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The Study Of Relation ship Between The Maturation Abnormalities Of Placenta And Late lntra uterine Fetal Death

دراسة العلاقة بين النمو غير الطبيعي للمشيمة وموت الاجنة المتآخر داخل الرحم

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Abstract :

This study was done on 60 pregnant women that have case intra uterine fetal death in kerbala city. We determined the placental abnormalities that lead to intra uterine fetal death through histopathological sections. The resulting shown six groups of cases with defective placental maturation .The first group of cases shown absence of syncytio-vascular membrane formation and the second group shown immaturity and hydropic degeneration of chorionic villi.

The third group shownchronic villitis and the fourth shown fibrin depositions and loss of vessels in the villous stroma of placenta .The fifth group shown foetal thrombotic lesions which consist of large groups of vascular fibrotic villi as the result of vessel thrombosis .The last group shown umbilical cord abnormal coiling (over coiling) or under coiling . These groups of cases represent the most important causes of late intra utrine fetal death.

الخلاصة:

أجريت هذه الدراسة على60 من النساء الحوامل اللواتي لديهن موت الاجنة او الاجهاض في مدينة كربلاء.تم تحديد الحالات المؤدية الى موت الاجنة داخل الرحم من خلال الفحص النسيجي المرضي للمشيمة. تم ملاحظة ستة مجاميع لحالات غير طبيعية في المشيمة حيث مثلت المجموعة الاولى غياب تكوين الغشاء الوعائي للمشيمة اما الثانية فكانت المشيمة تظهر تغيرات نسيجية مثل عدم النضج و تغيرات استسقائية للزغابات اللقانقية . بينما كانت المجموعة الثالثة التي لوحظت هي التهاب الزغابات المزمن. والمجموعة الرابعة التي ظهرت فكانت تمثل ترسب الفايبرين وفقدان الاوعية الدموية للمشيمة ,اما المجموعة الخامسة فهي افات التخثر الجنيني fetal thrombotic lesions حيث نلاحظ مجموعة كبيرة من الزغابات المتليفة الوعائية كنتيجة لوجود الخثرة الوعائية .والمجموعة الاخيرة وهي حالة تخص الحبل السري من جهة الطول الغير طبيعي أي طويل جدا او قصير جدا بالاضافة الى الالتواء الغير طبيعي وتعتبر هذه الحالات من اهم الاسباب لموت الاجنة المتأخر. .

INTRODUCTION :

The placenta is the fastest growing organ of the human body. The placenta have a good blood supply from maternal blood via the spiral arteries which is very important for the fetus and placental development (1). The normal parenchyma of placenta is divided into 10-40 lobes or lobules separated by grooves or septa(fig.1), these interlobular septa usually do not reach the chorionic plate or fetal surface(2). In the centre of each lobule one or several spiral arteries can be found(3).Abnormal maturation can be seen in several different conditions such as premature formation of terminal villi of placenta can be seen as a reaction or adaptation of the placenta to a decreased maternal-placental perfusion (4),and delayed maturation of placenta can be seen in several different clinical situations and It is association or/not with maternal diabetes (5),and it can be observed in association with congenital and/or chromosomal anomalies, with chronic villitis of unknown etiology. Immature intermediate villi can be recognised ,In the first weeks of development the whole placenta consist of mesenchymal villi and after approximately 12 weeks immature intermediate villi are formed(6). Immature intermediate villi are normally no longer present after 24 weeks of pregnancy.

Material and Method:

This study was done on 60 pregnant women with intra uterin fetal death in the hospital for obstetric of gnecology in kerbala city by macroscopical and microscopical placental examination. Sections from placenta were subjected to routine histopathological processing ,consisted of fixation , dehydration . Five to six microns-thick sections stained with haematoxyllin & eosine stains and examined under light microscope at various magnifications(7).

Results and Discussion

This study show many causes that insert in (intrauterine fetal death)by gross and microscopial placental examination. The **first** group with abnormality associated with late intra-uterine fetal death is delayed maturation of the terminal villi(5%). This abnormality is the result of abnormal or absence formation of terminal villi and syncytio-vascular membranes and decreased formation of capillaries. This abnormality occurs after 34-35 weeks of pregnancy and cannot be diagnosed before this gestation age. fig.(2). The formation of terminal villi with syncytio-vascular membranes and the increase in capillaries is essential for the increased demands of the fetus during the last 6-8 weeks of pregnancy. Especially oxygen delivery to the foetus is dependent on diffusion and the diffusion distance is decreased by formation of these syncytio-vascular membranes in the last weeks of pregnancy. During this period the placenta hardly grows and the formation of terminal villi is essential. This abnormality of the placenta does not give rise to growth restriction but in the last few weeks of intra-uterine life it can give rise to fetal hypoxia. In the foetal circulation from foetuses with this placental abnormality a severe increase of nucleated red blood cells can be found as a signs of fetal hypoxia (8). There is an increased risk of recurrence in subsequent pregnancies compared with normal placentas there is a 70 times higher risk of intra-uterine foetal death in placentas with this maturation defect and the risk of recurrence stillbirth is tenfold. In a population survey it was demonstrated that the incidence of this delayed placental maturation was 5% (4) .

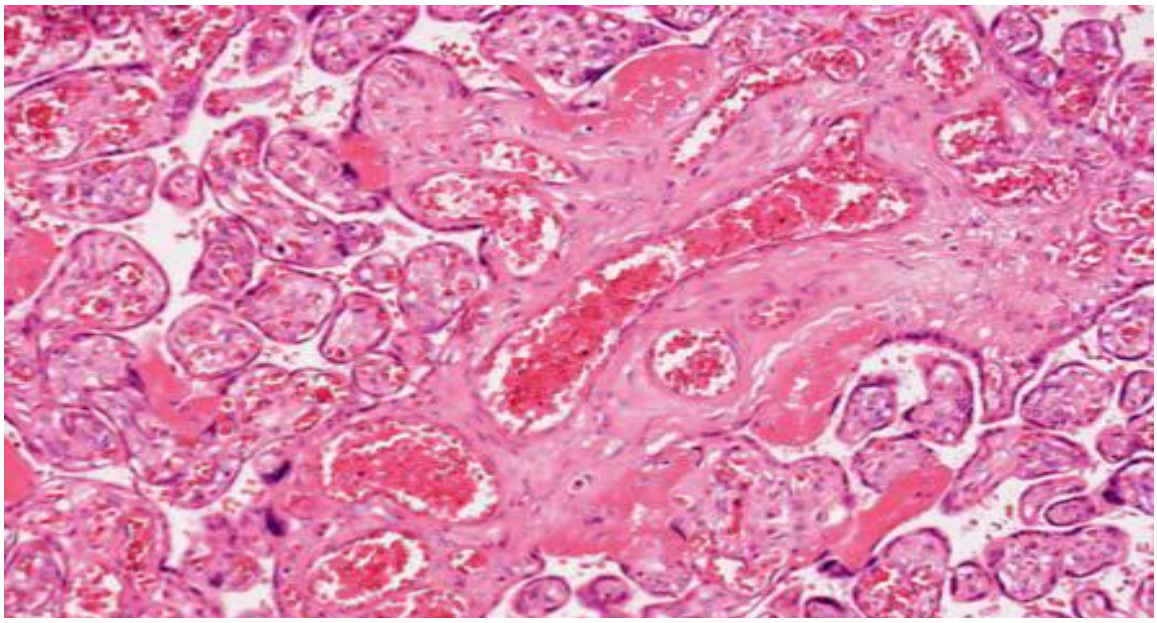


Figure (1) normal placenta at 35 weeks of gestational age(H&E 200x).

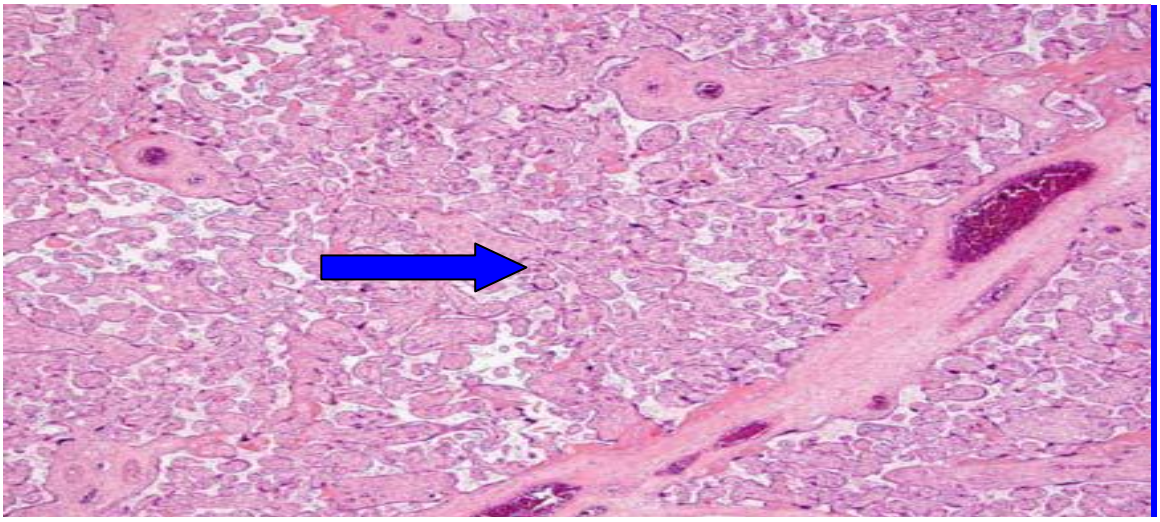


Fig. (2)) Placenta of 39 weeks of gestational age with defective placental maturation ,note the monotonous pattern of villi and the absence of terminal villi with syncytio-vascular membranes(H&E 200 X).

The **second** group of cases shows several placental histological abnormalities like immaturity and hydropic degeneration of the chorionic villi(17%), increased fibrinoid necrosis fig.(3). The immaturity of the villi and decreased formation of terminal villi also results in a less decreased diffusion distance with similar detrimental effects(3). These placenta abnormalities however, are not specific and recently it was demonstrated that similar histological features could be found in placentas from large-for-gestational age infants from non-diabetic mothers(9). In the same study it was demonstrated that intra-uterine fetal death and asphyxia were associated with a relative low placental/fetal weight ratio again indicating that a decreased surface area for diffusion or increased diffusion distance can lead to late intra-uterine fetal death

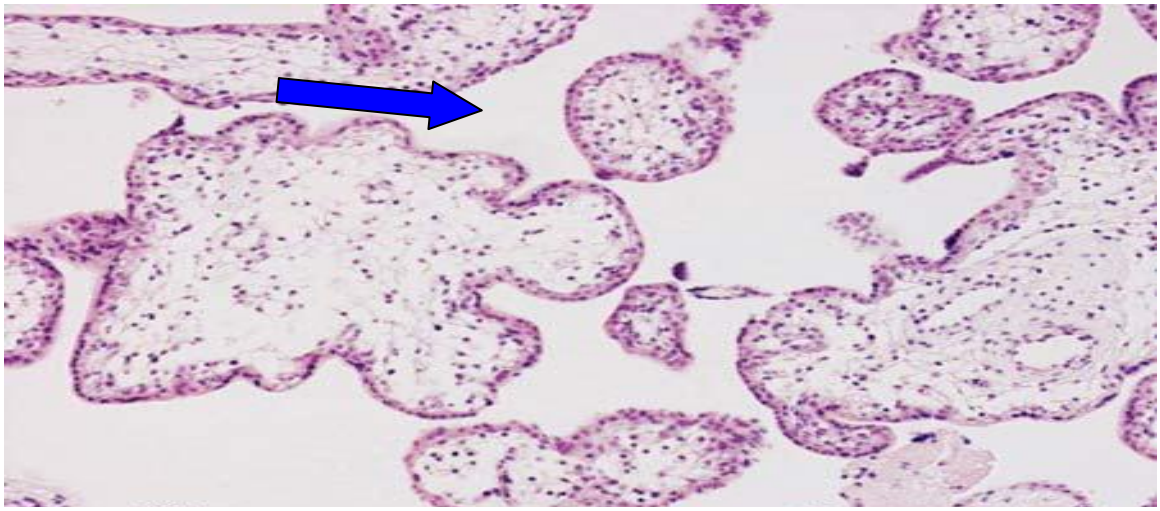


Figure (3) Placenta with 23 weeks of gestation. In the second trimester placenta parenchyma consists of immature intermediate villi with some formation of mature intermediate villi. The villi show the largest variation in diameter and form. Note the increase of the fibrous central core in the stem villi(H&E 200x).

The **third** group of cases with severe chronic villitis recognizable as a severe infiltration of lymphocytes and macrophages in the chorionic villi can be associated with perinatal death fig.(4). Sometimes specific abnormalities can be found e.g. viral inclusion bodies. The villi are also recognizable by degeneration of the trophoblastic lining with fibrin depositions and loss of vessels in the villous stroma. These histological abnormalities can be found in association with

cytomegalovirus, toxoplasmosis, rubella and syphilis(8). When no cause can be found this histological abnormality is known as a villitis of unknown etiology. Chronic villitis has a high recurrence risk in subsequent pregnancies up to 27 %. In cases with severe villitis there is also a decreased surface area
for diffusion that can lead to late intra-uterine fetal death (10,11).

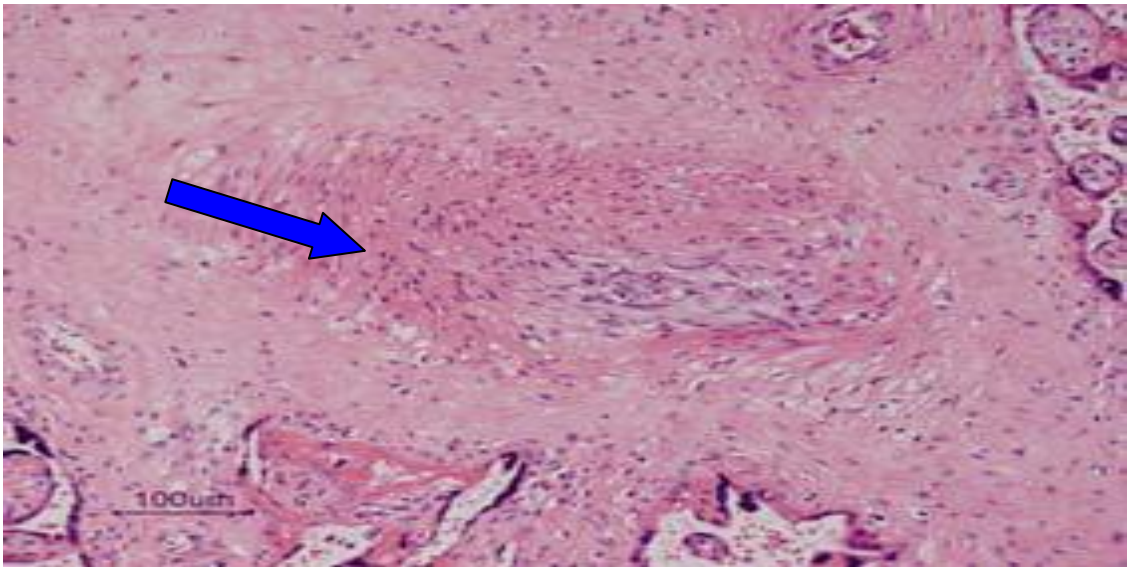


Fig. (4).Placenta with villitis and vasculitis and infiltration of lymphocytes(H&E 200x).

The **forth** group of cases with massive fibrin depositions in the placenta(20%) . The fibrin depositions are surrounding the terminal villi fig.(5)that lead to decrease the surface area necessary for normal exchange of nutrients and oxygen. The cause of these fibrin depositions is not known. It has been suggested that immunological abnormalities may be responsible for this condition(1). In some of these cases it is related with chronic villitis. There is a recurrence risk in subsequent gestations. The condition is difficult to detect during intra-uterine life, it is associated with growth restriction, usually with normal Doppler flow characteristics. In some cases a high level of alfa-fetoprotein can be found. In addition with growth restriction there is also an increased risk of cerebral damage resulting in mental retardation (12)

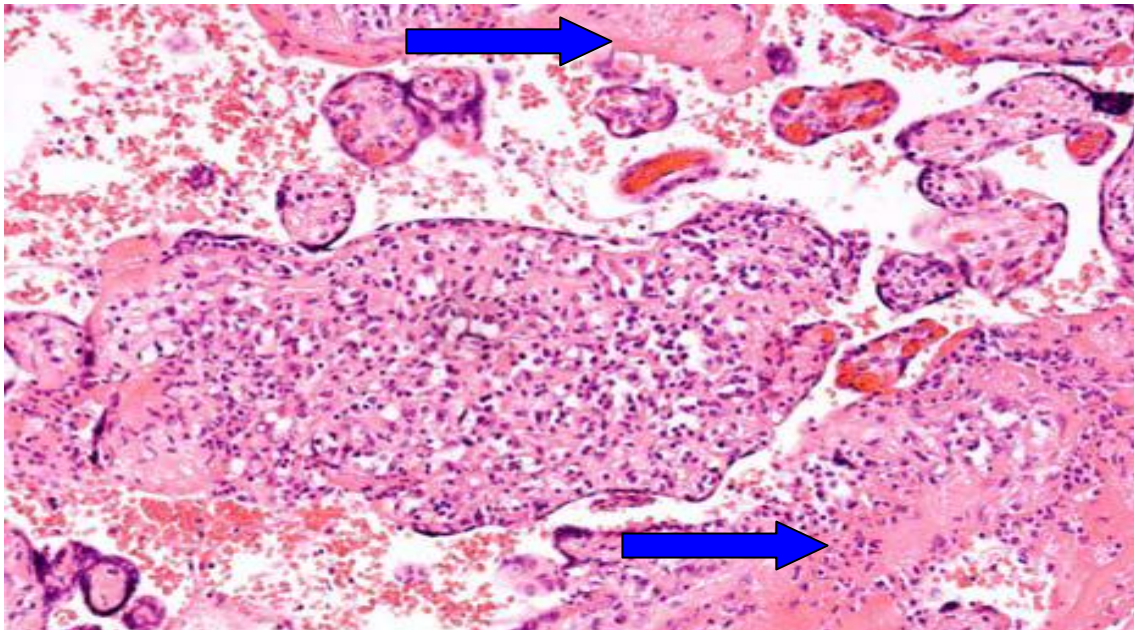


Fig. (5) Placenta with massive perivillous fibrin depositions and with severe villitis(H&E 200x).

The **fifth** group of cases with thrombosis of fetal vessels(15%) can be recognised both macroscopically as well as microscopically. The macroscopically visible lesions consist of whitish sharply demarcated lesions with a triangular appearance usually with a sharp point projecting to the fetal surface. Microscopically it consists of large groups of a vascular fibrotic villi as the result of fetal vessel thrombosis fig.(6). They are the result of lack of foetal perfusion. Infarcts are the result of decreased or absent maternal perfusion. Small groups of avascular villi (scored as a group of at least 5 a vascular fibrotic villi without inflammation or mineralization) as the result of minor fetal vessel thrombosis are not uncommon. An increased incidence is also described in fetuses with several coagulant disorders, anti platlets antibodies and hypercoagulability disorders. It has been associated with hydrops and asphyxia. Meconium could also give rise to thrombosis by focal degenerative vessel wall lesions (1)

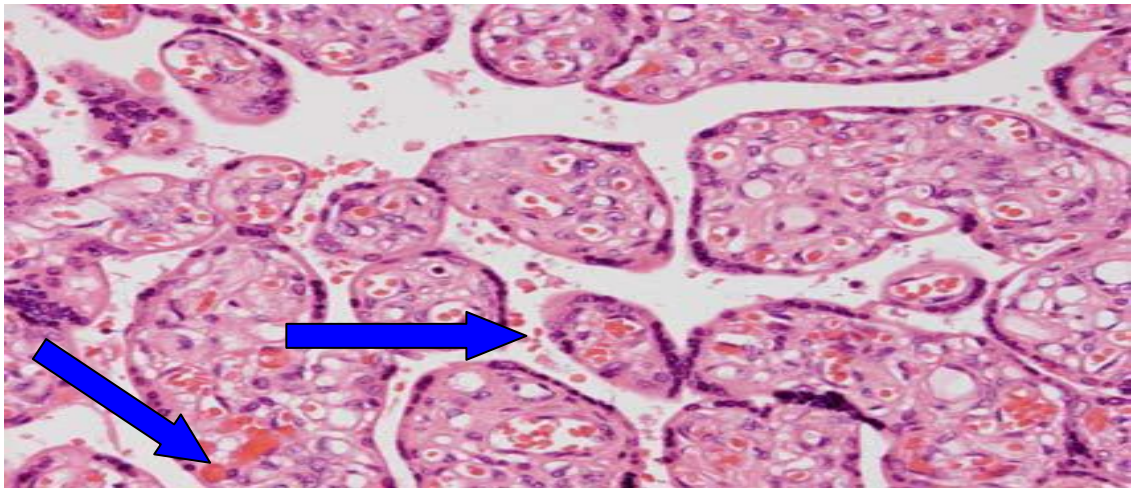
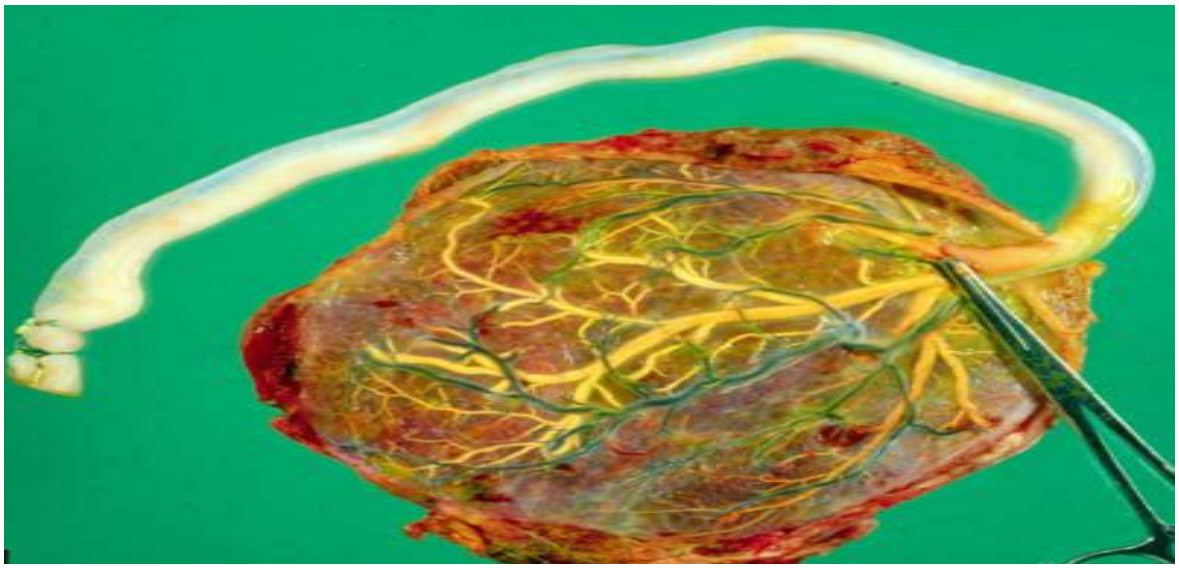


Figure (6) Placenta with arterial trombosis of chorionic plate(H&E 400x) .

The **sixth** cases associated with intra uterine fetal death is an umbilical cord with abnormal coiling(16%). The abnormal cord coiling is associated with severe perinatal morbidity and mortality. Over coiling (i.e. a coiling index of 0.3 or more; 3 or more coils per 10cm) and under coiling(fig.7) (i.e. a coiling index of 0.1 or less; 1 or less than 1 coil per 10 cm. Abnormal cord

coiling was also associated with chorionic plate vascular thrombosis. In a study of the author from 565 umbilical cords the coiling index was determined and correlated with clinical outcome(13). In the majority of cases with intra-uterine death were no explanation was found for the intra-uterine death an under coiled or over coiled cord was found. It is suggested from this study and others (14) that abnormal cord coiling has a remarkable high association with unexplained death and it is tempting to speculate that abnormal cord coiling may have serious effects on fetal well-being and is probably the cause of fetal death in some cases. Umbilical cord coiling is not a standard measurement in pathology departments and it could well be that the so far unexplained intra-uterine fetal deaths, in some series up to 36-50 %, are caused by abnormal cord coiling.(15)



Figure(7)Placentas with an umbilical cord with undercoiling (left).

It can be concluded that there are a lot of abnormalities and developmental disturbances in both umbilical cord and placenta, as mentioned above, which are responsible for late intra uterine fetal death. Several of these abnormalities are not well known or only recently described and it can be expected that the previously mentioned rate of unexplained intra uterine fetal death, up to 36-50 % in some series will decline to values below 5-10 % (16)

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