

Reducing Maternal and Fetal Risk: Early Detection and Monitoring of Battledore Placenta

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Abstract

Placental abnormalities including battledore placenta can have morbidity and mortality implications for mother and foetus. We reviewed gross and histologic findings of 32 battledore placentas and compared them to 32 normal cord insertion control placentas. Gross and histologic findings with the greatest difference in prevalence compared with controls were intervillous thrombus, arterial medial hypertrophy, acute funisitis, single artery umbilical cord and subchorionic haemorrhage. Battledore placentas did not meaningfully differ from controls regarding prevalence of acute or chronic chorioamnionitis, meconium staining, increased villous capillaries, increased perivillous fibrin deposition, distal villous hypoplasia, infarction, retroplacental haematoma, villous oedema, calcifications or increased syncytial knots. Early identification of battledore placentas may reduce risk of serious clinical conditions associated with maternal vascular malperfusion, infection and haemorrhage.

Keywords: Battledore placenta; maternal vascular malperfusion; ante-partum ultrasound; acute funisitis; subchorionic haemorrhage; pre-eclampsia

Introduction

Placental development is a complex process which sets the stage for normal fetal development. Any variation or disruption occurring during placental formation may lead to placental malfunction and maternal-fetal morbidity and mortality [1]. Battledore umbilical cord insertion is a less common placental anomaly previously reported to be associated with vasa previa [2]. We reviewed 32 battledore placentas from pregnancies in the Sligo University Hospital catchment area from 2016-2026 and compared the prevalence and gross and histopathologic findings with 32 normal cord insertion control placentas. Anonymised data including maternal age, clinical data and placental gross and histopathologic findings were reviewed for 32 battledore and 32 control placentas. Data was obtained from electronic gross and histologic pathology reports. Gross and histologic findings with the greatest difference in prevalence compared with controls were increased intervillous thrombus, arterial me-

dial hypertrophy, acute funisitis, single artery umbilical cord and subchorionic haematoma. Battledore placentas did not meaningfully differ from controls regarding prevalence of acute or chronic chorioamnionitis, meconium staining, increased villous capillaries, increased perivillous fibrin deposition, distal villous hypoplasia, infarction, retroplacental haematoma, villous oedema, calcifications or increased syncytial knots.

Methods

For National Histopathology Quality Improvement Annual Conference with Royal College of Physicians in Ireland, clinical audit on prevalence of placenta abnormalities including battledore placentas in Sligo University Hospital catchment area was performed. Search term 'battledore' was used to search electronic archives. Twin placentas were excluded. Anonymised data including maternal age, clinical findings and placental gross and histopathologic findings were reviewed for 32 battledore and 32 normal cord insertion control placentas without other gross abnormalities. Clinical details were also reviewed. Data was obtained from electronic gross and histologic pathology reports and clinical records issued by specialist registered consultant pathologists and obstetric gynaecologists.

Results and Discussion

Battledore placentas were seen in 1% of total placentas over a 10-year period (32/3640; Figure 1). Maternal age ranged from 27-38 years ($m=34$) and placental weights ranged from 305 to 601 grams ($m=457$). Clinical details for control cases included caesarean section (4), premature rupture of membranes (4), intrauterine growth restriction (2) and placenta previa (2). Clinical findings for battledore placenta cases included caesarean section (10), intrauterine growth restriction (4), retained/adherent placenta (6), pre-term delivery (3), placenta previa (2) and antepartum haemorrhage (2). Gross and histologic findings with the greatest difference in prevalence compared with controls are shown in Table 1. Subchorionic haematoma was seen in 10 cases (10/32; 31%) versus 4/32 (13%) in control placentas (Figure 2). Intervillous thrombi were seen in six battledore placentas (6/32; 19%) compared with 2/32 (6%) of controls (Figure 2). Acute funisitis was found in 6/32 (19%) battledore placentas and 3/32 (9%) of control placentas (Figure 2). There were three cases of single artery umbilical cord 3/32 (9%) compared with none in normal cord insertion control placentas. Arterial medial hypertrophy was seen in 2/32 (8%) of battledore cases and in none of the controls. Battledore placentas did not meaningfully differ from controls regarding prevalence of acute or chronic chorioamnionitis, meconium staining, increased villous capillaries, increased perivillous fibrin deposition, distal villous hypoplasia, infarction, retroplacental haematoma, villous oedema, calcifications or increased syncytial knots.

<i>Placenta type</i>	<i>Maternal age, m years</i>	<i>Placental weight, m grams</i>	<i>Intervillous thrombus</i>	<i>Arterial medial thickening</i>	<i>Acute funisitis</i>	<i>2 vessel umbilical cord</i>	<i>Submembrane haemorrhage</i>
Battledore	34	457	6/32 (19%)	2/32 (8%)	6/32 (19%)	3/32 (9%)	10/32 (31%)
Normal	34	476	2/32 (6%)	0/32 (0%)	3/32 (9%)	0/32 (0%)	4/32 (13%)

Table 1: Gross and histologic findings in battledore versus control placentas.

Placental abnormalities including battledore placenta can have morbidity and mortality implications for mother and foetus. In order to evaluate clinical implications of battledore placenta we reviewed gross and histologic findings of 32 battledore placentas and compared them to 32 normal cord insertion control placentas.

Battledore placenta, also known as marginal cord insertion, is a placental anomaly characterized by the umbilical cord's attachment to the periphery of the placenta instead of its core, usually identified by an insertion point situated 2cm or closer to the placental border [3]. This phenomenon manifests in around 7% of term pregnancies and is a central topic in obstetric discourse owing to its correlation with many detrimental pregnancy complications such as placental abruption, placenta previa, premature labour and fetal distress [4]. Relative analysis of battledore cases and standard controls reveals notable histological disparities, with battledore placentas often displaying hematomas, thrombi, and increased syncytial knots. In extreme cases, particularly when accompanied by other anomalies

such as circumvallate membrane insertion, it has been associated with intrauterine fetal death and preeclampsia. Moreover, vascular rupture and fetal haemorrhage throughout labour can result from the atypical branching linked to marginal insertion [3]. According to research, as a consequence, early prenatal diagnosis using high – resolution ultrasonography and Colour Doppler throughout the second trimester is crucial for identifying high-risk pregnancies. To assure positive maternal and newborn outcomes, thorough monitoring and in many cases, a scheduled caesarean section is essential to prevent intrapartum emergencies [3].

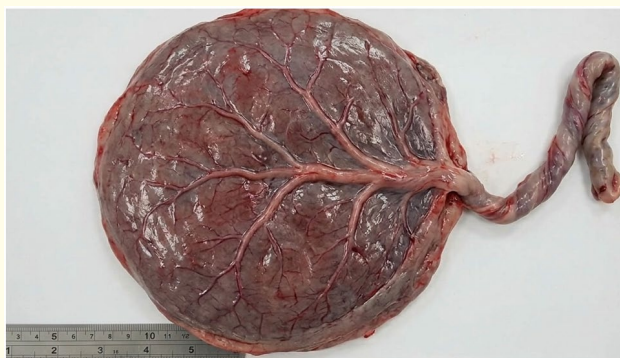


Figure 1: Battledore placenta.

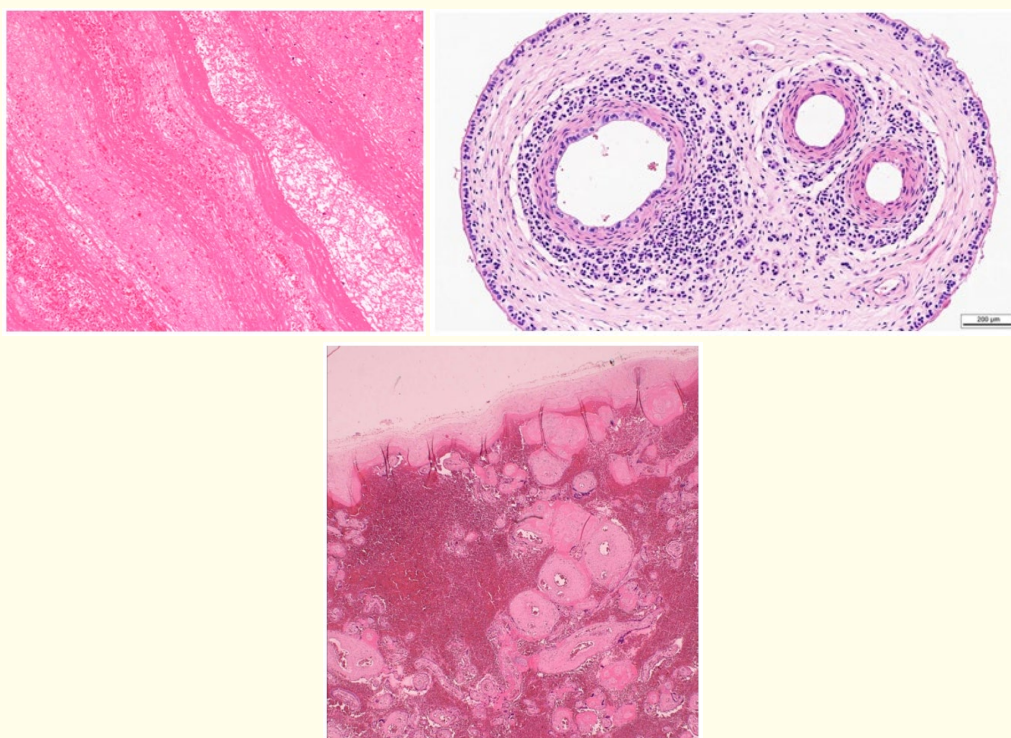


Figure 2: Top) intervillous thrombus; Middle) acute funisitis; Bottom) subchorionic haemorrhage.

Previous research on cases with battledore insertion show slightly reduced infant birth weight and normal pregnancies. An increased DNA/RNA ratio was also observed in battledore placentas suggesting possible tissue stress that may affect placental development and function, [5] including supply of nutrients and oxygen to the fetus [4]. In a descriptive study of 7,180 deliveries, including 60 cases of battledore placenta (0.8%), it was found that battledore placenta was associated with a higher frequency of complications, particularly fetal distress (61.7%), intrauterine growth restriction (16.6%), preterm labour (5%), and cord prolapse (3.3%). Overall, 87% of women with battledore placenta experienced antenatal or intrapartum complications, compared with 22% of women with a normal placenta [6]. The authors suggest that marginal cord insertion may reduce placental efficiency and contribute to fetal compromise and growth restriction. Careful assessment of placental cord insertion during second-trimester ultrasound was recommended, with closer monitoring and appropriate delivery planning when battledore placenta is identified. A recent systematic review and meta-analysis found that abnormal placental cord insertion, particularly velamentous and marginal insertion, was associated with increased risks of emergency caesarean delivery, small for gestational age, preterm birth, low birth weight, and intrauterine fetal death [7]. This study highlights the need for standardised diagnostic criteria and antenatal ultrasound assessment to improve pregnancy outcomes.

In relation to our findings, we can speculate that battledore insertion of umbilical cord may be associated with mechanical pressure that may alter blood flow and potentially introduce an element of stasis or hypercoagulability that results in histologic manifestations of maternal vascular malperfusion. The latter would include intervillous thrombi and arterial medial hypertrophy. These factors would also increase risk of acute funisitis or other infection. The battledore insertion of umbilical cord, to the degree the cord is subject to mechanical pressure, in utero or during delivery, would also account for subchorionic haemorrhage seen in our sample. Two of the latter cases required emergency caesarean section. Vascular issues may also be related to battledore placentas being nearly 20 grams (5%) lighter in weight than controls. Similar to previously reported findings aforementioned, our sample of battledore placentas were also associated with intrauterine growth restriction and pre-term delivery at a higher prevalence than controls.

Conclusion

Battledore placentas showed a greater prevalence of gross and histologic findings associated with maternal vascular malperfusion, infection and haemorrhage than controls. As battledore placentas are visible on ultrasound beginning at 11-14 weeks, increased monitoring of pregnancies from this point may help prevent serious clinical conditions such as gestational hypertension, preeclampsia, infection and haemorrhage.

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