

Determining the effectiveness of quantitative blood loss (QBL) versus estimated blood loss (EBL) during cesarean delivery

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Introduction

- Postpartum hemorrhage (PPH) is a significant cause of maternal death and severe maternal morbidity in the United States and worldwide.¹
- Severe maternal morbidity occurs in approximately 2.9 per 1000 births.²
 - The most common cause of this is due to postpartum hemorrhage.²
- Severe maternal morbidity:²
 - unanticipated surgical intervention
 - intubation for more than twelve hours postpartum
 - receiving a transfusion of more than three units
 - being admitted to the intensive care unit (ICU)
 - experiencing organ failure
- The risk of poor outcomes can result from both delayed recognition and denial of the occurrence of significant bleeding.³
- Effective measurement of ongoing blood loss is critical to early recognition.³
- Different methods for determining blood loss during a cesarean delivery have been used:³
 - Physician estimation, also known as estimated blood loss (EBL)
 - Quantitative gravimetric, also known as quantitative blood loss (QBL)
 - Hemoglobin content assays, also known as colorimetric blood loss (CBL)
- Calculations have also been used such as multiplying the difference of the pre-operative and post-operative hemoglobin values by the patient's estimated blood volume.⁴

Participants

	EBL	QBL	Total
Starting Total	434	546	980
Intra-op Transfusion	1	12	13
Net Total	433	534	967

Purpose

- This is a quality improvement (QI) project.
- Aim: to compare the accuracy of estimated blood loss (EBL) and quantitative blood loss (QBL) methods when determining blood loss at the time of cesarean delivery

Methodology

- This is a retrospective cohort study conducted at a single academic institution.
- Inclusion criteria: women aged 18-50 who underwent a cesarean delivery from January 2018 – June 2018 (EBL group) and January 2023 – June 2023 (QBL group)
- Discrepancy measure: subtract the actual hemoglobin change (pre- to one day post-surgery) from the anticipated hemoglobin change
 - A drop of 1 g/dl equals a 500 mL blood loss
- A positive value for the discrepancy measure is then associated with an overestimate of blood loss.
- A negative value is associated with an underestimate of blood loss.
- The absolute value of the discrepancy measure gives the magnitude of estimated blood loss accuracy.

Demographics

Demographic	EBL	QBL	P-value
Age	29.8 (6.2)	30.3 (6.0)	0.2825
Race	4% Asian 28% Black 52% White 16% Other	3% Asian 26% Black 55% White 16% Other	0.8815
BMI	34.9 (8.8)	35.8 (9.0)	0.1399
Gestational Age	37.4 (3.4)	37.9 (2.7)	0.0216
Length of Surgery	50% < 60 min	19% < 60 min	

Average Blood Loss

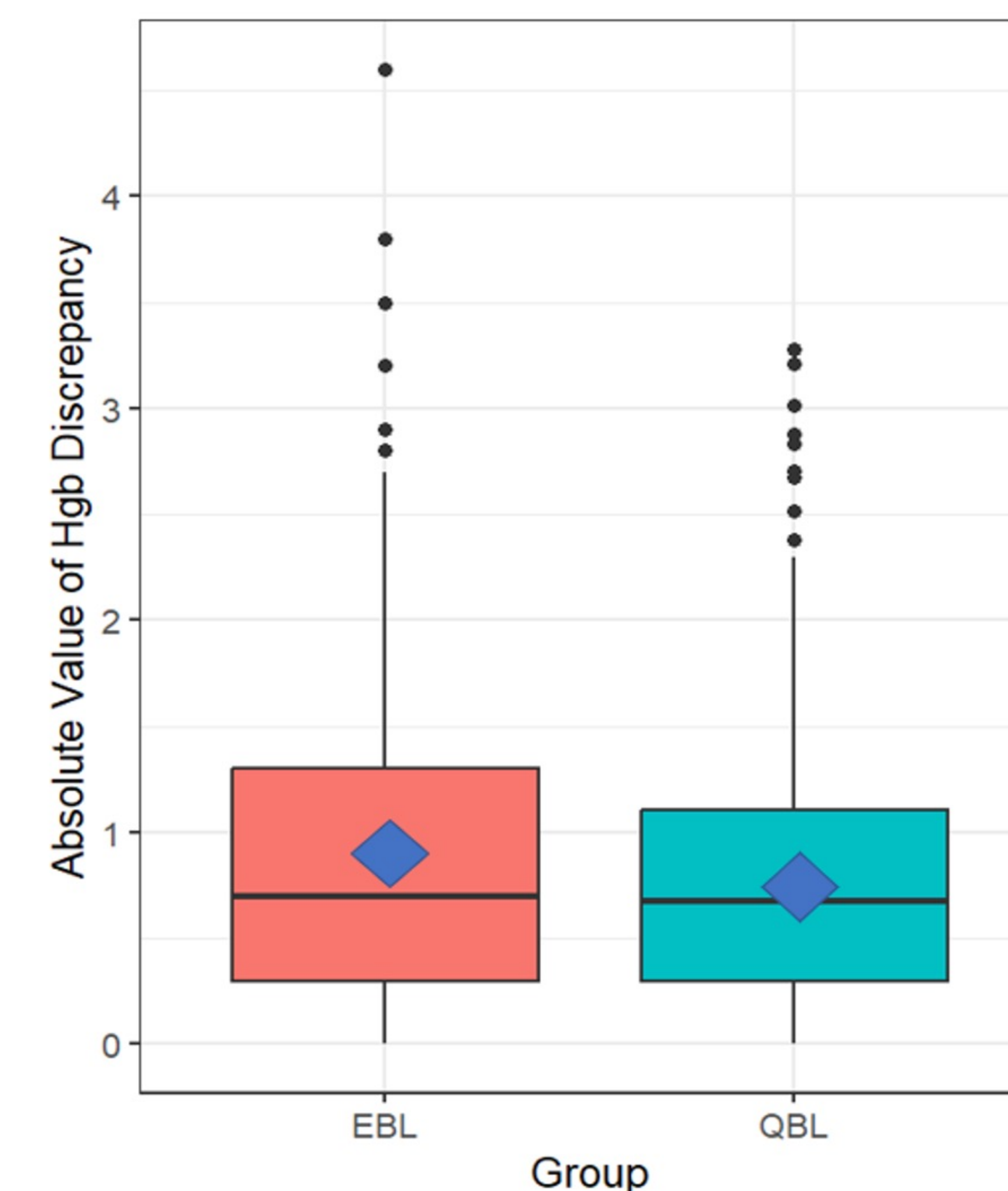
	EBL	QBL
Mean	0.89	0.79
Median	0.70	0.68
SD	0.72	0.66
p-value (unadjusted)		0.0335
p-value (adjusted)		0.0260

Results

- Statistical analyses:
 - Race: a chi-square test
 - Length of surgery: a Wilcoxon rank sum test
 - Age and BMI: independent t-tests
 - Absolute value of discrepancy: independent t-test
 - ANCOVA was performed to compare groups on the absolute value of discrepancy measure after adjustment for covariates
- The level of significance was set at .05. SAS software version 9.4 (Cary, NC) was used for all analyses.
- The mean (SD) absolute value of discrepancy was 0.89 (0.72) in the EBL compared to 0.79 (0.66) in the QBL group ($p = 0.0335$).
- When modeling absolute value of discrepancy by group with adjustment for variables where groups differed (i.e., gestational age and length of surgery), groups were still found to be significantly different ($p = 0.0260$).

References

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Conclusions

- QBL is a more accurate method compared to EBL when determining blood loss during cesarean delivery.
- While statistically significant, the clinical impact is small.
- It may be reasonable to employ QBL or EBL as standard practice in obstetric units.
- Clinical outcomes analysis is ongoing.
- Further studies are warranted to validate these findings, assess long-term outcomes, and determine if there are other, more effective blood loss determination methods.