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Umbilical Cord Hypercoiling: A Rare Cause Of Intrauterine Fetal Death

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ABSTRACT

Coiling of umbilical cord is a normal process during development. Abnormal umbilical coiling is associated with adverse pregnancy outcomes. Hyper coiling of umbilical cord may be associated with increased rate of miscarriage, fetal growth restriction, fetal heart decelerations, cord stenosis and intrauterine fetal death. The difference in coiling has been described as an antenatal marker for fetuses at risk**.** We describe a patient where hypercoiling in a pre term pregnancy contributed to fetal death in a woman with multiple previous caesarean sections. Routine investigations for fetal death were negative in the postpartum period.

Keywords: Umbilical cord, Umbilical coiling index, Hypercoiling, Intrauterine fetal death

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INTRODUCTION

Umbilical cord is vital for the development, well being and survival of the fetus. It is vulnerable to kinking, compression and torsion resulting in adverse perinatal outcome. Coiling of umbilical cord is a normal process during development and it may be due to the fetal movements, differential umbilical vascular growth rates, fetal hemodynamic forces and arrangement of muscle fibres in the arterial wall.[1] Abnormal umbilical coiling is associated with a range of adverse pregnancy outcomes. Hyper coiling of umbilical cord can lead to disturbance in the utero-placental circulation resulting in miscarriage, fetal growth restriction, fetal heart decelerations, cord stenosis and intrauterine fetal death.[2]

We describe a case of intrauterine fetal death (IUFD) at 30 weeks of gestation due to hypercoiling and thinning of umbilical cord with stenosis at the fetal end.

Case History

A 35 year old Gravida 6 para 4 was referred to our hospital at 30 weeks gestation with IUFD. She had previous four caesarean sections with normal babies and one first trimester miscarriage. Pregnancy was uneventful till she noticed absent fetal movements. Her past medical history was unremarkable; booking investigations and anomaly scan were normal. Scan on admission confirmed IUFD.

She underwent lower segment caesarean section in view of previous 4 caesareans. A macerated baby girl weighing 930 gm was delivered; baby had no dysmorphic features or skeletal abnormalities. Placenta weighed 285 gms with marginal insertion of the cord which was hypercoiled with stricture at fetal end (Fig 1). Placental histopathology showed 3 vessel cord with no other abnormality. (Fig 2) Patient had an uneventful recovery; investigations for IUFD were normal at six weeks postpartum.

Figure 1: A. Still born baby with hypercoiling of cord, B. Hypercoiling of cord with stricture at fetal end, C. Hypercoiling of cord after delivery of fetus , D. Hypercoiling of cord with marginal insertion

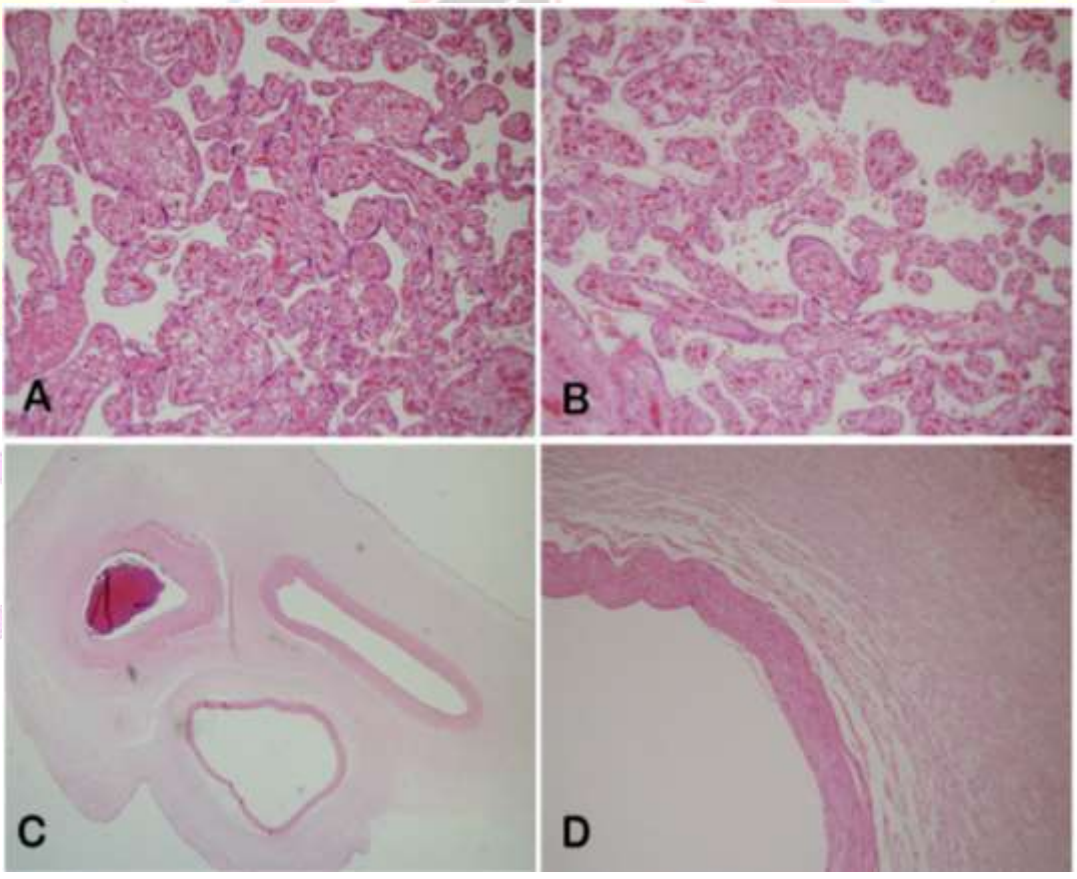

Figure 2

Figure A & B - H.E X100. Photomicrograph of sections of placenta showing mild congestion of villi with ↑^{ed} syncytial knotting.

Figure C & D - H.E X100 & 200. Sections of the cord with three vessels with no evidence of funisitis or vasculitis.

DISCUSSION

The role of umbilical cord coiling and the mechanism of coiling are still not clear. Umbilical cord coiling has been observed from six weeks of gestation. [3]

The umbilical cord coiling level can be described by the umbilical coiling index (UCI), which is the number of complete coils in the umbilical cord divided by the length of the cord in centimeters.[4] The coiling index decreases as pregnancy advances due to the increasing length of the cord. The length of the umbilical cord increases throughout pregnancy particularly in the later period of pregnancy, it increases by 3-6cm per month. The degree of lengthening varies in each fetus thus the change of UCI is individual. [5]

The normal UCI is reported as 0.17+/- 0.009 spirals per cm. Coiling index <10th centile (<0.07) or >90th centile (>0.30) is associated with adverse pregnancy outcome. [6] UCI below 0.07 is called hypocoiling and it is associated with growth restriction, fetal anomalies, fetal heart rate abnormalities and fetal death. [1,2] UCI above 0.30 coils/cm is considered as hypercoiling; it may be associated with long cords with constriction or torsion resulting in early intrauterine fetal death. [7] Overcoiling of umbilical cord is associated with high incidence of fetal deaths, intrauterine growth restriction, fetal acidosis and asphyxia. [2,9,8]

A large retrospective study found 18% incidence of umbilical hypercoiling in second and third trimester IUFD. Many of these cases had associated umbilical cord stricture leading to disturbance in feto placental circulation. Careful examination of the placenta and umbilical cord after delivery can reduce the cases of unexplained intrauterine fetal death.[10]

Some authors recommend routine antenatal assessment of umbilical cord coiling to detect pregnancies at risk. [3,7] During the 1st trimester, ultrasonographic examination of umbilical cord is difficult. Late second trimester (22-28 weeks) is considered as the optimal time for measurement of umbilical cord coiling as the amount of amniotic fluid decreases in the 3rd trimester and measurement becomes more difficult.[3]

CONCLUSION

Umbilical cord hypercoiling can lead to intrauterine fetal death. Determination of UCI on placental examination can reduce cases of unexplained intra uterine fetal deaths. In future, ultrasonic detection of UCI may become an essential part of fetal assessment in high-risk pregnancies.

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