord. *SurgObstetGynecol.* 1966;123:746-50.
4. T.H. Strong, J.P. Elliot, T.G. Radin. Non-coiled umbilical blood vessels. A new marker for the fetus at risk. *ObstetGynecol.* 1993;81:409-11.

5. T.H. Strong, Trisomy among fetuses with non coiled umbilical vessels, *J Reprod Med.* 1995;40:789-90.
 6. T.H. Strong, D.L. Jarles, J.S. Vega, D.B. Feldman. The umbilical cord coiling index. *Am J ObstetGynecol.* 1994;170(1):29-32.
 7. G.A. Machin, J. Ackerman, E. Gilbert Barnes. Abnormal umbilical cord coiling is associated with adverse perinatal outcomes. *PediatrDevPathol.* 2000 Sep-Oct;3(5):462-71.
 8. M. Ezimokhai, D.E. Rizk, L. Thomas, Abnormal vascular coiling of the umbilical cord in gestational diabetes mellitus. *ArchPhysiolBiochem.* 2001 Jul;109(3):209-14.
 9. Monique WM, Franx Arie, Michiel L, Gerard HA, Peter GJ. Umbilical Coiling Index in Normal and Complicated Pregnancies. *J Obstetrics and Gynecology.* 2006;107:1049-55.
 10. Harry M. Georgiou, Michael Permezel. The effect of vascular coiling on venous perfusion during experimental umbilical cord encirclement. *Am J ObstetGynecol.* 2001;184:673-78.
 11. T. Ercal, S. Lacin, S. Altunyurt, V. Saygili, O. Cinar. Umbilical ciling index: is it a marker for the fetus at risk. *Br J ClinPract.* 1996 Jul-Aug;50(5):254-56.
 12. Shalu Gupta, MMA Faridi, J Krishnan. Umbilical coiling index. *J Obstet Gynecol India.* 2006;56: 315-19.
-