Evaluation of the use of subcutaneous implantable vascular access ports in feline blood donors

Jo Ann Morrison, DVM, DACVIM; Susanne K. Lauer, Dr med vet, DACVSM; Claudia J. Baldwin, DVM, MS, DACVIM; Richard B. Evans, PhD; Claire B. Andreasen, DVM, PhD, DACVP; Joanne M. Kinyon, MS; Elizabeth Swanson, DVM

Objective—To compare the ease and effects of collecting blood from cats by use of subcutaneous totally implantable vascular access ports (VAPs) with collection via conventional jugular phlebotomy.

Design—Prospective randomized experimental study.

Animals—8 healthy cats.

Procedures—Cats in the port group (n = 4) underwent monthly blood donation by use of VAPs and manual restraint, and cats in the nonport group (4) underwent monthly blood donation by use of conventional jugular phlebotomy and sedation, for 6 months.

Results—Postsurgical VAP-related complications developed in 3 cats and included port erosion (n = 1), disconnection of the port from the catheter (1), and seroma formation (1). Blood was successfully collected 24 of 24 and 20 of 20 times in the nonport and port groups, respectively. Results of bacterial culture of blood were negative in 22 of 24 and 15 of 20 nonport and port collections, respectively. No differences in RBC morphology were observed between groups. Mean blood collection and total donation times were significantly longer for the nonport group. Collection time was more variable in the nonport group, and cats were less tolerant of handling during venipuncture, compared with cats in the port group. Blood collection required a mean of 2.4 persons for the nonport group and 2.1 persons for the port group.

Conclusions and Clinical Relevance—Positive results for blood collections via VAPs were increased donor acceptance, decreased number of personnel required, and decreased collection time. Drawbacks included contamination of blood products and port-related complications. (J Am Vet Med Assoc 2007;230:855–861)

A
nemia is the primary indication for blood transfusion in cats, and fresh whole blood has been most commonly administered. In emergency situations, immediate administration of fresh blood or blood products can be lifesaving. Treatment with blood components is recommended for cats with severe coagulation defects, anemia from retroviral infections, renal failure, blood loss, and hemolysis, and presurgical administration of blood components is used in cats with bleeding disorders.

The ease of blood collection contributes largely to the success or failure of blood donor programs. Compliant, deeply sedated, or anesthetized donor cats with easily ac-

From the Department of Veterinary Clinical Sciences, College of Veterinary Medicine, Iowa State University, Ames, IA 50011 (Morrison, Baldwin); Departments of Veterinary Pathology (Andreasen), Veterinary Diagnostic and Production Animal Medicine (Evans, Kinyon), and Veterinary Clinical Sciences (Lauer), School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA 70803; and Care Animal Hospital, 1195 E Palatine Rd, Arlington Heights, IL 60004 (Swanson). Supported by Iowa State University (Small-animal Grants Program) and Access Technologies, Skokie, Ill.

Presented as an abstract at the 20th Annual American College of Veterinary Internal Medicine Forum, Dallas, June 2002.

Address correspondence to Dr. Morrison.

ABBREVIATIONS

VAP Vascular access port
CPDA Citrate-phosphate-dextrose-adenine

Unauthenticated | Downloaded 10/09/23 12:59 AM UTC
Materials and Methods

Cats—Eight castrated male domestic shorthair cats obtained from the university Laboratory Animal Care. Cats were randomly allocated to 2 groups of 4 cats each. Cat weights ranged from 3.2 to 5.2 kg (7.0 to 11.4 lb; mean, 4.1 kg [9.0 lb]) in the nonport group and from 3.3 to 3.6 kg (7.25 to 8.0 lb; mean, 3.5 kg [7.7 lb]) in the port group. All cats gained weight during the study. At the time of final blood collection, the weight of cats in the nonport group ranged from 3.9 to 6.6 kg (8.6 to 14.5 lb; mean, 5.4 kg [11.9 lb]) and the weight of cats in the port group ranged from 4.1 to 5.7 kg (9.0 to 12.5 lb; mean, 5 kg [11 lb]). All cats were housed in individual cages (4 cages/room) during weeks 1 through 4. Cats underwent a standardized socialization schedule during weeks 1 through 3. Socialization consisted of two 5-minute sessions/d of simulated physical examination procedures and manual restraint. After week 4, the rooms were transformed into group housing with areas of approximately 10 X 12 feet (120 square feet) available for each group of 4 cats; cats remained in that housing until week 30.

Health screening—All cats were determined to be blood type A\(^\text{b}\) and had negative results when tested twice at 4-week intervals for FeLV and FIV.\(^{c,d}\) Two cats had positive test results for Mycoplasma haemofelis (previously Hemobartonella felis) via PCR assay,\(^e\) and 2 other cats had results consistent with possible infection with Bartonella spp via ELISA.\(^d\) Cats with positive test results for Mycoplasma spp and Bartonella spp were not treated because they were not anemic and the collected blood was not used for donations. All cats were inoculated against feline parvovirus (panleukopenia), calicivirus, feline herpesvirus-1 (rhinotracheitis), FeLV, and rabies virus. All cats received an anthelmintic upon introduction to the facility.

Anesthesia and pain management—For all surgical procedures, cats were premedicated with midazolam (0.1 mg/kg [0.05 mg/lb], IM) and butorphanol (0.2 mg/kg [0.09 mg/lb], IM). Anesthesia was induced with propofol (4 mg/kg [1.8 mg/lb], IV) and maintained with inhaled isoflurane (1% to 3% in O\(_2\) to effect). After the procedure, each cat received butorphanol (0.2 mg/kg, IM).

Surgery—At the end of the second week, VAPs were implanted into cats in the port group (Figure 1). Cats were randomly positioned in left or right lateral recumbency for access to the contralateral jugular vein, and the skin was prepared aseptically for surgery. A 3-cm-long skin incision was made approximately 3 cm cranial to the shoulder joint and parallel to the scapular spine. A subcutaneous pocket was created by blunt dissection of tissues in a caudal direction. The injection port was placed in the pocket, and the base plate was sutured to the underlying fascia of the cervical musculature with 2-0 polydioxanone suture. A 2-cm-long skin incision was made parallel and dorsal to the jugular vein in the midcervical region. The external jugular vein was isolated, and two 4-0 polypropylene stay sutures were placed around the vein. The vein was incised between the 2 ligatures, and a 5-F silicone catheter was introduced and advanced to the level of the right atrium. The catheter position was verified during surgery by use of a C-arm fluoroscopic unit (Figure 2). The catheter was flushed with heparinized saline (0.9% NaCl) solution and secured in place by tightening the caudal stay suture. The cranial stay suture was tightened to occlude the jugular vein. The proximal end of the catheter was passed via a subcutaneous tunnel to the injection port and connected to its boot attachment. The unit was flushed to verify patency prior to closure of the incision. Incisions were closed in routine fashion, and the site was bandaged for 2 days.

VAP maintenance—During the first week after the procedure, VAPs were flushed daily with 3 mL of saline...
solution and 3 mL of locking solution (1 U of heparin/mL of saline solution) under aseptic conditions. The solution was injected in a pulsatile manner through a Huber needle to flush the port reservoir and catheter. One additional milliliter of locking solution was slowly injected as the Huber needle was removed. The ports were flushed thereafter on a monthly basis (at the end of the blood collection procedure) in a similar fashion.

**Blood collection**—Blood was collected once monthly for 6 months with strict adherence to sterile procedure in both groups of cats. The sequence in which cats underwent blood donation was randomized for each collection time. A volume of 10 mL of blood/kg (maximum, 60 mL) was collected into a semiclosed collection system that had been primed with CPDA-1 (1 mL of CPDA-1/7 mL of blood to be collected) solution at each donation.

Before each blood collection, cats’ rectal temperatures and heart and respiratory rates were measured and an initial blood sample was collected for CBC and determination of PCV and plasma protein concentration. This sample was obtained via the port in the port group. No topically applied anesthetic was used over the ports when ports were manipulated. Collections were performed only if the PCV was >35%. The PCV was >35% for all cats, so all scheduled collections were performed.

**Blood collection via VAPs**—One holder performed minimal restraint with cats positioned in sternal recumbency. If additional restraint was needed, 1 additional handler was added. The port site was prepared aseptically by the collector, and a 19-gauge Huber needle was inserted into the reservoir of the port (Figure 3). A 4-mL aliquot of fluid was withdrawn from the port to remove the locking solution and was submitted for bacterial culture. Blood was collected into the collection system, and the port was flushed as described.

**Blood collection via jugular venipuncture**—Cats were sedated with ketamine (5 mg/kg [2.3 mL/lb], IV) and diazepam (0.1 mg/kg, IV), and glycopyrrolate (0.01 mg/kg [0.005 mg/lb], IV) was administered to prevent bradycardia. The skin over each jugular vein was prepared aseptically, and the cat was positioned in sternal recumbency by 1 handler. If additional restraint was needed, 1 additional handler was added. The jugular vein was occluded by the collector at the thoracic inlet, and jugular venipuncture was performed by use of a 19-gauge butterfly needle connected to the collection system. After blood collection, pressure was applied on the venipuncture site for 2 minutes and the cat was monitored until it recovered from sedation.

**Port and vascular patency**—Patency of the ports in the port group or accessibility of the jugular veins in the nonport group was verified for each collection in all cats.

**Bacterial culture**—At each donation in the port group, 2 aliquots of locking solution (2 mL each) were placed in 20-mL bottles of brain-heart infusion broth with sodium polyanethol sulfate and CO₂. One bottle was vented to provide an aerobic atmosphere, and the other was nonvented to maintain an anaerobic atmosphere. The bottles were placed in an incubator with 5% CO₂ for 10 days at 35°C. For both groups at each donation, 2 aliquots (5 mL each) of collected blood—CPDA-1 were placed in bottles containing 50 mL of culture broth and incubated. Aliquots (0.2 mL) of all incubated samples were applied to blood, MacConkey, and anaerobic blood agar plates at 48 hours, 96 hours, and 10 days. Bacterial colonies were counted, and the number of organisms per milliliter of locking solution or blood-CPDA-1 was determined. Antimicrobial sensitivity testing was performed as needed.

**Blood components**—One thousand RBCs were evaluated cytologically for poikilocytosis, crenation, Heinz bodies, and polychromasia on Wright-stained smears from both fresh blood and CPDA-1–anticoagulated blood by 1 investigator (CBA). The investigator was unaware of which group samples had originated from and whether CPDA-1 anticoagulant was present.

**Time**—Anesthesia time and time for surgical port implantation were recorded for cats in the port group. Times for blood collection and total donation times were recorded for cats in the port and nonport groups. Blood collection time in the nonport group was defined as the time from insertion of the butterfly needle into the jugular vein to the end of blood collection, and in the port group, it was defined as time from the initial withdrawal of blood from the VAP to the end of blood collection. Total donation times were calculated, beginning with the initial predonation evaluation for both groups and ending with the end of blood collection (port group) or recovery from sedation (nonport group). Recovery from sedation was considered to be complete when cats were ambulatory with minimal or no ataxia, vital signs were within reference limits, and mentation was considered to be normal.

**Behavior variables**—Behavior was assessed in each cat at each collection event. Behavior was evaluated during predonation physical examinations, predonation phlebotomy for PCV and plasma protein determination, and blood collection for both groups. In the nonport group, blood collection behavior was judged from the time of restraint for IV administration of sedation.
tion to the point of sedation. In the port group, behavior during port manipulation (eg, clipping, scrubbing, and needle insertion) was included in the predonation phlebotomy behavior score. Behavior was subjectively graded on a scale of 1 to 4. A score of 1 was assigned if the cat was sitting quietly, a score of 2 was assigned if the cat was vocalizing and active, a score of 3 was assigned if the cat was very active and also had avoidance behavior, and a score of 4 was assigned if the cat was fractious and had scratching or biting behavior.

Personnel—The number of personnel needed for each cat for each blood collection was recorded.

Statistical analysis—Data were collected on standard forms and analyzed at the end of the study. A response feature analysis was performed to compare the behavioral scores and blood collection times. Values of \( P < 0.05 \) were considered significant. Nonparametric Wilcoxon tests or Fisher exact tests were used, where appropriate, for comparisons between groups. All statistical analyses were performed with commercially available software.

Results

Surgery-related complications—Seroma formation at the port site occurred in 1 cat but resolved without treatment and did not interfere with the blood collection schedule. One catheter became disconnected from the port 142 days after the placement surgery. The catheter was reconnected during revision surgery, and the port functioned without further problems during the remainder of the study. Bacterial infection of 1 port with *Staphylococcus epidermis* resulted in port erosion 63 days after surgery. The catheter was removed, and another port was placed in the opposite jugular vein 56 days after removal of the first port. This did not interfere with the remaining blood collection schedule. Self-trauma to the ports was not observed in any cats during the study period.

Port and vascular patency—In the port group, ports were immediately patent after the first flush in 14 of 20 collections and were patent after the second flush in the remaining 6 collections. In the nonport group, only 1 jugular vein was punctured for blood collection in 20 of 24 collections. Both jugular veins were punctured to obtain the calculated blood volume in the remaining 4 collections.

Bacterial evaluation—Bacterial contamination of blood products was detected for 2 of 24 blood collections in the nonport group (1 *Streptococcus* sp and 1 *Micrococcus* sp) and for 5 of 20 collections in the port group (1 *Staphylococcus* sp in both blood product and locking solution, 3 *Propionibacterium acnes* isolates, and 1 *Lactobacillus* sp in blood product. There was no significant difference in the number of bacterial cultures with positive results for growth between groups. Antimicrobial treatment on the basis of culture and susceptibility results was initiated in the cat with bacterial growth in both blood and locking solution. As described, this port was surgically removed and subsequently replaced. Two weeks after port removal and prior to port replacement, a blood sample was aseptically collected and submitted for bacterial culture as described. That sample had negative results for aerobic and anaerobic growth, and no additional bacterial cultures had positive results for bacterial growth in that cat for the remainder of the study.

Blood component evaluation—No significant differences were noticed between groups in PCV, plasma protein, or CBC results or in erythrocyte morphology. No significant differences in poikilocytosis were noticed between anticoagulated and nonanticoagulated blood smears. Fifty percent to eighty percent crenation was observed in blood smears from 2 cats in the nonport group and 1 cat in the port group on the same day. Moderate polychromasia was observed in blood smears in 1 cat in the nonport group and 1 cat in the port group.

Time—Mean anesthesia time for surgical implantation of ports in the port group cats was 110 minutes (range, 86 to 150 minutes), and mean surgical time was 71 minutes (range, 54 to 102 minutes). Mean blood collection time in the nonport group (436 seconds) was significantly \((P = 0.02)\) longer than in the port group (248 seconds). Cats in the nonport group had more variability \((P = 0.02)\) in blood collection time (maximum, 855 seconds) than cats in the port group (maximum, 368 seconds). Mean total donation time was significantly \((P = 0.02)\) longer in the nonport group (41 minutes) than in the port group (9.2 minutes). Mean sedation recovery time in the nonport group was 26.8 minutes (range, 6.25 to 50 minutes).

Behavior scores—The mean behavior score for predonation physical examination was significantly \((P = 0.03)\) lower in the nonport group (1.1) than that in the nonport group (1.58). The mean behavior score for predonation phlebotomy was significantly \((P = 0.03)\) lower in cats in the port group (1.15) than cats in the nonport group (1.79). Mean behavior score for blood collection was 1.47 in the port group, compared with a score of 2 in the nonport group, a difference that was not significant.

Personnel numbers—A mean of 2.4 persons was required for donations in the nonport group, and 1 person was required to monitor recovery from sedation. A mean of 2.1 persons was required for donations in the port group, a difference that was not significant.

Discussion

Totally implantable VAPs have been an integral part of oncologic treatment in humans for more than 10 years. Ports allow long-term and reliable venous access for use in chemotherapy, parenteral fluid administration, and nutritional support. Advantages include elimination of the need for repeated IV catheterization, ease of implantation, a high degree of patient acceptance, low complication rates, the ability to administer many agents through the port on a long-term basis, and ease in obtaining blood samples for analysis. \(^{11,12}\) The present study was undertaken to determine the feasibility of using a similar port system in feline blood donors.

Anesthesia and surgical times were longer than expected for the first jugular port implantations in this study. There was a learning curve with port implantation, and surgical and anesthesia times decreased with subse-
quent procedures. The surgical technique itself involved minimal tissue dissection, and dissection was primarily confined to subcutaneous tissues. No specialized surgical instruments were required. The surgical time of < 1 hour in the last VAP placement indicated the relative technical ease of the procedure. Intraoperative difficulties included the need to use an applicator designed for humans for catheter introduction, hemorrhage around the catheter in 1 procedure, and inadvertent damage to the silicone catheter in 1 procedure. Disconnection of the port in 1 cat and port erosion secondary to infection in another cat were the important postoperative problems encountered, but these were satisfactorily addressed by revision surgery and appropriate antimicrobial treatment. In an earlier study in which use of VAPs in 8 feline blood donors was investigated, complications included self-resolving seroma (n = 3), dermatitis at port implant site (3), infection (1), and breakage at the port-catheter junction (1).

In humans, the rate of port-related complications caused by infection, thrombosis, or sepsis ranges from 4% to 33%. Port occlusion rates were significantly lower in the present study, compared with rates observed in human clinical studies. All VAPs were patent at each blood collection event with 1 or 2 flushes. Cats in the port group tolerated VAP flushing well and did not require sedation for VAP manipulation. In an earlier study partial VAP occlusions were noticed in 4 of 8 cats. Occlusion could be corrected in most cats with mild sedation and repositioning of the neck. Clinical evidence of port occlusion was not reported in 3 other reports of VAPs implanted in veterinary oncology patients. Similar to a recent prospective human trial, vortex-type ports designed to minimize occlusion were used in the present study and may have resulted in the more favorable occlusion rate observed. Routine echocardiographic evaluation of cats in the port group was not performed, so it is possible that clinically undetectable thrombi were present. In 1 cat that underwent echocardiographic evaluation 6 months after surgical port implantation, no signs of vascular, catheter, or atrial thromboses were observed.

Bacterial contamination of blood products was detected in both groups, despite the fact that strict adherence to aseptic technique was observed during collections. Intrasurgical contamination of the port, stagnant blood flow in and around the port, and the presence of foreign material may have contributed to the higher contamination rate in the port group. Other authors have described the use of an antimicrobial locking solution for VAPs, a potentially useful option for reducing bacterial contamination of blood products. In humans, the frequency of contaminated cellular blood products (erythrocytes and thrombocytes) is approximately 1 in 2,000. Transfusion-associated sepsis is suspected to occur in 1 in 50,000 platelet unit transfusions and in 1 in 500,000 RBC unit transfusions. To the authors’ knowledge, bacterial cultures of transfusion products are not obtained at every collection in veterinary settings and potential bacterial blood product contamination should be investigated in a larger, prospective, multicentric study. Contamination of a feline blood bank with Serratia marcescens has been described. In that report, 29 of 174 units of whole feline blood were confirmed to be contaminated and 2 additional units were suspected to be contaminated. In the present study, bacterial contamination was primarily caused by anaerobic bacteria. Lactobacillus spp and Propionibacterium spp were cultured from 1 cat with positive results for Mycoplasma spp. Anemia was never detected in that cat, so the clinical importance of the presence of Mycoplasma spp is unknown. The possibility of an underlying immune deficiency in this cat, predisposing it to bacterial infection, cannot be excluded. In human blood products, contamination is most frequently caused by Staphylococcus spp (73%) and gram-negative rods (10%). Episodes of bacteremia caused by Bartonella spp, Salmonella spp, and other bacteria have been reported in healthy cats. The prevalence of bacteremia in dogs, primarily associated with dental prophylaxis, has also been evaluated. In 1 study, results of bacterial culture of blood were positive in 9 of 30 (30%) dogs that underwent dental prophylaxis. There was no difference in the number of blood cultures with positive results for bacterial growth in dogs undergoing dental prophylaxis and control dogs. In another study, bacteraemia caused by anaerobic gram-negative and gram-positive bacteria was detected in 100% of dogs within 40 minutes of initiation of the dental procedure, regardless of the severity of dental disease. Periodic episodes of bacteremia, potentially related to resident anaerobic flora in the oral cavity, may have occurred in cats of the present study. The importance of this bacteremia is questionable because none of the cats had signs of illness (eg, fever and inappetance) or hematologic changes (leukocytosis). Half of the bacterial complications in the port group originated from a single cat from which Staphylococcus spp were cultured multiple times. Replacement of the port resolved the infection, and no further complications arose with that port. In a clinical setting, VAPs should not affect patient hematologic or biochemical variables, and blood components (RBCs and platelets) should not be damaged iatrogenically when VAPs are used. Good correlation between hematologic and biochemical variables in blood samples obtained via traditional venipuncture and VAPs in cats has been reported. Studies in humans have revealed that rates of RBC hemolysis are higher with phlebotomy via indwelling catheters than with traditional venipuncture and that rates of hemolysis were higher when blood was collected through a 22-gauge IV catheter. In the port group in the present study, blood was collected by use of a 19-gauge needle and in-dwelling 5-F (16-gauge) IV catheter. It is possible that this larger-sized catheter and needle minimized trauma to RBCs during blood collection. Polychromasia was seen in 2 cats and may have been an indication of RBC regeneration resulting from repeated blood collections. Anemia was not detected during the study, so the clinical importance of that finding is questionable. Packed cell volumes were not checked after blood collection, so it is possible that episodes of anemia may have been missed. The crenation observed in the blood smears of 3 cats in the present study was assumed to be artifactual because these changes were all noticed on the same day. Otherwise, no erythrocyte morphologic alterations or fragmentation was observed. Moreover, no morphologic differences between nonanticoagulated blood and CPDA-1-anticoagulated blood were observed, indicat-
Use of the VAPs significantly decreased donation time, compared with traditional phlebotomy. It is unlikely that cats’ weights accounted for any differences in blood collection times between the groups. Although it has been suggested that feline blood donors weigh at least 3.6 kg (8 lb), both groups included cats that initially weighed less than that. At the end of the study, however, all cats weighed more than that minimum weight and the mean weight in the port group (5 kg) was less than that in the nonport group (5.4 kg).

Although decreased blood collection time alone might not constitute an important advantage in practice (4.1 minutes for the port group, compared with 7.3 minutes for the nonport group), with the VAPs, blood could be collected consistently by 2 persons without sedating the donor cats. Total donation time, which encompassed recovery from sedation in the nonport group cats (41 minutes), was significantly shorter for cats in the port group (9.2 minutes). The advantage of avoiding sedation for blood donation would make routine blood donation in cats a more attractive and feasible option. The better behavioral scores in the port group suggested easier handling of donors and indicates that donor stress was decreased, compared with cats from which blood was collected via traditional phlebotomy. Because the principal investigators could not be blinded to the blood donor groups, the potential for bias in behavior assessment and handling must be considered. Behavior scores were different between the 2 groups, beginning with the predonation examination. It is possible that cats in the port group were more tolerant of handling, despite the randomized group assignments. More objective measurements of stress (eg, determination of plasma cortisol, catecholamine, and glucose concentrations) would be difficult to compare because each cat would have to serve as its own control. High plasma cortisol, corticotropin, and α-melanocyte-stimulating hormone concentrations have been observed in cats secondary to manual restraint and intradermal testing. Less need for manual restraint might have resulted in superior scores for cats in the port group, indicating less stress. Although stress reduction and not having to repeatedly sedate feline donors are positive factors from an animal welfare perspective, surgical implantation of VAPs might cause some to question the humane aspects of such a system. Repeated collection of blood via traditional jugular venipuncture carries the risk of thromboembolic events and repeated hypotensive episodes with sedation. Implanting a VAP does entail a surgical procedure with general anesthesia and necessitates use of a jugular vein, and a second anesthetic event is required for removal of the VAP system. However, VAPs are implanted as part of treatment in veterinary oncologic patients with chronic illness and have been well accepted by those patients. Long-term use of VAPs has been determined to decrease the emotional stress of children undergoing treatment for various illnesses. The authors are unaware of studies in which welfare was evaluated in feline blood donors.

Not having to monitor recovery from sedation in blood donors reduces the workload for support personnel. Although numbers of personnel needed specifically for blood collection were not significantly different between groups in the present study, this did not take into account the additional time needed for personnel to monitor cats’ recovery from sedation. Because cats in the port group were not sedated, comparisons between the 2 groups to account for this time could not be made. Mean sedation recovery time in the nonport group was 26.8 minutes. During that time, support personnel were necessary to monitor recovery, record rectal temperatures, and provide supportive measures when necessary (eg, add thermal support for cats with hypothermia). Cats in the port group did not require the same degree of intensive monitoring after blood donation.

Complications are rare for feline blood donors, but include induction of hepatic lipidosis and liver failure, thromboembolic complications, and hypovolemic shock. None of these complications were observed in the present study. Blood pressure measurements were not routinely taken during blood collection, so episodes of hypotension were not confirmed in either group. Several authors have reported hypotension-related adverse reactions in cats secondary to sedation and donation of maximal blood volumes. Routine IV administration of saline solution after donation has been recommended for avoidance of hypovolemia. Postdonation IV fluid replacement in feline donors could easily be performed in cats with VAPs and would decrease the risk of hypovolemia and other complications.

Results of the present study revealed the feasibility of using VAPs in a dedicated feline blood donor population. For some variables (eg, bacterial contamination), it is possible that nonsignificant differences may be clinically meaningful. The statistical power for detecting differences between groups was small because of the small sample size; therefore, seemingly important clinical differences were not found to be significant. The power to detect a difference between groups was 0.196, indicating that there was <20% likelihood of detecting a significant difference. At the conclusion of the study, the rate of infection in the nonport group was 8.3%, compared with 23% in the port group. If use of VAPs truly increases the risk of bacterial contamination in blood products, the risk of disease transmission to recipient cats would have to be considered. In another report in which the use of implantable ports in feline blood donors was investigated, there was 1 occurrence of infection among 8 cats in which blood was collected during a 6-month period. Because of the small sample size in our study, there was insufficient information to justify deeming 1 method of collection better than the other with regard to bacterial contamination.

Use of VAPs decreased the time required for blood collection and was well accepted by donor cats. The ease of port manipulation and tolerance of the ports by the cats facilitated blood collection during the 6-month study period.
ried. Two ports were maintained for longer periods (for as long as 43 months) and continued to yield easy vascular access with no complications. Implantation of VAPs would not preclude cats from living in a home environment and providing blood on a non-resident-donor basis. This would minimize the need to maintain a closed or hospitalized blood donor colony, which is advantageous from an animal welfare perspective. In addition, food withholding is not required prior to blood donation when VAPs are used, which also increases donor availability. Such a system would permit more efficient collection of feline blood products when the decreased blood collection times, better behavior scores, and avoidance of sedation and sedation recovery in the port group cats are taken into consideration. This would enable veterinarians to improve the quality of care for feline patients offering transfusion medicine when needed.


b. Dr. Urs Giger, Feline and Canine Blood Typing, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Penn.

c. IDEXX SNAP FIV/FeLV test, IDEXX Laboratories, Westbrook, Me.

d. The National Veterinary Laboratory, Franklin Lakes, NJ.

e. Microbiology Laboratory, Veterinary Medical Teaching Hospital, University of California, Davis, Calif.

f. Access Technologies, Skokie, III.

g. 50- to 150-mL single blood donor bag with needle, Animal Blood Bank, Dixon, Calif.

h. JMP statistical discovery software, version 6.0.0, SAS Institute Inc, Cary, NC.


References


