

Evaluation of Umbilical Cord Abnormalities in Tertiary Care Centre

Alka B. Patil¹, Amol Koranne², Sayli Thavare³, Bhagyashree Badade⁴

How to cite this article:

Alka B. Patil, Amol Koranne, Sayli Thavare, et al. Evaluation of Umbilical Cord Abnormalities in Tertiary Care Centre. Indian J Obstet Gynecol. 2020;8(2):11-17.

¹Professor and Head, ²Assistant Professor, ^{3,4}Junior Resident, Department of Obstetrics and Gynecology, Annasaheb Chudaman Patil Memorial Medical College, Dhule, Maharashtra 424001, India.

Corresponding Author: Alka B. Patil, Professor and Head, Department of Obstetrics and Gynecology, Annasaheb Chudaman Patil Memorial Medical College, Dhule, Maharashtra 424001, India.

E-mail: alkabpatil@rediffmail.com

Received on 04.05.2020; **Accepted on** 17.06.2020

Abstract

Introduction: The umbilical cord is the lifeline of the fetus. The umbilical cord plays an essential role in intrauterine life and is the pathway between mother, placenta and fetus during pregnancy and delivery. There are many umbilical cord abnormalities ranging from false knots, which have no clinical significance, to vasa previa, which could cause fetal demise.

Aims and Objectives: To evaluate patterns of umbilical cord abnormalities.

Methods: This retrospective study was conducted in ACPMMC Dhule. 100 pregnant women with singleton pregnancy who delivered after 28 weeks of gestation and who were diagnosed and documented as having umbilical cord abnormalities either antenatally or during and after delivery were included. Various patterns of umbilical cord abnormalities were noted and neonatal outcome was assessed based on APGAR score, NICU admissions, live birth or still birth.

Result: Of all cord abnormalities identified, Nuchal cord was the commonest i.e. 67%. The other abnormalities identified were abnormal cord length 12%, coiling abnormality 9%, single umbilical artery 4%, cord knot 5%. Less commonly seen abnormalities were Cord prolapse 1% and velamentous insertion of cord 1%. Of the total study patients 64% delivered by Vaginal delivery whereas 36% underwent cesarean section elective or emergency. Of all fetuses delivered 70% had live birth without any complication and did not require any NICU admission. 22% required NICU admission. 3% had early neonatal death, 2% late neonatal death whereas 3% was still birth.

Conclusion: Evaluation of umbilical cord abnormalities ensures prevention of adverse neonatal outcome. Education of health personnel about proper examination of umbilical cord should be emphasized.

Keywords: Umbilical cord; Abnormalities; Nuchal cord; Vasa Previa.

Introduction

Umbilical cord is the vital link between fetus and placenta. The baby's life hangs by a cord as said by Ian Donald aptly tells the importance of umbilical cord.¹ During prenatal development, the umbilical cord is physiologically and genetically part of the fetus and normally contains two arteries (the umbilical arteries) and one vein (the umbilical vein), buried within Wharton's jelly. The vein carries oxygenated blood from placenta to fetus whereas the arteries bring deoxygenated blood from fetus to the placenta.² The placenta and umbilical cord are the only vital organs of prenatal life which can be examined easily without endangering the mother or the baby.³

Various abnormalities are observed in the morphology and pathology of the umbilical cord but knowledge of them is quite poor. A considerable number of stillbirths that are thought to be unexplained may be attributable to placental or cord pathologies. Cord accident (compromised umbilical blood flow) as a cause of still birth is under reported, mainly due to a lack of diagnostic criteria.

With availability of advanced emerging prenatal ultrasound techniques many of the umbilical cord abnormalities can be detected in utero while some are not apparent till delivery.⁴

Different cord abnormalities include

Abnormalities of Cord Length

The length of the umbilical cord varies from no cord (achordia) to 300 cm, with diameters up to 3 cm. At term the typical umbilical cord is 55 to 60 cm in length with a diameter of 2.0 to 2.5 cm. About 5% of cords are shorter than 35 cm, and another 5% are longer than 80 cm.⁵

Abnormalities of Cord Insertion

Cord insertion is easily visualized during the second trimester ultrasound, and can be seen in over 99% of cases. Placental cord insertion site should be documented when 'technically feasible' as part of the second and third trimester ultrasound examination.⁶

1. In Velamentous insertion the umbilical vessels separate in the membranes at a distance from the placental margin.⁷
2. Marginal insertion of cord where cord is inserted at <1 cm from the true disc margin.⁸

Coiling of Umbilical Cord

Abnormal Coiling may be in the form of

- Number:*
1. Hypercoiled: More than 3 coils per 10 cm of cord.
 2. Hypocoiled: Less than 1 coil per 10 cm of cord.

- Position:*
1. Around the neck
 2. Around the body parts or limbs.

Cord Prolapse

Prolapse of the cord may be discovered for the first time on examination prior to a forceps delivery, the baby crying at birth, with no previously recorded alteration of the foetal heart.⁹

- Single Umbilical Artery
- Vasa Previa
- Cord Knots
- Cord Hematoma, Strictures.

Materials and Methods

- Study was conducted retrospectively in department of Obstetrics and Gynecology,

JMF's ACPM Medical College, Dhule between August 2018 and August 2019.

- 100 pregnant women with singleton pregnancy who delivered after 28 weeks of gestation during 1 year period from August 2018 to August 2019, who were diagnosed and documented as having umbilical cord abnormalities either antenatally or during and after delivery were included in the study after taking informed and written consent.

Examination of Umbilical Cord

- By routine ultrasound and color Doppler after 28 weeks of pregnancy.
- Gross examination at the time of delivery and after the delivery.

Noted mode of delivery

- Vaginal or Cesarean.

Recorded fetal outcome post delivery on basis of

- APGAR score at 1 and 5 minutes
- NICU admission
- Perinatal mortality

Cord was examined for the presence of the following:

- Loop(single/double) around fetal neck, shoulder, trunk,
- Single umbilical artery
- Cord length (long/short)
- Vasa previa
- Abnormal insertion of cord
- Coiling, knots (true or false)
- Cord prolapse and other cord abnormalities (cord hematoma, cyst)

Inclusion Criteria

- Maternal age between 18-35 years
- Primi or multigravida
- Singleton pregnancy
- Pregnancy of 28 weeks onwards
- Antenatal diagnosis of umbilical cord abnormalities by USG and/or Doppler
- Women delivered by vaginal route or c section with gross umbilical cord abnormalities.

Exclusion Criteria

- Pregnancy complicated by obstetrical, medical and surgical disorders.

- Fetal congenital anomalies detected at prenatal ultrasonography.
- Oligohydramnios/polyhydramnios.
- Multiple gestation.
- Rh incompatibility/fetal hydrops.
- Diagnosed intrauterine fetal death at time of first ultrasonographic examination.

Result

The study showed that among all cord abnormalities, Nuchal cord was found to be the commonest 67%, followed by abnormal cord length 12%, coiling abnormality 9%, cord knot 5%, single umbilical artery 4%. Less commonly seen abnormalities were cord prolapse 1%, vasa previa 1% and velamentous insertion 1%.

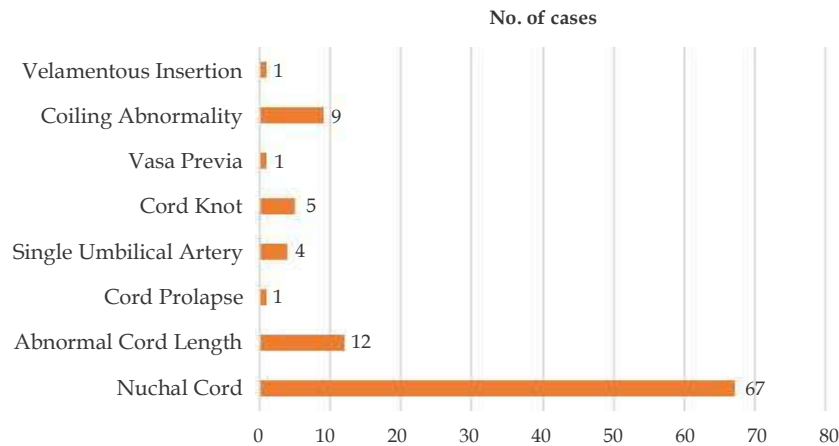


Fig. 1: No. of cases.

Table 1: Abnormal Cord Length

Length	% of Cases
Long (>100 cm)	5
Short (<40 cm)	7

Coiling Abnormality

Table 2: Number:

Coiling	No. of Cases	%
Hypercoiled	5	62.5
Hypo-coiled	4	37.5

Position

Table 3: Nuchal cord

Number of loops	% of cases
Single Loops	57.0
Two Loops	33.8
Three Loops	9.8

Table 4: Cord Knot

Type of Knot	No. of Cases	%
True Knot	1	20
False Knot	4	80

Discussion

Variations in umbilical morphometry leads to neonatal morbidity and mortality. The umbilical cord is the main link from the foetus to the placenta. More information regarding the neonate is obtained from the placenta and umbilical cord than even by a detailed antenatal history of the mother. With the availability of antenatal ultrasonography, many of these placental and cord anomalies may be detected antenatally. Thus, associated morbidity and mortality of neonates can be prevented.³ Umbilical cord abnormalities during the course of pregnancy and Labor are associated with foetal complications². The etiology of the different abnormalities is not clear. Although the fetal mortality associated with umbilical cord abnormalities is very high, identification of the fetus at risk has remained a difficult problem. Predisposing and etiological factors of cord abnormalities are obscure.¹⁰

Abnormal Cord Length

Abnormal cord length was found in 12% cases in our study which is similar to the findings by Shivakumar (13.6%) and Balakwade (11.2%). The

average length of cord was found to be between 40–100 cm. Cords less than 40 cm were termed as short cords whereas those with length more than 100 cm were termed as long cords.

Short cords are associated with:

- Cord herniation
- Congenital malformation
- Placental abruption
- Inversion of uterus
- Intrapartum distress
- Birth asphyxia
- Fetal death

Long cords are associated with:

- Cord prolapse
- Cord entanglement
- Fetal distress
- Fetal anomaly
- Fetal death.¹¹

Abnormalities of Cord Insertion

In 2012, Kuwata et al. coined the term 'mangrove sign' after visualization of branching vessels from a single site of the cord insertion, which was velamentous in nature.

Velamentous cord insertion associated with

- Congenital anomalies
- IUGR
- PIH
- Placental abnormalities
- Malpresentation
- Abruption placentae, Placenta previa.
- Preterm delivery
- Still birth
- Abnormal Fetal Heart Rate
- Operative delivery

There is evidence that a marginal insertion may evolve into a velamentous cord insertion as the pregnancy advances, due to trophotropism—a process by which the placenta preferentially grows in areas of optimal uterine perfusion and simultaneously atrophies in areas of relatively suboptimal conditions.⁶

Yampolsky et al. have found that eccentric umbilical cord insertions have a significant

impact on placental vascular structure, and are less metabolically efficient than placentas with central cord insertions. This aberrant vascular arrangement may predispose to adverse outcomes related to placental vascular invasion and perfusion. Additionally, given that marginal and velamentous cord insertions have been associated with similar maternal morbidities and pregnancy-related morbidities, these aberrant insertions are likely manifestations of a continuum caused by altered placental development.¹² A second theory proposes that abnormal cord insertions are caused by disorientation of the blastocyst during implantation, whereby the embryo is oriented toward to the chorion laeve instead of the endometrium, which leads to misalignment of the vascular stalk—the so-called 'theory of polarity'. The exposed umbilical vessels in velamentous insertions are at risk of compression, thrombosis or rupture due to lack of protection by Wharton's jelly. In our study velamentous insertion was seen only in one patient (1%). It was associated with bad obstetric outcome.¹³

Nuchal cord

Presence of umbilical cord around any fetal part, especially around fetal neck is frequently encountered in obstetric practice which causes considerable anxiety to women and treating obstetrician. Presence of nuchal cord may affect fetal status during Labor, at birth and after birth. Fetal sonologist can look for a "divot" sign on high-resolution ultrasound, a circular indentation of the fetal nuchal skin. Posterior cystic masses, folds of skin, or amniotic fluid pockets should be excluded with this finding.¹⁴

Of all cases of Nuchal cord (cord around neck) in our study maximum cases were seen with single loop of cord around neck (57%). Less commonly seen were two loops of cord around neck (33.8%) Least common was three loops of cord around neck (9.8%). These findings are similar to the study by Shivakumar et al. where single loop cases were (56%), two loops (35%) whereas three loops were (6.8%).

Grading system of tight nuchal cords as:

- Grade 1: Conjunctival hemorrhage and petechiae.
- Grade 2: Duskiness of face, facial suffusion and pallor.
- Grade 3: Respiratory distress, stupor and hypotonia requiring resuscitation.¹⁴

Coiling Abnormalities:

Definitions of under coiling and over coiling of cord have been well described for postnatal examination of umbilical cord.

$$\text{Umbilical cord coiling index (UCI)} = \frac{\text{Number of coils}}{\text{Total cord length}}$$

Coiling indices have also been developed for second trimester antenatal ultrasound assessment of the umbilical cord. In our study coiling abnormality was seen in 9 cases of which 5 (62.5%) cases had hypercoiled umbilical cord while 4 (37.5%) had hypo-coiled cords.

Cord Prolapse

An occult prolapse of the cord is sometimes seen at Cesarean Section, either lying lateral to the baby's head or less commonly posterior to the baby's head. In all cases of cord prolapse it must be remembered that this is the last stage of a journey and we have no idea when the journey commenced nor how many incomplete journeys occur. An emergency measure frequently employed for cord prolapse consists of pushing the presenting part away from the cervix to relieve the pressure on the cord.⁹

In our study cord prolapse was seen in one patient which was much less compared to incidence of 7.2% in study by Aarti Jeenwal and Hemlata Jharbade.

Single Umbilical Artery

The knowledge about the umbilical cord is important because the vessels in the cord are essential components of the foetal circulation.¹⁵ The presence of only one umbilical artery is associated with congenital anomalies in vessels.⁷ In our study single umbilical artery was found in 4% cases which is similar to findings of Aarti Jeenwal et al.

Cord Knot

True knot occurs due to active fetal movement and has an incidence of 1%. Wharton's jelly protects the fetal vessels from undue compression. True knot is more common in monoamniotic twins. True knots may cause still birth due to venous stasis causing thrombosis, fetal hypoxia, fetal neurological morbidity or death. False knots are knots protruding from the cord due to local collection of Wharton's jelly or vessel kinking and is usually of no significance.¹¹

In our study cord knots were seen in 5 cases of which only one was true knot whereas 4 were false knots.

Vasa Previa

Vasa previa is a type of velamentous cord insertion where the fetal vessels traverse in the membranes near or over the internal os.

Catanzarite et al. classified vasa previa into two based on placental characteristics:

- Type I comprising vasa previa with a single placental lobe with velamentous cord insertion
- Type II involving multilobular placentas with connecting vessels running over the cervical os.

Risk factors for vasa previa include:

- Placental abnormalities including succenturiate or bilobed placenta, previa or low-lying placenta,
- In vitro fertilization
- Multiple gestations.

The likelihood of vasa previa in the setting of velamentous cord insertion is approximately 1:50⁶. In our study we found vasa previa in one patient.

Recommendations

Recently, the measurement of utero-placental and umbilical blood flow has become possible through the combined use of B-mode and Doppler ultrasound (Gill et al., 1980; Reed et al., 1983). Umbilical venous flow obstruction can now be documented with reasonable accuracy. This technique may eventually prove useful in the diagnosis and evaluation of fetal disease as well as of umbilical cord abnormalities leading to fetal distress.¹⁰ Extremes of cord length are associated with poor perinatal outcome. If new gadgets are developed to know cord length and other cord abnormalities prenatally, we can improve the perinatal outcome.¹ Besides ultrasonography, other newer equipment and strategies should also be developed to diagnose placental and cord abnormalities antenatally, so as to decrease the incidence of the perinatal morbidity and mortality in the future and help in the delivery of a healthy baby.³ More robust studies are needed to develop evidence-based comprehensive guidelines for the management of pregnancies with abnormal cord insertions.⁶ The state of clinical finding of the umbilical cord like the length has very important clinical significance as it concerns the growth, wellbeing and the survival of the newborn. Efforts should be made to ensure that future research is focused on the umbilical cord and placenta as it concerns newborn survival. Health

care workers should be trained and retrained on this matter. Health education on the relevance of proper examination of the placenta and umbilical cord by the health care givers should be included in antenatal health talk.⁵

Diagnosis of a Hazardous Position of the Umbilical cord

A technique awaits discovery and in addition from working models the varying and possible cord positions and lengths could be worked out and further information obtained. As it is, the diagnosis depends on direct observation in the case of a nuchal or prolapsing cord and some forelying cords and on indirect evidence for the majority of hazardous positions of the umbilical cord. In practice absence of precise information about the position of the umbilical cord makes the mode of treatment a matter of obstetrical opinion and guesswork as has already been discussed in the foregoing cases. This will remain so in the borderline cases until techniques have been developed to study more accurately the actual intrauterine conditions. There is a great need for further research to obtain methods suitable for routine clinical practice to demonstrate the position of the umbilical cord in utero and to distinguish between harmful and harmless alterations of the foetal heart; only then can the decision between expectancy and intervention become scientific in obstetric practice.⁹

Conclusion

Umbilical cord has important clinical significance as it concerns growth, well being and survival of newborn. In practice absence of precise information about the position of the umbilical cord makes the mode of treatment a matter of obstetrical opinion. This will remain so in the borderline cases until techniques have been developed to study more accurately the actual intrauterine conditions. There is a great need for further research to obtain methods suitable for routine clinical practice to demonstrate the position of the umbilical cord in utero and to distinguish between harmful and harmless alterations of the foetal heart; only then can the decision between expectancy and intervention become scientific in obstetric practice. Sonographic examination and documentation of umbilical cord is vital for detection of umbilical cord abnormalities. Cord accidents (compromized umbilical cord blood flow) as a cause of stillbirth is under reported, mainly due to lack of diagnostic criteria. Health education on the relevance of proper examination

of the placenta and umbilical cord by health care giver should be emphasized.

References

1. Shiva Kumar H.C., Chandrashekhar T. Tharihalli et al. Study of length of umbilical cord and fetal outcome: A study of 1000 deliveries. *International journal of reproduction, contraception, Obstetrics and gynecology* 2017 September;6(9):3770-75.
2. Aarti Jeenwal, Hemlata Jharbade. Evaluation of umbilical cord complication and its relation with fetal outcome. *International journal of reproduction, contraception, obstetrics and gynecology* October 2018;7(10):4214-17.
3. Nair BT, Raju U. Study of correlation of neonatal outcomes with gross abnormalities of placenta and umbilical cord. *J Nepal Pediatr Soc* 2017;37(3):254-60.
4. Gennaro Scutiero, Bernadi Giulia et al. Umbilical cord Hematoma: A case report and review of literature. *Hindawi, Obstetrics and gynecology International*. Volume 2018, Article ID 2610980.
5. OA Ogunlaja, IP. Ogunlaja. Correlation between umbilical cord length, birth weight and length of singleton deliveries at term in a Nigerian Population. *Rwanda Medical Journal* September 2015;72(3).
6. Autumn J Broady, Marguerite Lisa Bartholomew. Structural umbilical cord and placental abnormalities. *Donald school Journal of Ultrasound in Obstetrics and Gynecology* Jan-March 2016;10(1):23-26.
7. J B Sharma. Abnormalities of placenta, cord, amniotic fluid and membranes. J B Sharma. *Textbook of obstetrics*. Avichal publishing company, Delhi. First edition 2018.
8. Umamaheshwari Guruswamy, Ramya Thangavelu, Chaitra Venkataswamy et al. Abnormalities of the umbilical cord: Correlation with placental histology and perinatal outcome.
9. Ian A. Donaldson. Abnormal positions of the Umbilical cord. *Postgrad. Med. J* 1996;42:20.
10. Ghosh, A., WOO, J.S.K., Machenry. C., WAN, C.W., O'HOY. K M and MA, H.K. Fetal loss from umbilical cord abnormalities: A difficult case for prevention. *Europ. J. Obstet. Gynec. reprod. Biol* 1984;18:183-98.
11. Mudaliar and Menon's Fertilization of ovum and development of embryo. *Mudaliar and menon's Clinical obstetrics*. Universal press, Eleventh edition 2011.
12. Yampolsky M, Salafia CM, Shlakhter O, et al. Centrality of the umbilical cord insertion in

- a human placenta influences the placental efficiency. *Placenta* 2009;30:1058-64.
13. Heifetz SA. The umbilical cord: Obstetrically important lesions. *Clin Obstet Gynecol* 1996;39(3):571-87.
 14. Pundalik K. Sonawane, Deep M. Bhadra. Comparative study of maternal and perinatal outcome in pregnancies with or without umbilical cord around fetal neck. *International Journal of reproduction, contraception, obstetrics and gynecology* 2019 Mar;8(3):1096-99.
 15. SmauelBimpong, Chrissie StansieAbaidoo et al., Morphometric characterization of umbilical cord vessels and neonatal outcome. *International Journal of Anatomy and Research* 2019, Vol. 7(1.1):6050-58.
-
-
-

Urological Injury in Obstetric and Gynecological Surgery: A Retrospective Analysis of Five Years

Anju Kumari Rani¹, Brijesh Singh², Shobhit Kumar³

How to cite this article:

Anju Kumari Rani, Brijesh Singh, Shobhit Kumar. Urological Injury in Obstetric and Gynecological Surgery: A Retrospective Analysis of Five Years. Indian J Obstet Gynecol. 2020;8(2):18-22.

¹Senior Consultant, ²Consultant Surgeon, General Hospital, Department of Obstetrics and Gynecology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, Uttar Pradesh 226014, India. ³Student, King George's Medical University, Lucknow, Uttar Pradesh 226003, India.

Corresponding Author: Anju Kumari Rani, Senior Consultant, Department of Obstetrics and Gynecology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow 226014, Uttar Pradesh, India.

E-mail: skanju02@yahoo.co.in

Received on 05.05.2020; **Accepted on** 05.06.2020

Abstract

To determine incidence and nature of urological injuries in obstetric and Gynecological procedures and their complications and mode of management in a tertiary care hospital, Gynecological Services, SGPGIMS, Lucknow.

A retrospective study of all obstetric and Gynecological surgeries over a period of 5 years from January 2014 to December 2018 was carried out at Gynecological Services, SGPGIMS, Lucknow, India. Cases with the documented urological injuries were analyzed further. A total of 1,526 patients underwent obstetric and Gynecological procedures like lower segment cesarean section, various types of hysterectomies, laparotomy were analyzed. Cases with urologic injuries were identified and analyzed for the type of injuries, timing of diagnosis, their management and consequences.

Out of 1,526 patients undergoing various surgeries, 8 (0.52%) patients had bladder injury and 1 (0.06%) patients had ureteric injury. In gynecologic procedures, the incidence of bladder injury was highest in radical hysterectomy (1 out of 35, 2.8%) followed by VH (2 out of 123, 1.62%), laparotomy (1 out of 194, 0.51%) and TAH (2 out of 635, 0.32%). Only 1 ureteric injury was noted in a case of TAH out of total 1094 Gynecological procedures (0.09%).

Statistically, ureteric injuries are less frequent but are responsible for significant morbidity when compared to bladder injuries which are more common

but with less complications as they are diagnosed and managed timely.

Keywords: Obstetrics and Gynecological Surgery; Bladder injury; Ureter injury.

Introduction

Due to close anatomical proximity of urogenital systems, urological injuries involving damage to the urinary bladder and ureter are not uncommon in obstetric and gynecological surgeries. In fact most of iatrogenic urinary tract injuries are due to gynecologic Surgeries.¹ Urinary tract injury complicates an estimated 0.2 to 1% of all gynecologic procedures.^{1,2} Since a very high number of gynecological surgeries are performed throughout the globe, there are relatively few urologic injuries but these urological complications carry a significant amount of morbidity. The cause of these injuries vary depending on the type of gynecologic surgery performed, complexity of surgery, altered pelvic anatomy due to endometriosis, previous surgeries, radiation therapy, cervical or broad ligament fibroids and intra-operative complication like severe bleeding.³ With increased knowledge of these injuries and improvements in surgical techniques, the incidences of these injuries have reduced and they are diagnosed timely and better managed in present day practice. Periodic analysis