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 We use this protocol and it's working

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SPARC Cat acute UroMOCA implantation

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SPARC

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ABSTRACT

This is a procedure for an acute wired UroMOCA implant cat experiment. A cystotomy is performed and an active, wired (for power) UroMOCA is placed in the bladder. The bladder is sutured closed, and urodynamics is performed to collect wireless data from the UroMOCA. This protocol includes basic surgery, UroMOCA implantation, urodynamics and imaging.

MATERIALS

Cat - Domestic short-haired cat. Male or female. 6-24 months; 3.5-5.0kg

Syringe Pump - Genie Touch; Kent Scientific

Pressure Transducer - Catalog # 503067

WPI Amplifier - 4 channel transbridge

WPI National Instruments multifunction I/O device - NI USB 6259

National Instruments Laptop with Labview software

Tubing - Masterflex L/S Platinum-Cured Silicone Tubing ID 3/16 "; Cole Parmer

BNC cables

Tubing to catheter - APIS

Laborie Catheter - Argyl Suction Catheter, 3.5 Fr Catalog # 8890703211

Covidien Sutures - 4-0 Vicryl Polysorb (Covidien UL212)

3-0 Prolene (Ethicon 8762)

2-0 Silk Syringe

60ml Contrast

Visipaque 320mg/ml

Receiving radio/antenna

Surgilube

Surgical instruments

BEFORE START INSTRUCTIONS

1 week before start of experiment - Confirm absence of bladder spasm; healthy cat

12 hours before experiment, start fasting the cat

You must transport the animal chart along with the cat to surgery site. The veterinary team will record all relevant data in the chart. The chart must then go back to the housing site.

Transport Cat

- 1 Transport cat from housing site to surgery site.

Animal Prep and catheter placement

- 2 Animal is anesthetized and abdomen is shaved by the vet team. The cat is then moved into the surgery room and attached to monitors by the vet team.
- 3 Drape animal and perform betadine scrub on abdomen and genitals.
- 4 Put surgilube on 3.5Fr catheter and insert into bladder through the urethra. Advance the catheter until resistance is met, then pull back 2-3cm.
- 5 Use gentle suction with syringe to withdraw urine from bladder through the catheter. Measure the volume and save the urine for urinalysis.

7 mL urine removed

Conductivity of urine was recorded before sending for urinalysis

40.78 mS/cm

41.54 mS/cm

41.52 mS/cm

Cystogram - DYNA CT

- 6 Use 1:10 dilution of contrast to saline to visualize bladder.

Fill the bladder with contrast and take a 3D CT image

Add 10 mL more to bladder take 3D CT image

- 7 Empty Bladder
~13.5ml

Urodynamics/Cystometry

8

Note

Performed after cat is transferred from Isoflurane to propofol anesthetic.

Note

Fill rate is 2ml saline/minute using syringe pump.

Note

Data is recorded using Labview software.

Note

Pressure is recorded using an external pressure transducer connected to syringe pump on one end and tubing that leads to the catheter on the other end.

- 9 Fill bladder with saline and record pressure using pressure transducer connected to LabView

Fill to 15 mL

10 Empty Bladder

Remove 17 ml of saline + urine

Urodynamics/Cystometry 2

11 Fill bladder with saline and record pressure using pressure transducer connected to LabView

Fill to 12 mL ; Non-voiding contraction seen

Fill to 13 mL ; Non-voiding contraction seen

Fill to 16 mL ; Non-voiding contraction seen

Surgery

12 See protocol titled "SPARC Cat surgery Day 0" for details on accessing and opening the bladder for device insertion.

13 1 cm incision made in bladder. Place device in bladder, with the wires for power remaining outside the bladder. Suture the bladder closed, check for leaks and place bladder back into body.

14 Test for device function.

Data is being sent wirelessly from the UroMOCA to the receiving radio

15 Close the abdomen, with the wires for power remaining outside of the animal

Cystogram - DYNA CT

- 16** Infuse 10mL of contrast (1:10 dilution) – Single CT image
Infuse an additional 5mL of contrast (1:10 dilution) – Single CT image
- 17** Empty Bladder

Urodynamics/cystometry 3

- 18** Fill bladder with saline at 2ml/min and record pressure using pressure transducer connected to LabView
- Fill to 12 mL ; No spontaneous contractions seen
- Fill to 15 mL ; Pressure response from UroMOCA is seen
- 19** Empty Bladder

Urodynamics/cystometry 4

- 20** Fill bladder with saline at 2ml/min and record pressure using pressure transducer connected to LabView
- Fill to 15 mL ; Tug on catheter - large contraction
- 21** Empty bladder
15ml removed

0.9% saline Bolus infusion 1

22 Infuse 0.9% saline in boluses of 3mL, 6mL, 9mL, 12mL, 15mL at a rate of 10mL / minutes.

UroMOCA transmitting data

23 Empty bladder

1.5% saline Bolus infusion 1

24 Infuse 1.5% saline in boluses of 3mL, 6mL, 9mL, 12mL, 15mL at a rate of 10mL / minutes.

UroMOCA transmitting data

25 Empty Bladder

3.0% saline Bolus infusion 1

26 Infuse 3.0% saline in boluses of 3mL, 6mL, 9mL, 12mL, 15mL at a rate of 10mL / minutes.

UroMOCA transmitting data

27 Empty Bladder

1.5% saline Bolus infusion 2

28 Infuse 1.5% saline in boluses of 3mL, 6mL, 9mL, 12mL, 15mL at a rate of 10mL / minutes.

UroMOCA transmitting data

29 Empty bladder

1.5% saline Bolus infusion 3

30 Infuse 1.5% saline in boluses of 3mL, 6mL, 9mL, 12mL, 15mL at a rate of 10mL / minutes.

UroMOCA transmitting data

31 Empty bladder

3.0% saline Bolus infusion 2

32 Infuse 3.0% saline in boluses of 3mL, 6mL, 9mL, 12mL, 15mL at a rate of 10mL / minutes.

UroMOCA transmitting data

33 Empty Bladder

0.9% saline Bolus infusion 2

34 Infuse 0.9% saline in boluses of 3mL, 6mL, 9mL, 12mL, 15mL at a rate of 10mL / minutes.

UroMOCA transmitting data

35 Empty Bladder

3.0% saline Bolus infusion 3

36 Infuse 3.0% saline in boluses of 3mL, 6mL, 9mL, 12mL, 15mL at a rate of 10mL / minutes.

UroMOCA transmitting data

37 Empty Bladder

0.9% saline Bolus infusion 3

38 Rotate animal on right side

Infuse 0.9% saline in boluses of 3mL, 6mL, 9mL, 12mL, 15mL at a rate of 10mL / minutes.

UroMOCA transmitting data

Euthanasia

39 Cleveland Clinic animal team euthanizes the animal

Dissection/Histology

40 Bladder is removed and placed in formalin for histological analysis