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A Technique for Chronic Jugular Catheterization in the Ferret

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FLORCZYK, A. P. AND J. E. SCHURIG. *A technique for chronic jugular catheterization in the ferret.* PHARMAC. BIOCHEM. BEHAV. **14**(2) 255–257, 1981.—A technique was developed to provide an efficient method for blood sampling and intravenous drug administration in the ferret by using an indwelling jugular catheter.

Blood Sampling IV drug administration Jugular catheter Ferret

THE Fitch ferret (*Mustela putorius furo L.*) is a mustelid carnivore that belongs to the same general group as otters, weasels and minks. Ferrets have been used as laboratory research animals in studies of the physiology of reproduction and of the immunology, pathology and pharmacology of viral diseases, virus-induced neoplasms and bacterial infections [1,2]. They might prove useful additional animals for the safety testing of drugs and a satisfactory alternative to the cat for pharmacological studies [1].

Our initial laboratory experience with the ferret revealed that they could not easily be bled or dosed by jugular puncture because of the small size of the vessel, the surrounding fascia and the thickness of the skin on the neck. The cephalic veins are also relatively small and difficult to locate. This paper describes the techniques for constructing and implanting a chronic indwelling jugular catheter which facilitates repetitive blood sampling and intravenous drug administration in a conscious ferret.

METHOD

Animals

Adult, castrated male Fitch ferrets, 1.1–1.5 kg supplied by Marshall Research Animals, Inc., North Rose, NY, were used.

Catheter Construction

The following materials are used for the construction of the catheter: (1) 18 cm piece of Silastic® medical grade tubing 0.020 in. I.D. by 0.037 in. O.D., cat. no. 602-135, Dow Corning Corp., Midland, MI; (2) 2.5 cm piece of Intramedic® polyethylene tubing 0.045 in. I.D. by 0.062 in. O.D., cat. no. PE160 (7431), Clay Adams, Parsippany, NJ; (3) Nonabsorbable surgical suture 00 silk, black braided type B, Ethicon, Inc., Somerville, NJ; and (4) 23 ga × 1 in. disposable hypodermic needles.

The first step in the construction of the catheter is to heat flare the 2.5 cm piece of polyethylene tubing at both ends to obtain a 2 cm piece. Then the Silastic® tubing is threaded through the flared piece of polyethylene tubing with approximately 1 cm sticking out at one end. The 23 ga×1 in. disposable needles are used to make pins to seal the catheter end. A sharp pair of cutting pliers is used to cut off the pointed end and the portion near the hub making a 2 cm pin. The crimped ends are filed down with a fine file or honing stone so that they are rounded and burr free and then sealed with Sealease® tube sealer (Clay Adams, Parsippany, NJ). This pin is inserted into the Silastic® tubing which is sticking out of the polyethylene portion approximately 1 cm. The Silastic® tubing with the pin is pulled back into the polyethylene tubing until the end of the Silastic® is almost even with the top flange, a suture is then tied securely around the top flange and the Silastic® tubing is pulled out gently to approximately 1–1.5 cm. A suture is then tied securely around the bottom flange and the ends of this suture are left long for suturing to the ferret's neck after surgery. Figure 1 is a picture of the materials needed for construction and a finished catheter.

Surgical Technique

Ferrets are anesthetized with Pentobarbital Sodium Solution (Fort Dodge Laboratories, Inc., Fort Dodge, IA), 30 mg/kg intraperitoneally. At this dose anesthesia lasts approximately 60–90 min. The fur on the ventral and dorsal area of the neck is clipped with care taken to avoid clipper irritation. Surgical instruments are soaked in 1:750 Zephiran® solution prior to use and the neck is swabbed with 70% alcohol prior to surgery. Using a scalpel a single midline incision of 3 cm is made on the ventral portion of the ferret's neck. The left jugular is identified and cleaned of fascia and ligated with 00 silk suture at the cephalic end. A trochar (a 13 ga 5 cm biopsy needle serves this purpose quite well) is used to externalize the catheter to the nape of the neck just under the skin. The

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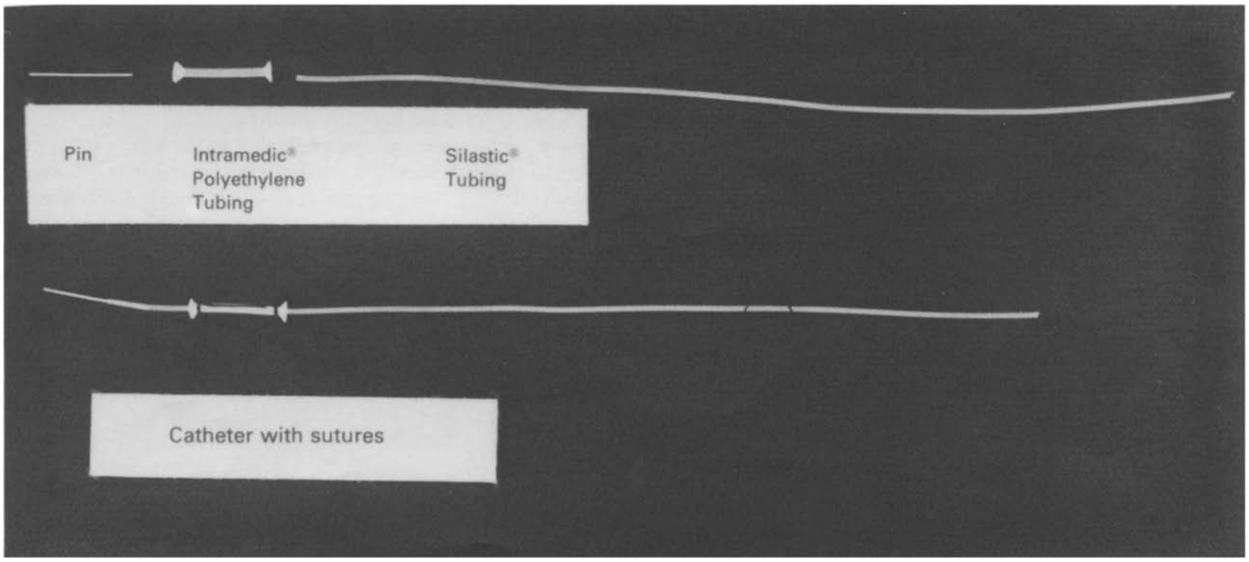

FIG. 1. Materials used in the construction of a catheter and a finished catheter.

catheter-filled with 200 units/ml of sodium heparin (Panheprin®, Abbott Laboratories, North Chicago, IL, 1000 units/ml diluted 1:5 with 0.9% saline) is then inserted into the trochar, and the flange of the catheter is brought even to the nape of the neck. The trochar is removed and the catheter can be trimmed so that approximately 4.5–5.0 cm of Silastic® tubing is inserted into the jugular. A small cut on the jugular with sharp iris scissors allows the catheter to be introduced into the jugular vein. The catheter is then anchored to the jugular with 00 silk so that it will not pull out easily yet will not be occluded. Nine mm stainless steel wound clips (Autoclips, Becton-Dickinson, Rutherford, NJ), 4 per incision, are used to close the incision. They can be removed in ten days. The flange that is located nearest the skin of the neck is securely fastened under the skin with several sutures. Figure 2 shows a ferret with an indwelling chronic catheter.

The entire procedure of making the catheter and surgical implantation takes approximately 30 min or less per animal.

Blood Sampling and Drug Administration

Blood sampling and drug administration require two people. One person restrains the ferret on a table with one hand over the midpoint of the trunk of the body and the other hand over the head while the other person draws blood samples and/or doses. Usually there is very little objection on the ferret's part to this method of restraining.

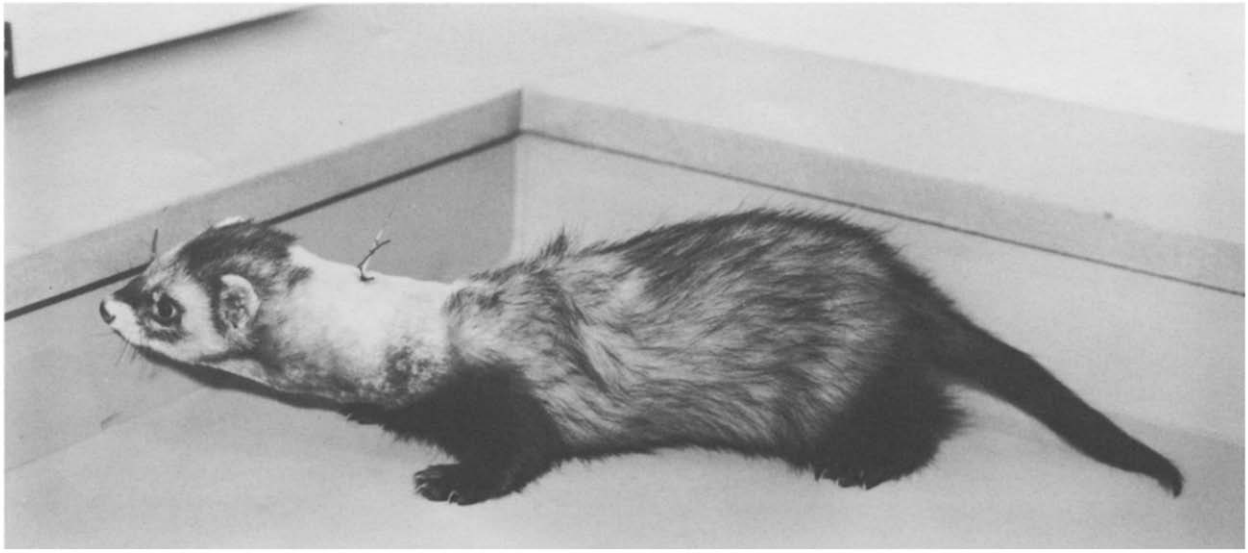

FIG. 2. Ferret with indwelling jugular catheter.

A 23 ga Becton-Dickinson tubing adaptor is inserted into the Silastic® tubing after the pin is removed. Usually a 3 cc syringe is used to flush and draw blood samples. The usual procedure is to flush the catheter with approximately 0.3 cc heparin, withdraw approximately 0.6 cc with the same syringe and discard, then with a clean syringe withdraw the needed amount of blood for blood chemistries and hematologies. After this procedure the catheter is refilled with heparin and the pin is reinserted.

For drug administration 0.3 cc heparin is injected into the catheter, 0.6 cc is withdrawn with the same syringe. With the appropriate drug-filled syringe an intravenous bolus injection is administered, followed with normal saline to flush the drug through the catheter. After this the catheter is refilled with heparin to retain patency and the pin is reinserted.

RESULTS AND DISCUSSION

Approximately 25 ferrets in our colony have been surgically implanted with this jugular catheter. The ferrets demonstrate no discomfort after 24 hours and are usually used for blood sampling or drug testing 48 hours after surgery. The catheters have remained patent for up to 21 days with periodic heparin flushing.

The techniques described in this paper allow the ferret to be readily used in experiments where repetitive blood sampling and/or IV drug administration are needed. This indwelling chronic catheter eliminates stress to the ferret, requires minimal restraint during the experimental procedures and provides an intravenous drug delivery system which is efficient and without chance of infiltration.

ACKNOWLEDGEMENT

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