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Perioperative use of flash glucose monitoring system in dogs undergoing general surgery: a clinical feasibility study

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ABSTRACT

Importance: Flash Glucose Monitoring System (FGMS; FreeStyle Libre) enables non-invasive, continuous glucose monitoring. However, its perioperative utility in canine surgeries has not been evaluated. This study highlights the feasibility of FGMS in perioperative glucose management for veterinary patients.
Objective: This study aimed to evaluate the clinical applicability and accuracy of FGMS in perioperative glucose monitoring in dogs.
Methods: Thirty-two dogs that underwent surgery were monitored during the preoperative, intraoperative, and postoperative phases using FGMS and portable blood glucose meter (PBGM).
Results: A total of 224 paired glucose measurements were analyzed for correlation and accuracy using ISO 15197:2013 standards. Spearman's correlation analysis revealed positive correlation between FGMS and PBGM ($\rho = 0.894$, $\rho = 0.823$, and $\rho = 0.795$, respectively) during the preoperative, intraoperative, and postoperative phases, respectively ($p < 0.001$). The Bland-Altman plot of the difference between FGMS and PBGM showed a positive bias during the intraoperative phase (23.3 mg/dL), despite a negative bias in the preoperative (−16.0 mg/dL) and postoperative (−4.58 mg/dL) phases. Parkes consensus error grid analysis demonstrated that 100% of the data pairs fell within clinically acceptable zones (zones A and B) throughout the operation.
Conclusions and Relevance: FGMS provides continuous and noninvasive glucose monitoring in dogs with clinical feasibility throughout the perioperative period, although its accuracy decreases during the intraoperative phase. For patients with relatively stable blood glucose levels, the Libre device is clinically effective for perioperative glucose monitoring and provides a simpler and more accessible alternative to traditional methods.

Keywords: Anesthesia; blood glucose; dogs; continuous glucose monitoring device; perioperative care

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Conflict of Interest

The authors declare no conflicts of interest.

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INTRODUCTION

Monitoring blood glucose (BG) levels during surgery is vital to ensure the health and safety of canine patients [1]. Preoperative fasting can lead to hypoglycemia, particularly in small-breed dogs with limited glycogen reserves [2]. Anesthetic agents can disrupt glucose metabolism, potentially causing either hypoglycemia or hyperglycemia [3]. Intraoperative complications such as hypothermia, hemorrhage, hypotension, and impaired tissue perfusion can also disrupt glucose delivery and utilization, causing significant fluctuations in BG levels. Additionally, surgical stress can trigger the release of stress hormones, which stimulate hepatic glucose production, increasing the risk of hyperglycemia [4].

Hyperglycemia and hypoglycemia are significant concerns perioperatively, as both conditions can lead to severe complications [5,6]. Hyperglycemia may result in electrolyte imbalances, surgical site infections, and impaired wound healing, while hypoglycemia can cause neurological damage, seizures, and even death if not promptly addressed [6-9]. Maintaining stable BG levels is vital for preventing adverse outcomes and ensuring optimal recovery.

The hexokinase method is commonly used as a reference method for BG measurements [10]. Performing blood sampling during surgery is challenging in small dogs weighing less than 10 kg, particularly in those without an arterial line. Given the restricted access, limited time, and specific settings during surgical procedures, BG monitoring is traditionally performed using portable devices [11,12]. Portable BG monitoring systems have several limitations. Frequent blood sampling is invasive and can cause stress and discomfort in animals, which is particularly problematic during the already stressful perioperative period [13]. It provides only snapshot readings that may miss significant fluctuations in glucose levels. The intermittent nature of these measurements can lead to delayed detection of hyperglycemic or hypoglycemic events, potentially compromising patient safety [14].

The FreeStyle Libre is a type of Flash Glucose Monitoring System (FGMS) and offers several advantages for managing BG levels in surgical patients. With a single application, it can be used for up to 14 days, enabling continuous glucose monitoring through a noninvasive method. It simplifies BG measurement by allowing easy access via a mobile device [15]. This ability to measure BG effortlessly is particularly valuable in the operating room, where time and space are limited. The FGMS has demonstrated clinical applicability in patients with diabetes, both humans and dogs [12,16,17]. In humans, it has been extensively validated and used to manage diabetes in general surgery patients [18]. Recent studies have evaluated the application of the Freestyle Libre in veterinary patients, demonstrating its potential for glucose monitoring in non-anesthetized animals. However, few studies have measured intraoperative glucose levels in dogs, and those that do exist typically involve small sample sizes of fewer than ten animals [19,20]. These studies presented data exclusively from the intraoperative period.

This study aimed to evaluate the clinical applicability of a flash glucose monitoring system in canines using the FreeStyle Libre. We hypothesized that the FreeStyle Libre would accurately predict BG levels during canine anesthesia, enhance glucose management, and improve patient outcomes. This study is the first to assess the perioperative utility of an FGMS in a large group of dogs, potentially paving the way for the use of FGMS in veterinary surgery.

METHODS

Animals

Thirty-two client-owned dogs were included in this study (**Table 1**). The study protocol, including potential side effects, was communicated to the owners, and written informed consent was obtained before enrollment. The application of the Libre device incurred no cost to the owners. This study was reviewed and approved by the Institutional Animal Care and Use Committee (approval No. CBNUA-24-0018-0). This study was conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology statement.

The inclusion criteria required dogs to undergo surgery under general anesthesia lasting 90 min or more. Complete blood counts (IDEXX ProCyte Dx) and serum chemistry tests (Hitachi automatic analyzer 3100; Hitachi High-Technologies Co., Japan) were performed prior to surgery. Dogs with elevated serum total protein concentration (> 7.5 g/dL), serum triglyceride levels (> 250 mg/dL), or serum cholesterol levels (> 500 mg/dL) were excluded because these factors could affect glucose measurement [21]. Dogs with decreased or increased packed cell volume (< 25% or > 60%, respectively) were excluded because of the limitations of portable blood glucose meter (PBGM). Dogs with endocrine disorders that could affect BG levels, such as diabetes mellitus, were excluded. None of the dogs received any other drugs, such

Table 1. Characteristics of the 32 dogs and operations enrolled in the study

Characteristics	Values
Age (yr)	9.7 (2–13.8)
Breed	
Alaskan Malamute	1
Beagle	1
Bichon Frise	1
Dachshund	1
Doberman Pincher	1
Labrador Retriever	1
Maltese	9
Mixed	8
Pomeranian	1
Toy Poodle	7
Spitz	1
Sex	
Intacted male	1 (3.1)
Castrated male	14 (43.8)
Intacted female	4 (12.5)
Spayed female	13 (40.6)
Body condition score	5.9 (4–9)
Body weight (kg)	9.5 (2.1–53)
Anesthetic time (min)	117 (91–168)
Operation time (min)	80 (54–125)
Incision time (min)	28 (15–38)
Type of surgery	
Integumentary system	17 (53.1)
Digestive system	6 (18.8)
Liver	6 (18.8)
Extrahepatic biliary system	2 (6.3)
Endocrine system	1 (3.1)
Hemolymphatic system	9 (28.1)
Urinary system	2 (6.3)
Reproductive and genital systems	5 (15.6)
Respiratory system	1 (3.1)

The data are presented as median (min-max) or number (%). In cases where a single patient underwent multiple surgeries, all procedures were documented.

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as glucocorticoids, ascorbic acid, glutathione, uric acid, acetaminophen, salicylic acid, or isoniazid prior to surgery.

PBGM

VetMate (i-SENS Inc., Korea) is a portable veterinary BG meter that measures BG levels within 5 sec using 0.4 μL of venous or capillary blood. It employs a glucose dehydrogenase flavin adenine dinucleotide enzyme-based method and is capable of measuring glucose levels in the range of 20–600 mg/dL within a hematocrit range of 15%–65%.

FGMS

The FreeStyle Libre 2 (FreeStyle Libre, USA) is an FGMS based on the glucose oxidase method designed to measure glucose in subcutaneous interstitial fluid. It was placed by a single veterinarian at least 1 h before entering the operating room. A 6 cm^2 area of hair was shaved from the left thorax behind the scapula, and the site was cleaned with alcohol prior to placement. After activation, a 1-h sensor warm-up period was required. To prevent dislodging of the device, the sensor was secured along the torso with Micropore tape for additional adhesion. The detection limits of the sensors were between 20 and 500 mg/dL. If the values are below or above these ranges, they are indicated as “low” or “high,” respectively.

Data collection

Food was withheld from the dogs for 12 h before surgery. After the FGMS sensor warm-up was completed, PBGM tests were performed for comparison with the initial baseline FGMS values obtained before entering the operating room. All BG levels were concurrently assessed using FGMS within 1 min of PBGM measurement. Pre- and post-anesthesia blood samples were collected from peripheral veins, such as the cephalic and saphenous veins, whereas during anesthesia, measurements were taken from the sublingual veins. For all patients, at least three pairs of data were collected every 30 min after intubation during anesthesia. Following anesthesia recovery and transfer to the intensive care unit, data were collected at 1, 2, and 4 h post-transfer. The dogs fasted for the duration of data collection.

Anesthesia

Following premedication with intravenous midazolam (0.2 mg/kg), general anesthesia was induced with propofol and maintained with isoflurane inhalation. For intraoperative analgesia, remifentanil or fentanyl was administered via a constant-rate infusion. Additionally, vasopressors, such as dobutamine, are occasionally used to manage intraoperative hypotension, defined as a mean arterial pressure below 60 mmHg.

Statistical methodology

Data were analyzed using statistical software (Microsoft Excel [Microsoft, USA], SPSS Statistics Version 27 [IBM Inc., USA], and GraphPad Prism Version 10 [GraphPad Software, USA]). Normality was evaluated using the Shapiro-Wilk test, and nonparametric tests were applied accordingly. The accuracy and clinical utility of the FGMS results were evaluated based on the PBGM values, which were validated for accuracy by comparison with the traditional laboratory method, the hexokinase method [21].

Correlations between FGMS and PBGM were evaluated using Spearman’s correlation. The differences between FGMS and PBGM were plotted using Bland–Altman plots. Accuracy of the FGMS was assessed according to ISO 15197:2013 criteria: 1) at least 95% of results have to be within ± 15 mg/dL at glucose concentrations < 100 mg/dL and within ± 15% at ≥ 100 mg/

dL; 2) in a consensus error grid analysis, at least 99% of results have to be within zones A and B [22]. The number of glucose concentration pairs was calculated where the test readings were within ± 15 mg/dL of the reference BG reading for concentrations below 100 mg/dL, and within ± 15% of the reference BG for concentrations of 100 mg/dL or higher. To evaluate clinical accuracy, Parkes consensus error grids for type 1 diabetes mellitus were used to classify pairs of glucose readings into five categories based on clinical risk (a-e): (a) no effect on clinical decisions, (b) changes in clinical action unlikely to affect the outcome, (c) changes in clinical action likely to influence the outcome, (d) changes in clinical action that may pose significant medical risk, and (e) changes in clinical action that could result in dangerous consequences [23] (R Studio; PBC, USA).

RESULTS

Two hundred twenty-four pairs of data were collected. Data analyses for each dog included one pair of preoperative data, three pairs of intraoperative data, and three pairs of postoperative data. Of the collected data, 14% (32/224) were gathered preoperatively, 43% (96/224) were gathered intraoperatively, and 43% (96/224) were gathered postoperatively. Based on the PBGM method, 0.4% (1/ 224) of the samples were in the hypoglycemic range (< 70 mg/dL) with a glucose concentration of 58 mg/dL, 87.5% (196/224) were in the euglycemic range with a median glucose concentration of 118 mg/dL (min–max: 70–177), and 12.1% (27/224) were in the hyperglycemic range with a median glucose concentration of 241 mg/dL (184–358). The median glucose concentrations (min–max) in the PBGM and FGMS groups were 132 mg/dL (56–358) and 118 mg/dL (58–450), respectively. The absolute median difference between PBGM and FGMS was 20 mg/dL (range, 0–121).

Preoperatively, 96.9% (31/32) of FGMS readings were higher than the corresponding PBGM values. During surgery, 17.7% (17/96) of the FGMS readings were higher than the PBGM measurements, whereas postoperatively, 53.1% (51/96) of the FGMS readings were higher than the corresponding PBGM readings.

Box plots of glucose concentrations in PBGM and FGMS at each time point are shown in **Fig. 1**. The mean preoperative PBGM (min–max) was 111 mg/dL (56–186) and the mean FGMS was 127 mg/dL (68–195). The mean intraoperative PBGM values at 30, 60, and 90 min were 139 (72–297), 148 (70–335), and 159 (74–317) mg/dL, respectively, and the mean FGMS values were 117 (73–220), 127 (68–241), and 133 (58–281) mg/dL, respectively. The mean PBGM values at 1, 2, and 4 h postoperatively were 134 (75–358), 113 (71–257), and 117 mg/dL (79–253), respectively, and the mean FGMS values were 141 (73–450), 115 (74–295), and 121 mg/dL (79–282), respectively.

Data were analyzed independently for the preoperative, intraoperative, and postoperative periods. The Spearman correlation coefficients for the comparison of FGMS with the PBGM were indicative of strong positive linear relationships across the preoperative, intraoperative, and postoperative periods (all $p < 0.001$; **Fig. 2**) [24]. The correlation coefficients for the preoperative, intraoperative, and postoperative periods were 0.894 (95% confidence interval [CI], 0.788 to 0.948; **Fig. 2A**), 0.823 (95% CI, 0.743 to 0.880; **Fig. 2B**), and 0.795 (95% CI, 0.705 to 0.860; **Fig. 2C**), respectively.

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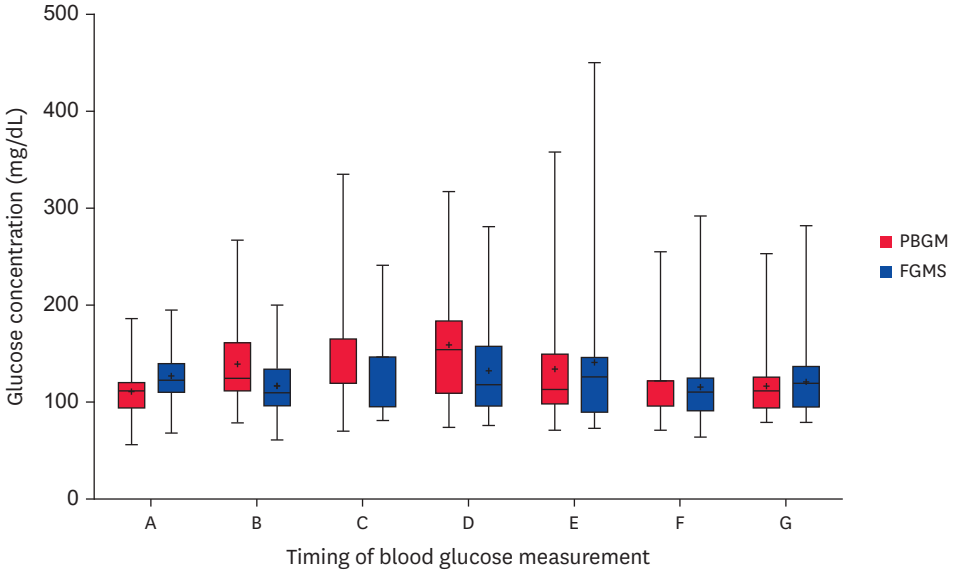

Fig. 1. Box plots of glucose concentrations for PBGM and FGMS.
The box represents the interquartile range, the dot represents the mean value, and the whiskers represent the range from the minimum to the maximum value. (A) The mean preoperative PBGM (min–max) was 111 mg/dL (56–186 mg/dL), and the mean FGMS was 127 mg/dL (68–195 mg/dL). (B) The mean 30 min intraoperative PBGM (min–max) was 139 mg/dL (72–297), and the mean FGMS was 117 mg/dL (73–220). (C) The mean 60 min intraoperative PBGM was 148 mg/dL (70–335), and the mean FGMS was 127 mg/dL (68–241). (D) The mean 90 min intraoperative PBGM was 159 mg/dL (74–317), and the mean FGMS was 133 mg/dL (58–281). (E) The mean 1 h postoperative PBGM was 134 mg/dL (75–358), and the mean FGMS was 141 mg/dL (73-450). (F) The mean 2 h postoperative PBGM was 113 mg/dL (71–257), and the mean FGMS was 115 mg/dL (74–295). (G) The mean 4 h postoperative PBGM was 117 mg/dL (79–253), and the mean FGMS was 121 mg/dL (79–282).
PBGM, portable blood glucose meter; FGMS, Flash glucose monitoring system.

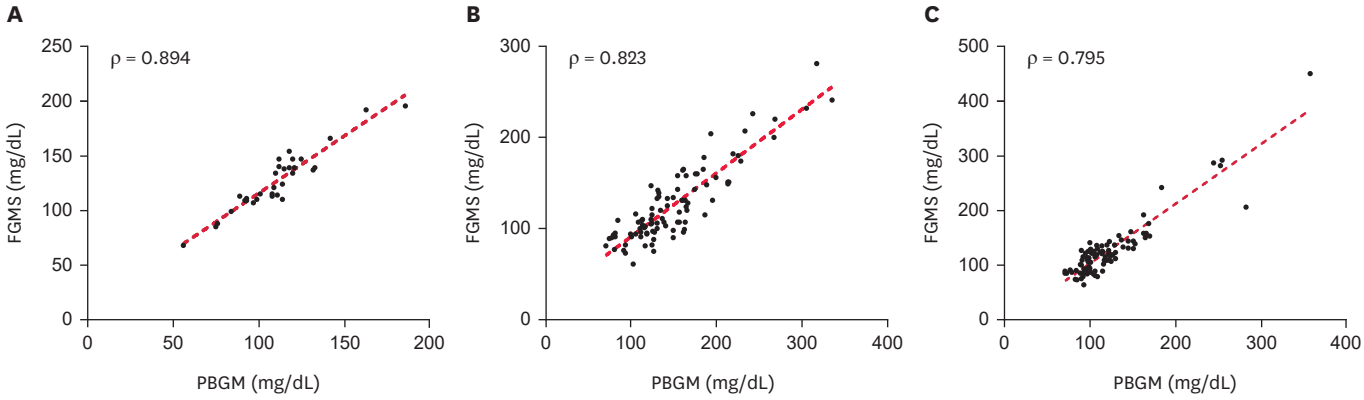

Fig. 2. Preoperative, intraoperative, and postoperative correlation between PBGM and FGMS.
Spearman correlation coefficients between FGMS and PBGM demonstrated strong positive relationships throughout the preoperative, intraoperative, and postoperative periods (all $p < 0.001$). The coefficients were 0.894 (95% CI, 0.788 to 0.948) preoperatively (A), 0.823 (95% CI, 0.743 to 0.880) intraoperatively (B), and 0.795 (95% CI, 0.705 to 0.860) postoperatively (C).
PBGM, portable blood glucose meter; FGMS, flash glucose monitoring system.

Bland-Altman plots showed differences between the values obtained using PBGM and FGMS in **Fig. 3**. Preoperative (**Fig. 3A**), intraoperative (**Fig. 3B**), and postoperative (**Fig. 3C**) results constant bias and standard deviation (95% limits of agreement) was estimated to be 16.0 mg/dL, 9.4 mg/dL (−2.40 to 34.4), −23.3 mg/dL, 24.8 mg/dL (−71.8 to 25.3) and 4.58 mg/dL, 21.4 mg/dL (−37.3 to 46.5), respectively. The Bland-Altman analysis of the postoperative glucose measurements between the PBGM and FGMS showed heteroscedasticity, with greater variation at higher glucose concentrations.

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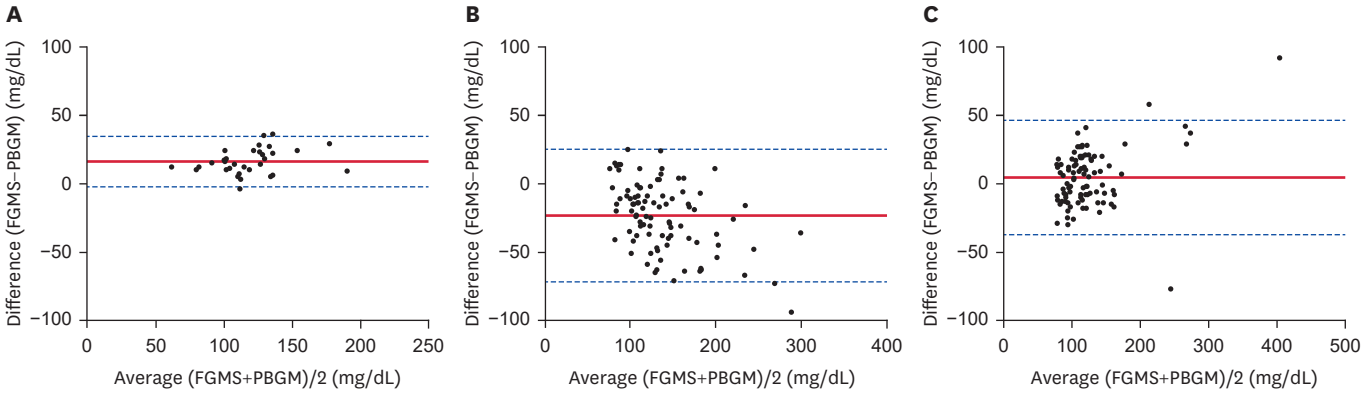

Fig. 3. Bland-Altman Plots comparing PBGM and FGMS preoperative, intraoperative, and postoperative.
Bland-Altman plots demonstrating the differences of the FGMS compared to PBGM. (A) In the preoperative phase, the constant bias and standard deviation (95% limits of agreement) were estimated to be 16.0 mg/dL, 9.4 mg/dL, respectively, with limits ranging from −2.4 to 34.4 mg/dL. (B) In the intraoperative phase, the constant bias and standard deviation (95% limits of agreement) were estimated to be −23.3 mg/dL, 24.8 mg/dL, respectively, with limits ranging from −71.8 to 25.3 mg/dL. (C) In the postoperative phase, the constant bias and standard deviation (95% limits of agreement) were estimated to be 4.58 mg/dL, 21.4 mg/dL, respectively, with limits ranging from −37.3 to 46.5 mg/dL. The Bland-Altman analysis of postoperative glucose measurements between the PBGM and FGMS showed heteroscedasticity, with greater variation at higher glucose concentrations. The red line represents the constant bias, and the blue dotted line indicates the 95% limits of agreement.
FGMS, flash glucose monitoring system; PBGM, portable blood glucose meter.

The analytical and clinical accuracies of the FGMS were evaluated based on the PBGM results, following ISO 15197:2013 standards. In the preoperative measurements, 100.0% (4/4) of FGMS results were within ± 15 mg/dL of the BG for values < 100 mg/dL, and 50.0% (14/28) were within ± 15% for values ≥ 100 mg/dL. During intraoperative measurements, 48.3% (14/29) of FGMS results fell within ± 15 mg/dL for BG < 100 mg/dL, and 52.2% (35/67) were within ± 15% for BG ≥ 100 mg/dL. Postoperatively, 75.0% (21/28) of FGMS results were within ± 15 mg/dL for BG < 100 mg/dL, and 66.2% (45/68) were within ± 15% for BG ≥ 100 mg/dL. In total, 56% (18/32) of the data collected during the preoperative phase, 51.0% (49/96) during the intraoperative phase, and 68.8% (66/96) during the postoperative phase met the criteria.

The Parkes consensus error grids for the FGMS are shown in **Fig. 4**. In the preoperative results, 90.3% (29/32) of the data were in zone A and 9.4% (3/32) in zone B (**Fig. 4A**). During the intraoperative period, 56.2% (54/96) of the data were in zone A 43.8% (42/96) in zone B (**Fig. 4B**), whereas in the postoperative results, 86.5% (83/96) of the data were in zone A and

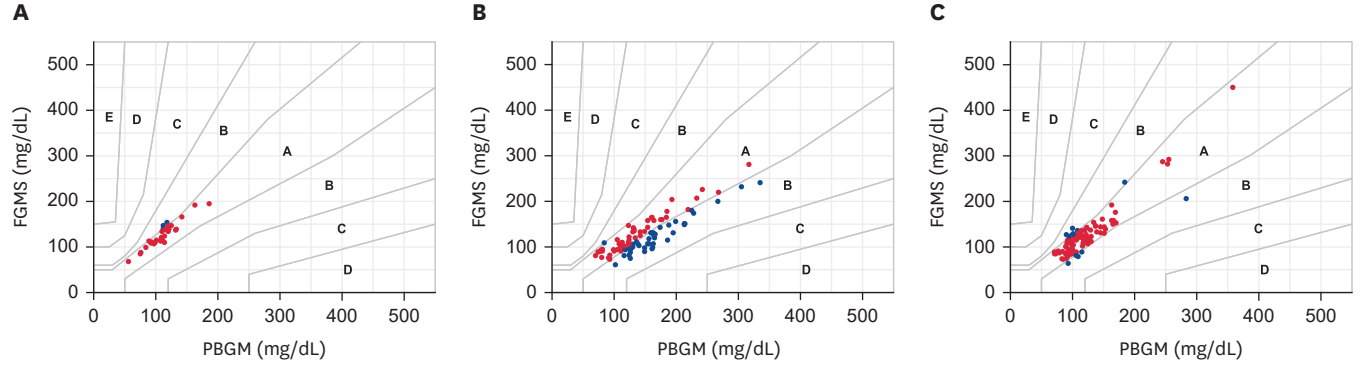

Fig. 4. Parkes consensus error grids comparing preoperative, intraoperative and postoperative FGMS value to PBGM value.
(A) In the preoperative period, 90.3% (29/32) of the data were in zone A and 9.4% (3/32) in zone B. (B) In the intraoperative period, 56.2% (54/96) of the data were in zone A and 43.8% (42/96) in zone B. (C) In the postoperative period, 86.5% (83/96) of the data were in zone A and 13.5% (13/96) in zone B. 100% of the preoperative, intraoperative, and postoperative data pairs were in zones A and B of the error grid. Zone A indicates no impact on clinical decisions and zone B indicates changes in clinical action unlikely to impact the outcome. No pairs fell into the other zones.
FGMS, flash glucose monitoring system; PBGM, portable blood glucose meter.

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13.5% (13/96) in zone B (**Fig. 4C**). In other words, 100% of the preoperative, intraoperative, and postoperative data pairs were in zones A and B of the error grid.

DISCUSSION

To the best of our knowledge, this is the first study to evaluate the utility of the FGMS in a population of over 30 dogs that underwent surgery under general anesthesia. During the intraoperative phase, FGMS showed lower accuracy and tended to underestimate glucose compared to PBGM. However, 100% of data pairs remained within clinically acceptable zones (A and B) per Parkes consensus error grid analysis. Our results demonstrate that the FGMS has potential clinical applicability for perioperative glucose monitoring in canines, although its accuracy varies depending on the perioperative phase.

In our study, the correlation coefficients between FGMS and PBGM decreased over time (ρ = 0.894, ρ = 0.823, and ρ = 0.795, respectively). Previous studies comparing FGMS and PBGM in diabetic dogs with diabetic ketoacidosis reported a correlation coefficient ranging from 0.88 to 0.89 [16,25]. In contrast, intraoperative studies conducted on humans with diabetes showed a lower correlation coefficient (r = 0.771), which was lower than that observed in our study [18]. The Spearman correlation assumes a monotonic relationship, where the values consistently increase or decrease. In this study, most of the glucose data from normal dogs without endocrine disorders fell within the normal glycemic range (70–180 mg/dL). The narrow range of glucose values, with limited variability and skewed data distribution, likely contributed to the observed decrease in correlation [26]. This effect was most pronounced during the postoperative phase, when glucose levels stabilized after recovery from anesthesia.

Box plot analysis demonstrated that the boxes fell within the normal glycemic range. The patient maintained normal glycemic control, suggesting stable glucose regulation without medical administration. The mean glucose levels measured using the PBGM were higher than those recorded using the FGMS during the intraoperative phase, whereas the opposite trend was observed in the preoperative and postoperative phases. In our study, 82.3% (79/96) of the intraoperative FGMS readings were lower than the corresponding PBGM measurements, indicating a tendency for FGMS to underestimate glucose values compared with PBGM. This observation is further supported by the Bland-Altman analysis, which demonstrated a negative bias of −23.3 mg/dL between the two methods. Intraoperative studies conducted on human patients with diabetes reported a comparable negative bias of −18.44 mg/dL [18]. Clinically, this underestimation could be beneficial as it may reduce the likelihood of overlooking true hypoglycemia in patients.

According to the ISO 15197:2013 standards, 56.3% (18/32) of the data points during the preoperative phase, 51.0% (49/96) during the intraoperative phase, and 68.8% (66/96) during the postoperative phase met the established criteria. Previous studies comparing FGMS and PBGM in dogs with diabetic ketoacidosis found that 40.2% of the readings met the established criteria [25]. Additionally, in non-diabetic dogs with rapidly fluctuating BG levels, 41.6% of the values were within the acceptable range [12]. The accuracy of FGMS during surgery appears to be higher than when BG levels change rapidly, such as during the administration of insulin or dextrose. Diffusion between plasma glucose and interstitial glucose does not occur instantaneously, resulting in a potential lag when BG levels change rapidly [27]. In human studies, glucose diffusion required approximately 5 min [28]. In circumstances where rapid

fluctuations in BG levels are expected, it is advisable to implement more frequent monitoring to ensure the accurate and timely management of glycemic changes.

The intraoperative phase showed lower accuracy than the pre-and postoperative phases, as indicated by the lower percentage of data points falling within zones A and B of the Parkes consensus error grid. The accuracy of the FGMS during surgery may be influenced by various factors associated with surgery and anesthesia. Fluctuations in BG levels during surgery may result from the secretion of stress hormones due to surgical pain [29]. Additionally, decreased tissue perfusion caused by cardiovascular and respiratory suppression during the surgical procedure can impair glucose diffusion and lead to inaccurate glucose measurements [30]. Furthermore, dehydration and hypotension in dogs have been reported to negatively affect the FGMS accuracy [20,31]. Physical factors such as tissue compression due to the recumbent position may reduce blood flow and contribute to diffusion deficits in humans [32]. Furthermore, errors in the FGMS readings may arise from the use of warm air blankets, which could affect the performance of the device due to skin temperature changes [33]. Electrical interference from elective devices has also been noted in various studies as a potential source of reduced FGMS accuracy [18,34,35].

This is the first study to evaluate BG levels before, during, and after surgery using a single device, highlighting the clinical implications of perioperative glucose management in veterinary patients. Determining whether the reduced accuracy observed during anesthesia reflects temporary device interference or a permanent decline in accuracy is crucial for practical use of the device. According to the error grid analysis, the reduced accuracy during surgery was restored following anesthesia recovery, with high accuracy achieved in postoperative BG measurements. This suggests that a single device can effectively manage BG levels throughout the operation, without the need for replacement. The data obtained from this study demonstrate the accuracy and clinical utility of this system for veterinarians, providing valuable insights into its effectiveness in perioperative BG monitoring.

The main limitation of this study was that the small number of hypoglycemic events limited the ability to fully assess the performance of the FGMS in detecting low glucose levels. The absence of hypoglycemic events may be attributed to the patient selection criteria and limited sample size. Another limitation of this study was that the data were not analyzed in conjunction with the measurements obtained using the hexokinase method, which is considered the gold standard for BG measurement. However, research comparing the PBGM used in this study with the hexokinase method has demonstrated that VetMate is a valid alternative with significant validity [21,31]. Further studies are needed to evaluate the BG levels in dogs with conditions excluded from this study, such as diabetes or endocrine disorders, to enhance the generalizability of the findings to a broader population of canine surgical patients.

In conclusion, the FGMS provides continuous and non-invasive glucose monitoring in dogs, demonstrating clinical feasibility throughout the perioperative period when compared with PBGM. Although the device does not fully comply with the ISO 15197:2013 standards, error grid analysis indicates that its deviations have a minimal impact on clinical outcomes. Its accuracy decreases during the intraoperative period, with a tendency to underestimate glucose levels. The use of Freestyle Libre for continuous glucose monitoring will enable veterinarians to track real-time fluctuations in BG levels during surgery and recovery.

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