

# The incidence and outcomes of antepartum haemorrhage of unknown origin at Tygerberg Hospital: a retrospective, descriptive study.

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## Declaration:

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the authorship owner thereof (unless to the extent explicitly otherwise stated) and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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The author has no conflicts of interest to declare.

## Abstract in English:

### *Objective:*

The primary aim of this study is to describe the maternal, as well as fetal and neonatal outcomes of patients presenting to Tygerberg Hospital with a diagnosis of antepartum haemorrhage of unknown origin (APHUO). The secondary aim is to determine the prevalence of antepartum haemorrhage (APH) and APHUO at Tygerberg Hospital during the period of data collection.

### *Methods:*

The research design is that of a retrospective, descriptive audit. This study took place from 01 April 2015 to 30 September 2015. The patient records of all patients presenting to Tygerberg Hospital Obstetrics Admissions area with APH were analysed. A total of 120 patients presented with APH. The focus of the data collection was with the group of patients presenting with APHUO.

### *Results:*

The prevalence of APHUO was 0.8%. Twenty nine percent of patients presenting with APHUO had a preterm delivery. The neonatal complications of patients with APHUO were related to prematurity. Abruption placentae was diagnosed on placental examination in 8.1% of patients presenting with APHUO.

### *Conclusion:*

This study supports the literature findings that the biggest risk to patients presenting with APHUO is preterm labour. The second risk is a subclinical abruption placentae. The prevalence of APHUO in this study is much lower than the prevalence reported in the literature. This can be attributed to the few number of patients presenting with APHUO in this study.

## Abstrak in Afrikaans:

### *Doelwit:*

Die primêre doel van hierdie studie was 'n beskrywing van die moederlike, fetale en neonatale uitkomst van pasiënte wat by Tygerberg Hospitaal presenteer het met 'n diagnose van antepartum bloeding met onbekende oorsprong (APHUO). Die sekondêre doel was om die prevalensie van antepartum bloeding (APH) en APHUO by Tygerberg Hospitaal, gedurende die dataversamelingsperiode te bepaal.

### *Metode:*

Die navorsingsmetode was 'n retrospektiewe, beskrywende oudit. Die studie periode het plaasgevind tussen 1 April 2015 en 30 September 2015. Die pasiëntrekords van alle pasiënte wat presenteer het by Tygerberg Hospitaal Verloskunde Toelatingsarea met APH is nagegaan. 'n Totaal van 120 pasiënte het presenteer met APH. Die fokus van die dataversameling was op die groep pasiënte wat presenteer het met APHUO.

### *Resultate:*

Die prevalensie van APHUO was 0.8%. Nege-en-twintig persent van pasiënte wat presenteer het met APHUO het voortydse verlos. Die neonatale komplikasies van pasiënte met APHUO was oorwegend verwant aan prematuriteit. Abruptio plasenta is met plasentale ondersoek gediagnoseer in 8.1% van pasiënte wat presenteer het met APHUO.

### *Gevolgtrekking:*

Hierdie studie ondersteun die bevindings in die literatuur dat die grootste risiko vir pasiënte wat presenteer met APHUO, voortydse kraam is. Die tweede risiko is 'n subkliniese abruptio plasenta. Die voorkoms van APHUO in hierdie studie is veel laer as die voorkoms wat in die literatuur aangedui is. Dit mag te wyte wees aan die klein getal pasiënte wat in ons oudit met APHUO presenteer het en mag dus nie noodwendig verteenwoordigend wees nie.

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## List of abbreviations:

APH	Antepartum haemorrhage
aOR	Adjusted odds ratio
APHUO	Antepartum haemorrhage of unknown origin
ARV's	Antiretroviral treatment
CTG	Cardiotocogram
CI	Confidence interval
CS	Caesarean section
EFW	Estimated fetal weight
Hb	Haemoglobin
HIV	Human immunodeficiency virus
Ig	Immunoglobulin
LBW	Low birth weight
SLE	Systemic lupus erythematosus
TBH	Tygerberg Hospital
VL	Viral load
VS	Versus
NCCEMD	National Committee on Confidential Enquiries into Maternal Deaths
NICU	Neonatal Intensive Care Unit
NND	Neonatal death
PPROM	Preterm prelabour rupture of membranes
PTB	Preterm birth
PTD	Preterm delivery
PTL	Preterm labour
RR	Relative risk
SBR	Still birth rate
SFH	Symphysis fundal height

## Literature review:

### *Definition:*

An antepartum haemorrhage is defined as bleeding into or from the genital tract from 24 weeks gestation and onwards, before the delivery of the baby (1) . Antepartum haemorrhage of unknown origin (APHUO) is a specific obstetric entity that poses significant management dilemmas with regards to the timing of delivery, whether it presents as a single episode, recurrent episodes, or as a large volume of blood in the absence of an abnormal fetal heart rate. APHUO is defined as bleeding through the internal cervical os where a placenta previa, placental abruption, show and bleeding from local causes have been excluded (2) . APHUO is also known or referred to as unexplained antepartum haemorrhage (1) .

### *Importance:*

The National Committee on Confidential Enquiries into Maternal Deaths (NCCEMD) publishes Saving Mother Reports on maternal deaths in South Africa in 3-yearly cycles. These reports provide data on the numbers, causes and avoidable factors associated with maternal deaths. Globally, hypertensive disorders and obstetric haemorrhage are major direct causes of maternal mortality. In the Saving Mothers Report for the triennium 2008 – 2010, it is stated that obstetric haemorrhage forms one of the "Big 5" causes of maternal mortality in South Africa. These are in order: non-pregnancy related infections (40.5%), obstetric haemorrhage (14.1%), hypertensive complications in pregnancy (14.0%), pregnancy-related sepsis (9.1%) and medical/surgical complications (8.8%) (3) . In the Saving Mothers Report for 2011 – 2013, it indicated that maternal deaths due to obstetric haemorrhage has increased to 15.8% of the total deaths (4) . Of this group APHUO constituted 3.6% of the 2008 - 2010 deaths and 1.2% of the 2011 - 2013 triennium deaths. The maternal mortality ratio (institutional) in South Africa is estimated to be 126.75/100 000 live births and has decreased since 2008 - 2010 (163.11/100 000 live births). Of the obstetric haemorrhage group, post-partum haemorrhage contributed the largest number of patients, but antepartum haemorrhage is still the cause of a significant number of deaths.

### *Prevalence:*

Tygerberg Hospital is a secondary and tertiary referral hospital for the Metro East area of the Western Cape. In a cohort analytical study to determine the perinatal outcome of women with

antepartum haemorrhage of unknown origin at Tygerberg Hospital by Pattinson (1990), the prevalence of APHUO in the population served by Tygerberg Hospital was 2.6%. The study population was retrieved from the 1989 - 1990 Perinatal Mortality Research Unit data base, which included all patients who delivered at Tygerberg Hospital Maternity services. There were 6850 women in the data base of which 178 women had an APHUO and 534 women were randomly selected from the data base to act as controls (2).

A review article on antepartum bleeding of unknown origin presenting in the second half of pregnancy by Magann, reported the prevalence of APHUO to be 2% (5). The literature search was reviewed from 1966 - 2004. The inclusion criteria only focussed on women presenting with APHUO. A total of 24 abstracts were provided through a MEDLINE search. Only 10 articles were identified from the 24 abstracts that were reviewed, which met the inclusion criteria of APHUO and pregnancy outcomes (5). Of the 10 studies that were reviewed to determine the incidence of APHUO, only 4 studies looked at antepartum bleeding confined to the second and third trimesters. These 4 studies consisted of a total population of 75 001 patients, of which 1391 patients were bleeding in the second and third trimesters of pregnancy (5).

McCormack (2008) performed a retrospective observational study to evaluate the factors associated with APHUO after 24 weeks of gestation and to correlate APHUO with maternal and perinatal outcomes. The study population consisted of singleton pregnancies that delivered at King Edward Memorial Hospital (a tertiary referral centre) in Western Australia between January 1998 and December 2004. During this period, 28 014 singleton deliveries met the inclusion criteria. There were 26 583 deliveries without APHUO and 1431 patients with APHUO. The prevalence of APHUO derived was 5% of the study population (6).

A study done in Scotland by Bhandari (2013) to determine the maternal and perinatal consequences of APHUO, found the prevalence of APHUO to be 10% in their study population. The aim of their study was to explore the risk of adverse maternal and perinatal outcomes in women with APHUO, including pre-eclampsia, induced labour, mode of delivery, preterm delivery, postpartum haemorrhage, admission to neonatal unit and perinatal death. Their study population only included primigravid women after 24 weeks of gestation, to eliminate the confounding effect of parity. The study period was between 1976 and 2010. Two cohorts were used, where the exposed cohort was women with APHUO, and the unexposed

cohort the women who did not have APHUO in their pregnancy. Statistical analysis was carried out on 75 940 women: 7517 women with APHUO, and 68 423 women without APHUO (7).

### *Preterm birth:*

Preterm birth (PTB) is defined as birth before 37 completed weeks of gestation. Preterm birth is a worldwide economic problem, but more so in budget-constrained developing countries. Morbidity and mortality risks are significantly higher in the preterm baby (8). Risks of preterm birth include increased incidences of respiratory distress syndrome secondary to hyaline membrane disease, increased risk of long term neurological damage and neonatal sepsis (9). The risk of morbidity is proportionate to the early gestation of delivery. A study by Wang (2004) compared the clinical outcomes of late preterm infants (35 – 36 completed weeks' gestation) to early term infants (37 – 40 completed weeks' gestation). Data was collected from infants born between October 1997 and October 2000 from the medical record database of the Massachusetts General Hospital (a tertiary teaching hospital). A total of 7474 records were sorted through (6881 records of infants 37 – 40 weeks' gestation and 593 records of infants of 35 – 36 6/7 weeks' gestation). A random selection of 90 late preterm and 95 early term records were assessed. The outcomes assessed were the Apgar scores, clinical outcomes consisting of temperature instability, hypoglycaemia, intravenous infusion, respiratory distress, jaundice, investigation for neonatal sepsis, median lengths of hospital stay and hospital costs. The results showed that the median hospital stay for late preterm and early term infants were similar, but a wide variation of hospital stay was documented for late preterm infants. The Apgar scores were comparable between the two groups. Nearly all the analysed clinical outcomes differed significantly between late preterm and early term infants, with an increased need for evaluation of possible sepsis in the late preterm versus early term infant (36.7% vs 12.6%; OR 3.97). There was also increased hospital costs for late preterm infants (10).

PTB has an association with APHUO found in numerous references in the obstetric literature (5, 11-15). In a review of the literature over 38 years, ten articles investigated the association between APHUO and adverse pregnancy outcomes or management of bleeding in the second half of pregnancy. Of these 10 studies, only 4 provided case-controlled reports of patients presenting with APHUO. The risk of preterm delivery before 37 weeks and the risk of intrauterine fetal demise >20 weeks was also reported on. A significant risk of delivery before

37 weeks' gestation was observed with an overall OR of 3.17 (95% Confidence Interval [CI] 2.76 – 3.64) (5).

Willocks (1971) reviewed 307 women with APHUO from 1964 - 1969. According to this study, the main fetal risk was ascribed to prematurity (11). Batzofin (1984) also did a retrospective analysis of vaginal bleeding in the first half of pregnancy and its outcome. The control group consisted of 6706 patients and 523 cases presenting with vaginal bleeding in the first half of pregnancy were analysed. Their results concluded that bleeding in the first half of pregnancy was associated with more preterm deliveries and low birth weight (12).

A Finnish study (1992) concluded that bleeding during the second trimester increased the risk for PTB with a calculated OR 2.9 (95% CI 1.9 – 4.6), low birth weight OR 4.1 (95% CI 2.6 – 6.4) and congenital malformations OR 2.9 (95% CI 1.7 – 4.7). The study was a prospective birth cohort over one year, consisting of 8718 singleton pregnancies with vaginal bleeding in the first, and/or second trimester of pregnancy. The percentage of patients who bled vaginally in the second trimester of pregnancy constituted 2.4% of their study population (13).

Signore (1998) published a study examining the ultrasonographic findings in the second trimester of pregnancy and the perinatal outcomes in patients presenting with second trimester vaginal bleeding. A retrospective case cohort study was performed in 167 patients who presented with antepartum haemorrhage between 13 and 26 weeks of gestation. They found that second trimester vaginal bleeding was associated with a higher risk of preterm delivery (PTD) (relative risk [RR] 1.9, 95% CI 1.4 – 2.8) (14).

A retrospective case report by Chan (1999) examined 718 cases of singleton pregnancies diagnosed with APHUO after 24 weeks of gestation in Hong Kong, China. These patients were compared to 718 singleton pregnancies who delivered during the same time as the study cohort, without any form of antepartum haemorrhage. The study and control group were matched for age, ethnicity and parity to eliminate the effect of these confounding factors. This study concluded the main adverse outcome in patients presenting with APHUO to be PTB and its related sequelae (15). In the group with APHUO, 6.9% delivered before 34 weeks (early preterm birth) and 15.8% delivered before 37 weeks gestation (late preterm). The control group had 1.25% of patients delivering before 34 weeks and 4.7% delivering before 37 weeks gestation (15).

A retrospective cohort study by Yeung (2012) determined the risk of PTD prior to 34 weeks in women presenting with APHUO. The risk was increased three to five-fold for delivery before 34 weeks gestation (16). This study was conducted at a regional hospital in Hong Kong, during the study period of January 1995 to December 2004. All singleton pregnancies who presented with their first episode of APHUO after 24 weeks and before 34 weeks of gestation were included in their study. They found the rate of PTB before 34 weeks and before 37 weeks significantly increased in women who had APHUO before 34 weeks of gestation. The OR for PTB prior to 34 weeks was 5.1 and before 37 weeks 3.2. Risk factors for preterm labour with APHUO before 34 weeks included a history of previous preterm deliveries, uterine contractions in the index pregnancy, persistent bleeding at the time of admission and two or more episodes of APHUO (16).

A strong association was also seen with PTD in patients with APHUO in a more recent study by Bhandari (2013). PTD occurred in 14.1% of the group presenting with APHUO compared to 6.4% of the control group. The risk of PTD in the study population remained elevated even after adjusting for confounding factors (aOR 2.30; 95% CI 2.11 – 2.50). No association was found with hypertensive disorders of pregnancy, preterm prelabour rupture of membranes (PPROM), or elective and emergency caesarean sections (7).

#### *Low birth weight:*

In the cohort analytical study by Pattinson (1990) analysing the outcome of women with APHUO, they found no increased risk for low birth weight (LBW) babies, PPRM or low 5-minute Apgar score (2).

An Australian study found that women with APHUO had significantly smaller babies (2940 vs 3325g, p-value < 0.001). This difference is statistically but not clinically significant (6).

The study by Batzofin (1984) evaluating the effect of vaginal bleeding in early pregnancy, showed that small infants weighing < 2500g were twice as common in the study group as the control group (RR 2.09 [P = 1.0]). The author concluded that the greatest risk to a pregnancy complicated with vaginal bleeding prior to 20 weeks gestation, is premature delivery before 37 weeks gestation (RR 2.07, [P = 3.1]), which is a contributing factor for a lower birth weight, depressed 1minute Apgar score and increased perinatal mortality (12).

However, in the study by Sipila (1992) where singleton pregnancies were evaluated with bleeding in the first and or second trimester of pregnancy, the LBW rate was increased 3-fold among the patients who had vaginal bleeding. In this study, there was no association between the patients who had antepartum haemorrhage and perinatal mortality (13) .

Ogueh (1998) did a retrospective analysis to determine the value of hospitalisation in APH/UO. In their study the average birth weight centile was 53.8% of their study population, suggesting the APH/UO does not commonly lead to placental insufficiency. The study population included all cases of APH/UO that presented at the Chelsea and Westminster Hospital from February 1993 to December 1995. During this period, there was a total of 7523 deliveries. The total number of APH/UO cases in this study group was 126 (17) .

In the more recent analytical cohort performed by Bhandari (2013), LBW had a 2-fold increased risk in the presence of APH/UO. However, after adjusting for confounding factors, the LBW risk was not statistically significantly different, with an adjusted OR of 0.9 (95% CI 0.79 – 1.03) (7) .

#### *Stillbirth and perinatal death risk:*

APH/UO is also associated with an increased incidence of intra-uterine and perinatal deaths (14). This is a devastating outcome to any mother and one of the key aims of all obstetricians to prevent these complications from occurring.

In a review published in 2005, 4 studies were identified comparing the stillbirth rate (SBR) in women with or without APH/UO during pregnancy. Having an APH/UO increased the risk of a stillbirth, with an OR 2.09 (CI 1.43 – 3.06) (5) .

Signore (1998) performed a retrospective case control study on 167 women who had an ultrasound examination when they presented with an episode of APH in the second trimester of pregnancy. The control group consisted of 167 patients selected from the unit's perinatal database. The study patients were identified through a review of the ultrasonography database from the Department of Obstetrics and Gynaecology at the University of Florida. All patients between 13 and 26 weeks' gestation with singleton pregnancies undergoing an ultrasound examination for the indication of antepartum haemorrhage between 1989 and 1994 were potential subjects. The control patients were all singleton pregnancies who had no vaginal bleeding in their current pregnancy, and had an ultrasound examination during their second

trimester. The study concluded that a second trimester APH increased the risk of perinatal death (RR 5.4, 95% CI 2.1 – 13.7). The perinatal mortality rate in the group with APH was 162:1000 compared to 30:1000 in the control group (14).

In the Ninth report on perinatal care in South Africa (Saving Babies Report 2012 – 2013), it emphasised that antepartum haemorrhage as the primary obstetric cause, is one of the leading causes of perinatal deaths. The top three causes of perinatal mortality in the lower levels of care (primary health care centre, district hospital and regional hospital) are unexplained stillbirths, spontaneous preterm labour and intrapartum asphyxia. In the higher levels of care (provincial tertiary and national central academic hospitals), the top three causes are complications relating to antepartum haemorrhage, hypertension and spontaneous preterm labour (8).

#### *Abruptio placentae:*

Abruptio placenta remains a concern in any patient presenting with APH as there might be no predisposing factors, and can have a poor outcome on the mother and fetus. In a local study done at Tygerberg Hospital, the clinical diagnosis of an abruptio placenta in patients presenting with APH/PHUO was made in 9.5% of cases within 1 hour of admission (2). On examination of the placenta after birth, 7% of patients with APH/PHUO had evidence of abruptio placentae, compared to 2% in the control group. The study concluded that the clinical risk of an abruptio placentae decreased markedly after 24 hours of presentation with an APH/PHUO (2).

The available literature has differing results. McCormack found a similar incidence of intrapartum placental abruption for patients with and without APH/PHUO (0.4% cases without APH/PHUO and 0.3% cases with APH/PHUO, p-value 0.4). In the same study, patients with pre-eclampsia and gestational diabetes had a reduction of APH/PHUO. In the group with no APH/PHUO, 11% had pre-eclampsia compared to 8% in the group who had APH/PHUO (p-value < 0.001). In the group with no APH/PHUO 5% of patients had gestational diabetes compared to 3% in the group of patients with APH/PHUO (P < 0.001). A possible explanation by the authors for this results was proposed that these patients subsequently developed abruptio placentae and were classified that way (6).

### *Congenital anomalies:*

An increased incidence of fetal congenital anomalies has been described in pregnancies complicated by APHUO. The review performed by Megann included 2 studies describing this risk. Both these articles concluded that there is an increased risk for fetal congenital anomalies in women presenting with APHUO (13, 15). The OR was 1.42 (95% CI 1.07 – 1.87) (5).

The study by Sipila (1992) examined the effect of first and or second trimester vaginal bleeding on pregnancy outcome. Their findings were that bleeding in the second trimester was associated with a poorer pregnancy outcome. The adverse outcomes included an increased risk of PTD, LBW and congenital abnormalities (OR 2.9, 95% CI 1.9 – 4.6, OR 4.1 CI 2.6 – 6.4 and OR 2.9, 95% CI 1.7 – 4.7 respectively) (13).

A retrospective review by Chan (1999) of 718 cases of singleton pregnancies complicated by APHUO, concluded that more congenital abnormalities were present in the APHUO group. There were 7 neonatal deaths (NND) of which 2 were attributable to prematurity. The remaining 5 cases were secondary to lethal congenital anomalies namely: small bowel atresia, achondrogenesis and multiple congenital abnormalities (15). This study concludes that screening for congenital fetal abnormalities are an important part of the management in cases with APHUO, especially in cases where a detailed anatomical survey in the second trimester was not performed (15).

### *Induction of labour:*

Historically APHUO was managed by induction of labour at 38 weeks gestation. Willocks investigated this and found that this practice did not decrease the fetal loss number in the case of minor APHUO episodes (11). Of the 307 cases with APHUO that were studied, he concluded that there was no fetal loss which could have been avoided by routine induction of labour at 38 weeks gestation. In this group of 307 cases, 311 infants were born. The total fetal loss in this group was 14.2% (13 of 311 infants). There were 8 stillbirths and 5 neonatal deaths. Six stillbirths and 4 neonatal deaths were related to prematurity. The remaining 2 stillbirths were attributed to a baby weighing 4.7 kilograms with shoulder dystocia, and a known case with placental insufficiency at 39 weeks. The one remaining neonatal death delivered at 35 weeks and died from respiratory distress syndrome (11).

In the study by Chan (1999) the induction of labour at term rate was higher in the group with APHUU. In this group, 15.7% were induced for the indication of previous APH in the index pregnancy. They also found that routine induction of labour at term for patients who presented with APHUU in their pregnancy has not been shown to improve the outcome of the babies. When the Apgar scores were compared between the APHUU group and the control group, no differences were revealed when deliveries before 34 weeks were excluded (0.3% vs 0.2% for the control group). When all deliveries in the study group were included, there were more babies with an Apgar score of less than 7 at 5 minutes after birth, accounting for 2% in the group with APHUU vs. 0.5% in the control group (p-value < 0.025). The author contributed this finding to the larger number of preterm deliveries in the group with APHUU. The perinatal mortality rate in the group with APHUU was 13.9/1000 births, vs 6.9/1000 births in the control group. This difference however was not statistically significant (15). When neonatal outcomes were compared between the study and control group, the incidences of neonatal intensive care admissions were higher as well as prematurity related complications, because of the higher proportion of preterm deliveries in the group with APHUU. The difference however was not statistically significant because of the small number. The number of deliveries before 34 weeks in the group with APH was 50 of 718 deliveries (6.6%), compared to 9 of 718 deliveries (1.25%) in the control group (p-value < 0.001) (15).

Another study conferred no benefit for hospitalization in patients with APHUU. The factors investigated were the presence of recurrent haemorrhage, gestation at delivery, birth weight and a difference in 5-minute Apgar score. In-patient management was of no benefit in the absence of heavy or repeated bleeding, fetal or maternal compromise, or the onset of labour (17).

#### *Neonatal morbidity:*

In an Australian study looking at the outcomes of pregnancies complicated by APHUU, they found that neonates of patients with APHUU were at increased risk for admission to an intermediate level II nursery (13% vs. 16% in the control group with no APHUU), or NICU (20% vs. 6% in the control group with no APHUU [p-value < 0.001]). Other risks for neonates born to mothers with APHUU were hyperbilirubinaemia (6% vs. 5% [p-value = 0.029]), perinatal deaths (2.2% vs. 1.2% [p-value = 0.001]), early neonatal deaths (<7 days, 1.3% vs. 0.3% [p-value, 0.001]) and late neonatal deaths (0.145 vs. 0.02% [p-value = 0.005]). The

women with APHUU were more likely to have a PTD with an OR  $\geq 4$ . In this study population, 40% of patients (567 of 1431 patients) in the study group had PTD compared to 15% (3897 of 26 583 patients) in the control group ( $P < 0.001$ ) (6).

In the study by Chan (1999), the incidence of neonatal morbidity was increased because of the higher proportion of PTD. However, this was not statistically significant because of the small number of cases with neonatal morbidity (15).

*Number or frequency of APHUU:*

A large study consisting of 32 162 deliveries investigated APHUU after 24-weeks' gestation over 5 consecutive years. In the majority of cases, only 1 episode of APHUU had occurred in each pregnancy and in 3% of cases, recurrent further episodes of bleeding were recorded. In all the cases of APHUU, the patients were hemodynamically stable, with light or minimal bleeding reported. In the group with repeated bleeding, there were no associated adverse pregnancy outcomes including preterm labour (PTL) before 34 weeks of gestation (15).

In a retrospective analysis to determine the need for hospitalisation in APHUU, 15.8% (20 of 126 patients with APHUU) had recurrent bleeding. In all instances, the recurrences were mild, except in 1 patient who had moderate APHUU, where the pregnancy continued to term. One patient with a twin pregnancy and recurrent bleeding went into preterm labour at 27 weeks gestation, requiring a caesarean section for the second twin for a transverse lie. The only patient in the study group who had 3 episodes of APHUU required an emergency caesarean section at 35 weeks because of an abnormal CTG (17).

## Retrospective, Descriptive Study:

### *Aim of the study*

The primary aim of this study is to describe the outcome of patients admitted to Tygerberg Hospital (TBH) with a diagnosis of APH. The secondary aim is to determine the prevalence of antepartum haemorrhage (APH) at TBH out of all obstetric admissions during the six months of data collection and to determine the proportion of patients with APH within the larger group with APH.

The purpose of this study is to analyse APH and describe the maternal outcomes as well as the fetal and neonatal outcomes until the day of discharge from Tygerberg Hospital. The significance of this study in our local population may add in-depth knowledge and or management changes to Tygerberg Hospital's protocol on the management of APH. The analysed outcomes of this study would also be of benefit when counselling patients regarding the expected outcomes of a pregnancy complicated by an APH.

### *Methods:*

The research design is that of a retrospective descriptive audit. All patients presenting with an APH at TBH Obstetric Emergency Unit during the data collection period between 1 April 2015 and 30 September 2015, were identified from the Obstetrics Emergency admissions register. The cases were then individually analysed. The clinical information about the mother and new born baby has been extracted from their files and captured on a structured data sheet. Data analysis was subsequently performed in retrospect.

After identification of the patients with APH at  $\geq 24$  weeks' gestation, the mother and linked baby files were reviewed. The captured data was transferred to a Microsoft Excel sheet, which was used for data analysis. The incidence of APH at Tygerberg Hospital has been calculated using the total number of antenatal admissions during the study period as the denominator. Incidences were classified according to the cause of antepartum haemorrhage i.e. placenta previa, abruptio placenta, labour, local causes or of unknown origin. The proportion of APH in the larger group of APH was calculated. Maternal and fetal/neonatal data on outcome was systematically collected.

### *Statistical methods:*

Statistical analysis was performed using the IBM SPSS version 24 (IBM, Armonk, NY, USA). A p-value of  $<0.05$  was regarded as statistically significant. Categorical data were summarised

using frequency tables and percentages. Continuous data were checked for normality of distribution using histograms, normal probability plots, and with Kolmogorov-Smirnov tests. Normally distributed variables were summarised using mean, standard deviation and range, while skewed data were summarised with the median, inter-quartile range and range. For hypothesis testing involving two categorical variables, Pearson's chi square or Fisher's exact tests were used. Comparison on means between two groups was achieved using students' T-tests or Mann Whitney tests, while three/more groups were compared with one-way ANOVA or Kruskal-Wallis tests.

*Ethical considerations:*

The study was approved and registered by the Human Research Ethics Committee of the Faculty of Medicine and Health Sciences, Stellenbosch University (S14/09/184).

In view of the retrospective audit design of the study, a waiver of consent was requested and granted by the Human Research Committee of Stellenbosch University. All information of patients was stored anonymously and names were replaced with a study number. The document correlating the patient name and number was stored in a password controlled file and only the primary investigator had access to it.

## Results:

This study was conducted from 01/04/2015 to 30/09/2015. There was a total of 4812 admissions from the obstetrics emergency area. A total of 120 patients were identified presenting with an APH to Tygerberg Hospital obstetrics emergency admissions area. APHUO formed 35% of the admissions with APH and consisted of 37 patients. The prevalence of APHUO at during this study period was 0.8%. Data collection was possible for 105 patients who presented with APH and 15 folders were lost/missing/incomplete. Of the 15 cases which could not be used for data collection, one patient record was incomplete, but the diagnosis of placenta previa was known. The remaining 14 folders was missing or had incomplete maternal records at Tygerberg Hospital. The maternal and linked neonate files were accessed via the electronic patient admission and discharge database. Of the 14 missing cases, 9 patients delivered at Tygerberg hospital, 1 patient delivered at Ceres hospital, 1 delivered at Khayelitsha District Hospital, 2 delivered at Karl Bremer hospital and 1 patient delivered at Helderberg Hospital. All these hospitals have level I obstetric facilities, apart from Tygerberg Hospital. Effort was invested in finding missing files at the records departments of the hospitals involved.

The maternal characteristics at study entry are shown in Table 1

**Table 1: Demographic characteristics of the study population (all antepartum haemorrhages)**

<b>Variable</b>	<b>n = Number of median (range)</b>	<b>Percentage (%)</b>	<b>Number of available data<sup>1</sup></b>
<b>Age</b>	28.62 (17 – 44)		
<b>Gravidity</b>	2 (1-7)		
<b>Parity</b>	1 (0-6)		
<b>Previous miscarriage</b>			114
<i>None</i>	91	79.8	
<i>One</i>	18	15.8	
<i>Two</i>	5	4.4	
<b>Booked</b>			113
<i>Yes</i>	107	94.7	
<i>No</i>	6	5.3	
<b>Number of ANC visits</b>	6 (0 – 12)		100
<b>Smoking</b>			104
<i>Yes</i>	32	30.8	
<i>No</i>	72	69.2	

<sup>1</sup> The total number of patients was 120. The difference between this number and the total number of available data reflects the missing data.

The Rhesus status was positive in 99% of patients (n=103 of 104 with available data). Two patients tested positive for syphilis (n=2 of 105 with available data). HIV reactive patients contributed 22.6% of patients (n=24 of 106 with available data). The remaining medical and surgical history of the study population is depicted in Table 2.

**Table 2: Medical and surgical history of the study population (all antepartum haemorrhages)**

<b>Variable</b>	<b>n = number or median (range)</b>	<b>Percentage (%)</b>	<b>Number of available data<sup>1</sup></b>
<b>Previous medical history</b>			99
<i>Diabetes Mellitus</i>	1	1	
<i>Asthma</i>	3	3	
<i>Epilepsy</i>	2	2	
<i>Tuberculosis</i>	3	3	
<i>Hypertension</i>	1	1	
<i>None</i>	89	89.9	
<b>Previous surgical history</b>			102
<i>Uterine surgery<sup>a</sup></i>	16	15.6	
<i>Abdominal surgery<sup>b</sup></i>	2	1.9	
<i>Other</i>	3	2.9	
<i>None</i>	81	79.4	
<b>Previous caesarean section</b>			105
<i>Yes</i>	16	15.2	
<i>No</i>	89	84.8	
<b>Caesarean section</b>			105
<i>None</i>	89	83.8	
<i>One previous</i>	13	12.4	
<i>Two previous</i>	3	3.8	

<sup>1</sup> The total number of patients was 120. The difference between this number and the total number of available data reflects the missing data.

a Uterine surgeries: 16 previous caesarean sections

b Abdominal surgeries: 1 x appendicectomy, 1 x salpingectomy

c Other: 1 ear, nose and throat surgery, 1 x cardiac surgery (commissurotomy), 1 x neurosurgery

The gestation of the first episode of APH was available for analysis in 105 cases. The median gestation at first haemorrhage was 31 completed weeks (range 24 – 41 weeks). Fifteen case records were incomplete in terms of the gestation of first APH. Gestation was ascertained by sure dates in 3% of cases (3 out of 105 cases), 64% by an early ultrasound (ultrasound done  $\leq$  24 weeks gestation), 4% by SFH (symphysis-fundal height), 28% by a late ultrasound (ultrasound performed  $>$  24 weeks' gestation) and 1% by a Ballard score. Information with regards to the type of haemorrhage during the APH follows in Table 3.

**Table 3: Antepartum haemorrhage characteristics**

<sup>1</sup> The total number of patients was 120. The difference between this number and the total number of available

<b>Variable</b>	<b>n = number or median (range)</b>	<b>Percentage (%)</b>	<b>Number of available data<sup>1</sup></b>
<b>Volume of haemorrhage at first presentation</b>			101
<i>Spotting</i>	33	32.7	
<i>Half soaked pad</i>	32	31.7	
<i>Soaked pad</i>	24	23.8	
<i>Clothes soaked</i>	4	4	
<i>Bed soaked</i>	1	1	
<i>Not documented</i>	7	6.9	
<b>Cause of APH</b>			102
<i>Placenta previa</i>	13	12.7	
<i>Abruptio placentae</i>	19	18.6	
<i>Local lesion</i>	5	4.9	
<i>APHUO</i>	37	35.3	
<i>Labour</i>	28	27.5	
<i>Other<sup>d</sup></i>	1	1	
<b>Antenatal comorbidities</b>			104
<i>Gestational diabetes mellitus</i>	1	1	
<i>Anaemia (Hb &lt; 11.5)</i>	27	26	
<i>Hypertension</i>			
<i>Pre-eclampsia</i>	4	3.8	
<i>None</i>	8	7.7	
<i>Other<sup>e</sup></i>	55	52.9	
	9	8.7	

data reflects the missing data. <sup>d</sup> Other: urinary tract infection

<sup>e</sup> Other: 1 x Pregnancy induced hypertension, 2 x systemic lupus erythematosus, 1 x previous history of an abruptio placentae, 1 x known cardiac surgery, 2 x substance abuse, 1 x known brain surgery, 1 x maternal syphilis infection.

Of the 120 patients with APH, fetal data collection was available for 104 cases. On evaluation of the CTG at the presentation of the first episode of APH, 76% of fetuses had a normal CTG (79 of 104 cases). A suspicious CTG was documented in 4% of cases (4 of 104 cases) and a pathological CTG was present in 3% (3 of 104 cases). Cardiotocographs were analysed and reported as per The National Institute for Health and Care of Excellence Guidelines of year 2014. In gestations below 27 weeks (peri-viable), only an ultrasound was performed to confirm the presence or absence of the fetal heart activity. Fetal demise was confirmed in 12.5% (13 cases) and 4.8% of cases were still alive (total number of peri-viable fetuses was 18 cases out of 104 cases with available data).

Fetal growth restriction was documented in 1 case with ultrasound features of uteroplacental insufficiency. The fetus had severe asymmetrical growth restriction (EFW 704 grams at 28 weeks gestation), the umbilical artery doppler was above the 95<sup>th</sup> centile with periods of absent end diastolic flow and centralization of the middle cerebral artery (pulsatility index of the umbilical artery doppler: 1.76 and of the middle cerebral artery 1.77, with a placental-cerebro ratio of 1.01) and cardiomegaly. There were two sets of twins in the group with APH - one monochorionic diamniotic and one dichorionic diamniotic twin pregnancies. Ninety-three percent of fetuses did not have any known structural or growth abnormalities (97 of 104 cases).

Fetal anomalies were known in 3.7% (4 of 104 cases). Two fetuses had congenital anomalies in the APHUO group and 2 fetuses had congenital anomalies in the group where APH was caused by a local lesion.

In the group with APHUO, one fetus was diagnosed with bilateral hydronephrosis and mild nuchal oedema at a 21-week detailed anatomy ultrasound. The maternal serology for Toxoplasmosis IgG and IgM was negative and Cytomegalovirus (CMV) IgG positive and IgM was negative. An amniocentesis for karyotyping was performed which was normal. The second case had mild nuchal oedema that remained stable on follow up ultrasound at 25 weeks. Maternal serology for CMV and Toxoplasmosis was negative. The patient declined invasive testing (amniocentesis).

In the group with APH secondary to a local lesion, one fetus had hyperechogenic bowel at the detailed anatomy scan at 19 weeks. The mother declined invasive testing for karyotyping. Maternal serology for CMV and Toxoplasmosis was negative. The second case was a fetus diagnosed with a left sided (and no right sided) superior vena cava, discordance in ventricular

and great artery size with a suspected hypoplastic aortic arch. Amniocentesis results showed a normal karyotype and negative for 22q-microdeletion.

The median number of days for hospitalization in patients with APHUO was 1 day (range 0 – 14 days). Twenty seven percent (10 of 37 of patients admitted with APHUO) delivered during admission with the first episode of APHUO. The maternal outcomes in the group of patients presenting with an APHUO are seen in Table 4.

**Table 4: Maternal outcomes in patients diagnosed with antepartum haemorrhage of unknown origin (total number of patients with APHUO = 37)**

<b>Variable</b>	<b>N = number or median (range)</b>	<b>Percentage (%)</b>
<b>Recurrent bleeding</b>		
<i>Yes</i>	14	37.8
<i>No</i>	17	45.9
<i>Not applicable</i>	6	16.2
<b>Volume of haemorrhage (pad)</b>		
<i>Spotting</i>	8	24.3
<i>Half soaked</i>	4	10.8
<i>Soaked</i>	2	5.4
<i>Not applicable<sup>f</sup></i>	22	59.5
<b>Delivery gestation (weeks)</b>	38 (26 – 41)	
<b>Delivery gestation</b>		
<i>Below 34 weeks<sup>g</sup></i>	8	21.6
<i>34 weeks and above</i>	29	78.4
<b>Induction of labour</b>		
<i>Yes</i>	11	29.7
<i>No</i>	26	70.3
<b>Spontaneous delivery</b>		
<i>Yes</i>	16	43.2
<i>No</i>	21	56.8
<b>Caesarean section</b>		
<i>Yes</i>	12	32.4
<i>No</i>	25	67.6
<b>Abruption of placenta</b>		
<i>Yes</i>	3	8.1
<i>No</i>	25	67.6
<i>Not documented</i>	9	24.3

f: 22 patients did not have recurrent bleeding.

g: 11 of 37 patients with APHUO (29.7%) delivered before 37 weeks gestation.

Of the 8% (3 out of 37) patients who did have a placental abruption, the clinical presentation will be described below:

- a. The first patient was a 35-year-old gravida 2 para 1 at 36 weeks gestation. She presented with her second episode of APHUU, lower abdominal pain and no cervical dilatation. Her first episode of APHUU was 6 weeks prior to the last episode (at 30 weeks gestation). She had no co-morbidities and was only taking antiretroviral treatment for HIV. The admission CTG was pathological.–An emergency caesarean section was performed and 30% abruptio was seen on the placental surface.
- b. The second patient who experienced the complication of abruption placenta, was a 40-year-old gravida 5 para 4. The pregnancy gestation was uncertain and the estimated fetal weight was 973g on ultrasound (the patient had no prior antenatal care in the index pregnancy). She presented with APHUU (moderate vaginal bleeding - pad and linen saver soaked) in the presence of pre-eclampsia with severe features. The CTG became pathological (reduced beat to beat variability, no accelerations and recurrent unprovoked decelerations) within 18 hours of admission. Abruptio placenta was diagnosed at caesarean section (percentage of placental abruption was not documented).
- c. The third patient who developed a placental abruption was a 20-year-old primigravida at 31 weeks gestation who presented with APHUU (ongoing mild vaginal bleeding) also in the presence of pre-eclampsia with severe features. Induction of labour was commenced after a full course of steroids (2 doses of betamethasone 12mg intramuscularly, 24 hours apart), on suspicion of a subclinical abruptio placentae. A caesarean section was performed due to a pathological CTG (recurrent late decelerations and reduced beat to beat variability). A retroplacental clot (approximately 100 ml organized retroplacental blood clot – percentage of the placental abruption was not documented) was observed at the time of the caesarean section.

Patients who were admitted with APHUU and were hemodynamically stable after admission, were admitted to the antenatal ward for observations. Monitoring of the fetus (when viable)

consisted of 6-hourly CTG's. Of the 37 patients admitted with APHUO, 78.4% of CTG's (29 of 37 patients) remained normal. Two CTG's (5.4%) became pathological, and 6 patients did not require CTG monitoring in the antenatal ward - four of the 6 patients remained in labour ward as labour was subsequently diagnosed and the remaining 2 patients were of a gestation below 27 weeks and therefore no CTG monitoring was performed. Cardiotocographs were interpreted using the NICE Guidelines of 2014 (18).

Antenatal corticosteroids were administered in 62.2% of patients (23 of 37 cases). Of the remaining 14 cases who did not receive antenatal steroids, 11 patients were  $\geq 34$  weeks gestation. Of the remaining 3 patients, 1 patient presented at 24 weeks gestation, 1 patient had APHUO at 32 weeks gestation where vaginal spotting was reported by the patient, but no vaginal bleeding noted on vaginal examination and no ongoing bleeding during the hospital stay for maternal and fetal observations and 1 patient presented with APHUO at 27 weeks gestation - no reason was documented as to why steroids were not administered. The patient presented again at 31 weeks gestation with APHUO. Steroids were administered during the second episode of APHUO.

The neonatal outcomes of patients presenting with APHUO are described in Table 5.

**Table 5: Neonatal outcomes of patients who presented with APHUO (n=37)**

<b>Variable</b>	<b>n = Number or median (range)</b>	<b>Percentage (%)</b>
<b>Birthweight (grams)</b>	2980 (730 – 4460)	
<b>Sex</b>		
<i>Male</i>	20	54.1
<i>Female</i>	17	45.9
<b>Apgar score at 1 minute</b>		
<i>&lt; 7</i>	2	5.4
<i>7 or more</i>	35	94.6
<b>Apgar score at 5 minutes</b>		
<i>&lt; 7</i>	1	2.7
<i>7 or more</i>	36	97.3

Six neonates born to patients who had APHUO had complications. A description of their complications will follow here:

- a. A 28-week neonate was delivered vaginally, after presenting with an APHUO and PPRM, followed by labour 13 days after admission. Antenatal corticosteroids were administered before delivery. The mother was on antiretroviral therapy (for HIV) and her viral load was suppressed. Postnatal complications: apnoea, non-invasive ventilation which failed, intubation, surfactant administration, NICU admission and hyperbilirubinaemia. Non-invasive ventilation is utilized as continuous positive airway pressure (CPAP).
- b. A neonate was born at 32-weeks' gestation after presenting with APHUO, administration of antenatal corticosteroids and PPRM 2 days after admission. The presence of a maternal multifibroid uterus was the only comorbidity. An emergency caesarean section was indicated for a pathological CTG (tachycardia, atypical variable decelerations). Postnatal complications included: Hyaline membrane disease Grade I (HMD), CPAP and hyperbilirubinaemia.
- c. A patient presented at 27 weeks gestation with pre-eclampsia and an APHUO. The fetus was asymmetrically growth restricted, umbilical artery Doppler above the 95<sup>th</sup> centile with periods of absent end-diastolic flow, redistribution to the middle cerebral artery, cardiomegaly and oligohydramnios. Antenatal corticosteroids were administered and an emergency caesarean section performed at 29-weeks for a pathological CTG. Complications postnatal included: HMD, CPAP, NICU admission, hyperbilirubinaemia, blood transfusion, nosocomial sepsis, necrotizing enterocolitis (hemi-colectomy).
- d. The fourth neonate was born at 26 weeks and 4 days' gestation according to a late ultrasound. The mother presented with pre-eclampsia and an APHUO, therefore antenatal corticosteroids were administered. The delivery route was an emergency caesarean section, indicated after a pathological CTG trace (reduced short term variability and atypical variable decelerations). Postnatal complications included: Respiratory distress syndrome (RDS), CPAP and hyperbilirubinaemia.

- e. The fifth neonate was born at 31 weeks' gestation after admission with pre-eclampsia and an APHUO. Antenatal corticosteroids were administered and delivery ensued with the suspicion of a sub-clinical abruptio placentae. Neonatal complications included: RDS, CPAP and hyperbilirubinaemia.
- f. The last case was a neonate born at 38 weeks gestation with recurrent APHUO, lower abdominal pain and prelabour rupture of membranes. The first episode of APHUO occurred 2 weeks before this admission. An emergency caesarean section was performed after the CTG was pathological (reduced short-term variability and atypical variable decelerations). Postnatal complications included anaemia, blood transfusion and hyperbilirubinaemia. The neonate was admitted with asymptomatic anaemia with an Hb of 6.9, requiring investigations for the anaemia and a blood transfusion, complicated by neonatal jaundice requiring phototherapy.

None of the neonates with hyperbilirubinaemia needed an exchange transfusion and all responded appropriately to phototherapy.

## Discussion:

### *Prevalence*

The prevalence of APH/PHUO in this present study population is 0.8% which may be attributed to the small number of patients in this study. This is much less than the prevalence reported in the literature, where Pattinson's study had a prevalence of 2.6% (2), Magann's study had prevalence of 2% (5), and the study by McCormack had a prevalence of 5%<sup>6</sup>. Of the 102 cases available for data collection, APH/PHUO was the most common cause of APH, consisting of 35% of all patients admitted with APH. This is similar to the data of McCormack (6), Chan (15) and Ogueh (17), where APH/PHUO also constituted the majority of cases of APH. In the study by Chan (15), 38% of all APH was due to APH/PHUO, Ogueh (17) found 72% of APH to be due to APH/PHUO, and in the study by McCormack (6), 69% of patients with APH were secondary to APH/PHUO.

### *Demographics:*

In the present study, the median age of patients presenting with APH was 28 years, which is comparable to the median age of patients presenting with APH in the study by Chan (30 years) (15) and is slightly more than the median age in the study by Bhandari (25 years) (7).

Our data found an interesting finding about the risk for previous miscarriage and the association with antepartum haemorrhage. Patients with one or two miscarriages comprised nearly 20% which is one in five of the patients with a diagnosed antepartum haemorrhage. Our study was performed in a population of patients with good antenatal care which is confirmed by the fact that 95% of the patients had at least one visit to antenatal care. In our population there was no clear association with underlying medical conditions and the risk for antepartum haemorrhage. However data should be interpreted with caution because the rate of underlying medical conditions in the general population is not known. Our data does not support caesarean section and previous uterine surgery as a significant risk factor which is confirmed by only 16% of these patients having a previous caesarean section. However this data should be interpreted with caution because we don't know the rate of caesarean section in our population. The caesarean section rate at Tygerberg hospital is 49%.

The causes of antepartum haemorrhage in the study population was quite widespread. One in five patients who presented with APH had an abruptio placentae. This is a significant number of patients, therefore care should be taken to exclude an abruptio placentae as the consequences to the fetus - fetal distress, necessitating caesarean section or in the worst case scenario, an intrauterine demise – and to the mother may be dire.

When a patient presents with APH, it is important to aim to determine a cause. Therefore, a placenta previa can be carefully excluded with an ultrasound examination and examination of the perineum, vulva, vagina and cervix can exclude APH due to local lesions or trauma. For the diagnosis of an abruptio placentae, one should be careful not to rely solely on ultrasound findings of a retroplacental haematoma. Rather, a thorough clinical and abdominal examination, as well as assessing for fetal distress.

APH secondary to a Placenta previa accounted for 12.7% of the study population, abruptio placentae for 18.6%, APH due to a local lesion/trauma 4.9% and APHUO accounted for 35.3% of all cases of APH. Twenty seven percent of our study group of patients with APH progressed on to labour. Therefore, not all causes of APH may be complicated, especially when presenting with APHOU at term. The study by Ogueh (17) also concluded that APHUO at term is most likely a “show”.

The volume of haemorrhage did not accurately predict the eventual cause of the antepartum haemorrhage. With regards to the volume haemorrhage at first presentation, two thirds of the study population presented only with mild APH, namely spotting, or a half-soaked pad. Only one patient of the study population of APH had severe haemorrhage with a bed soaked with blood.

When evaluating the antenatal co-morbidities in the group of patients that presented with antepartum haemorrhage, almost a third of these patients had a haemoglobin of  $<11.5\text{mmHg}$ . This is very important in the management of a patient with APH as in some cases these patients presents with a repeated episode of APH. Thus, adequate management including correcting anaemia in the pregnant patient is important. More than half of our study population did not have any antenatal co-morbidities.

Of the patients who required a CTG with the first presentation of APH, 76% of the CTG's remained normal. This is reassuring, bearing in mind the rate of one in five of patients presenting with APH is secondary to an abruption. A suspicious CTG was documented in 4% of cases, in pathological CTG in 3% of cases.

#### *Gestation of first haemorrhage and PTD:*

The median gestation of first haemorrhage in the group with APH is 31 weeks. This is very important, as literature concluded with APH and particularly APHOU, there's an increased risk of preterm delivery. The association with preterm delivery has been found in numerous references in the obstetric literature. Willocks (11) stated that the main fetal risk was ascribed

to prematurity in patients who present with APHUU. Signore (14) found that second trimester vaginal bleeding was associated with a higher risk of preterm delivery with a relative risk of 1.9. In contrast to the study by Chan (15), in this current study the risk of preterm delivery is much higher. One in five patients (22%) delivered before 34 weeks, compared to 6.9% of patients that delivered before 34 weeks in the study done by Chan. In Chan's study, 23% of patients with APHUU delivered before 37 weeks, compared to this present study where 29.7% of the deliveries were before 37 weeks in patients with APHUU.

With the high risk of preterm deliveries in this study one can agree with the study by Pattinson (2) which concluded that with his study of patients with APHUU, once an abruptio placentae has been excluded the only other significant risk remaining in patients with APHUU is preterm labour.

#### *Recurrent bleeding:*

In this study of patients that presented with APHUU, 37% (14 of 37 patients) had recurrent bleeding which is very different to 3% of the total patients that presented a recurrent episode of APHUU in the study by Chan (15). This is a significant proportion of patients, adding to the diagnostic dilemma as how to manage these patients further. Of the patients presenting with recurrent haemorrhage, a third of these cases only presented with mild antepartum haemorrhage and only two (approximately 5%) of the 37 patients had a soaked pad on presentation.

#### *Hospitalization of APHUU:*

Of the 37 patients admitted to hospital with APHUU observation, majority of CTG's (29 of the 37 CTG's) remained normal. This seems reassuring but also one needs to be vigilant that a subclinical abruptio placentae. Five percent of CTG's becoming pathological in this group of patients.

#### *Abruptio placentae:*

When placentas were evaluated postpartum for the presence of an abruption, three of the 37 patients (8.1%) had a demonstrable abruptio on the placenta. This is similar to the finding by Pattinson (2) where 7% had evidence of abruptio placentae on placental examination. However, on 24% (9 of 37 patients) had no documentation with regards to post-partum placental examination. This highlights the importance of documenting and evaluating the placenta postpartum as this will aid in managing the patient differently in her next pregnancy. This will

also add value to the significance of an abruptio placentae being evident in a patient who presents with APHUUO.

#### *Induction of labour:*

The rate of induction of labour was 29% in this present study which is comparable to 27.4% in the study by Chan. In Chan's study he noted that 15.7% of all patients who were induced were induced for the indication of a previous APH in the index pregnancy. They have also found that the patients who had an induction of labour for APHUUO has not been shown to improve the outcome of the babies. The study by Willocks (11) concurs with this statement.

#### *Delivery gestation:*

The mean delivery gestation in our group with APHO was 38 weeks. This is similar to the study by McCormack where the mean gestation of delivery is also 38 weeks. The delivery gestation below 34 weeks of the group of patients with APHO in this study was 21% which is significantly higher than the 7.5% mentioned in the study by Yeung (16). In the present study, the deliveries before 37 weeks (11 of 37 neonates) 29%, is also higher than the proportion of delivering before 37 weeks (17%) in Yeung's study. This might be because of the fewer number of patients in this study compared to Yeung (37 vs 990). This is an important finding, as the neonatal morbidity is proportional to the gestation of delivery as is demonstrated in this study with the fetal outcomes of patients with APHUUO. The study by Yeung illustrates that APHO prior to 34 weeks is associated with a three to five-fold increased risk of preterm delivery.

#### *Antenatal Steroids:*

A large number of patients, more than half, 56%, required antenatal corticosteroids as these patients were preterm (less than 34 weeks) at presentation of APHO. This highlights the fact that the majority of patients in this case study were preterm and should they have delivered, would have suffered the consequences of preterm delivery.

#### *Birth weight:*

The median birth weight in this population group is 2980g which is comparable to the birth weight in the group by McCormack (6) of 2940g.

In this study the birth weight plots on the 35th centile for a median gestation of 38 weeks (Fenton growth chart). This is comparable with the study done by Pattinson (2) stating that

they found no increased risk for low birth weight babies in their analytical study. In contrast, the study done by McCormack (6) found smaller babies in women with APHUUO but noted that this difference is statistically significant but not clinically significant. In the study by Ogueh (17) the average birth weight centile was 53,8%. The study by Bhandari (7) also concluded that the low birth weight risk was not statistically significant with an adjusted odds ratio of 0,9.

#### *Apgar scores:*

The majority of the neonates had Apgar scores above 7 at 1 and 5 minutes (94,6% and 97.3% respectively). The study by McCormack (6), had a different finding, where neonates born to patients with APHUUO had lower Apgar scores. However, this study is in keeping with the study by Pattinson (2) where there was no increased risk for low five-minute Apgar scores.

#### *Neonatal morbidity:*

In this study neonatal morbidity accounted for 16% of neonates. This is comparable to the study by McCormack (6) where he noted that 13% of the neonates of patients with APHUUO were at an increased risk for admission to a level 2 nursery. In this study all but one admission was related to prematurity.

#### *Congenital anomalies:*

There were also two cases of congenital anomalies in the group of 37 patients who presented with APHUUO. This is comparable to other studies also stating that there's an increase in congenital anomalies in patients with APHUUO. One such study is a retrospective review by Chan (15) where they found more congenital anomalies present in the group of APHUUO patients which they have studied. Magann (5) concluded that there's an increased incidence of fetal congenital anomalies in the pregnancies complicated by APHUUO. He found the odds ratio of 1.42 in his study.

#### *Stillbirth:*

The study by Magann (5) found that patients who had APHUUO, had an increased risk of still birth with an odds ratio of 2,09. Similarly, Signore (14) found the perinatal mortality rate to be increased in the group with APH. In this study there were no perinatal mortalities in the group with APHUUO.

## Conclusions:

APHUO remains a dilemma to the treating physician. The causes of antepartum haemorrhage is varied and one should bear in mind that one in five patients who present with antepartum haemorrhage have a subclinical or clinical abruption. The second most important cause of APH is a placenta previa. In comparison with other studies it is also noted that preterm labour is significant in patients who present with APHUO. This knowledge will add value when counselling a patient who presents with APHUO remote from term. A large proportion of patients who present with APH have also gone into labour, concluding that minimal APH at term when all other causes have been excluded is most likely a “show”. This study supports the findings in the literature that the biggest risk to patients who present with APHUO is preterm labour. The second risk to be aware of is a subclinical abruption placenta. The prevalence of APHUO of 0.8% in this study is much lower than the reported prevalence and this can also be attributed to the few numbers of patients present in this study.

### *Strengths and limitations:*

The data has been collected in retrospect, thus not all data collected is complete. An important note was that 24% of the placentas were not examined for the presence of an abruption placenta. Many of the files were lost, thus the total number of patients presenting with APHUO were deducted from the available files.

### *Recommendations:*

It is recommended that all placentas are examined in patients who present with APHUO where an abruption placenta has been excluded. This will aid in the management of future pregnancies. It is also important to note that after a 24-hour period has lapsed, the clinical incidence of an abruption does seem to be reduced. This study has also demonstrated that there is a risk for recurrent bleeding. Thus, once a patient has been discharged with APHUO, one should also make sure that parameters such as anaemia has been addressed. During admission of a patient with APHUO, one needs to be very vigilant to do 6 hourly CTG's as CTG abnormalities or placental abruption will mostly be clinically evident within the first 24 hours after admission.

## References:

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