Cohort Study Highlighting the Unmet Need for Vaginal Cell Salvage in AVB

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Introduction

Between 10-15% of births are Assisted Vaginal Birth (AVB) using vacuum or forceps. The rate of post-partum haemorrhage (PPH) following AVB is estimated to be 10-40% with similar rates cited for both methods,[1] however the Cochrane review exploring AVB only included two studies reporting on blood loss.[2] Failed AVB and conversion to Caesarean section (CS) at full dilatation is known to be associated with high rates of PPH and intraoperative blood cell salvage is used routinely in these cases at NBT to minimize need for transfusion.

We aimed to evaluate blood loss and blood product use in AVB, identify risk factors for PPH and assess the impact of blood loss to establish a potential role for vaginal cell salvage in our current practice.

Design

Observational, retrospective cohort study of all women who had an attempted AVB during 18-months (01/08/2019 – 31/01/2021) at a tertiary level maternity unit in the UK.

Methods

Inclusion criteria: attempted AVB, singleton cephalic pregnancies, ≥36weeks gestation

Primary outcomes: total weighed blood loss, PPH ≥1,000 or ≥1,500mL and blood product use

Secondary outcomes: maternal length of stay, neonatal length of stay, NICU admission and neonatal IV antibiotics

Data were extracted into a bespoke Excel spreadsheet and analysed using SPSS version 28.0. Continuous variables were reported as mean and standard deviation or median and interquartile range; categorical variables as frequencies and percentages. Free-text comments underwent content analysis for thematic insights.

References:
1. Murphy D, Strachan B, Bahl R, RCOG. Assisted Vaginal Birth: green-top guideline no.26. BJOG. 2020;127:e70–112
2. Verma GL, Spalding JJ, Wilkinson MD, Hofmeyr GJ, Vannevel V, O'Mahony F. Instruments for assisted vaginal birth. Cochrane Db Syst Rev. 2021;2021(9):CD005455

Results

Of 1,061 AVBs, 989 (93.2%) were successful, whilst 72 (6.8%) were converted to caesarean section.

Median blood loss was significantly higher for successful AVBs (673 mL [IQR 406, 1,065]) than conversions to CS (501 mL [377, 712], p=0.002).

Of those who had an attempted AVB in theatre, the rate of PPH ≥1,000mLs (RR=3.185, 95% CI [1.56, 6.52], p<0.001). and ≥1,500mLs (RR=3.841, 95% CI [1.00, 15.44], p=0.034) was significantly higher in those who had a successful AVB than in those who had conversion to CS.

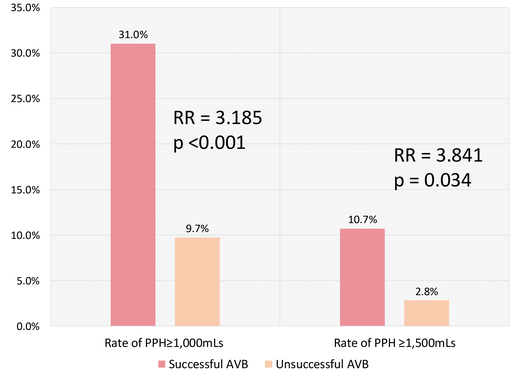

Figure 1. Rate of PPH ≥1,000mLs and PPH ≥1,500mLs in successful Vs unsuccessful AVB

Results: Impact of PPH in successful AVB

Women were significantly more likely to have prolonged hospital stay (≥5 days) following PPH ≥1,000mLs (p=0.006).

Rate of blood transfusion was significantly higher in those with a PPH ≥1,000mLs (RR=28.089, 95% CI [12.34, 63.956], p<0.001) and PPH ≥1,500mLs (RR=1.799, 95% CI [1.4, 2.32], p<0.001).

Rate of neonatal IV antibiotics was significantly higher in those with a PPH ≥1,000mLs (RR=1.799, 95% CI [1.4, 2.32], p<0.001) and ≥1,500mLs (RR=2.089, 95% CI [1.56, 2.80], p<0.001).

Results: Risk factors for PPH following successful AVB

Following successful AVB, both longer passive and active second stage were significantly associated with PPH ≥1,000mLs (passive: 95% CI [5, 12], p<0.001; active: 95% CI [6, 22], p<0.001) and ≥1,500mLs (passive: 95% CI [5, 23], p<0.001; active: 95% CI [3, 26], p=0.011).

Delivery with non-rotational forceps was associated with a significantly higher blood loss compared to other devices (p<0.001).

Other significant risk factors for PPH ≥1,000mLs following AVB included: augmented labour (p=0.012), OASI (p<0.001), nulliparity (p=0.002), high maternal BMI (p=0.003) and high neonatal birthweight (p<0.001).

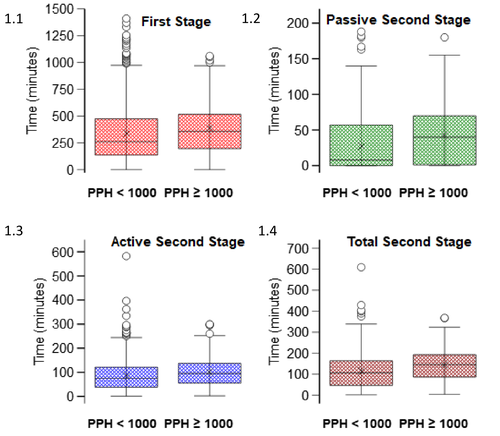

Figure 2. Comparative box-and-whisker plots for length of labour by stage between those who had a PPH <1000 mLs and a PPH ≥1000 mLs within the successful AVB group.

Discussion

This study is the first to compare blood loss and PPH rates between successful AVB and unsuccessful AVB converted to CS, results demonstrate the significance of increased blood loss in the successful group. Modifiable risk factors for PPH following AVB include prolonged second stage, non-rotational forceps and augmentation which should help guide decision making in labour and birth. Following transfer to theatre, the risk of PPH increased three-fold if the AVB was successful, however CS at full dilatation is often deemed higher risk than AVB, with the routine use of cell salvage in these cases at NBT. The impact of PPH on both maternal and neonatal outcomes and the current amber alert on blood product usage issued by NHS Blood and Transplant demonstrates the need to prioritise blood conservation strategies in AVB such as vaginal cell salvage.

Conclusions

There is significant blood loss associated with AVB and our results highlight the potential role for vaginal cell salvage in current clinical practice. We are currently developing a study to assess feasibility, acceptability and safety of vaginal cell salvage to address this.