Altasciences, 6605 Merrill Creek Pkwy, Everett, WA 98203, United States
Altasciences.com | contact@altasciences.com

Method for Surgical Closing of Muscle Biopsy Sites on Non-Human Primates in Group Housing

David Benedict, Brett Megrath, Christina Cruzen, DVM DACLAM

Altasciences, Seattle, WA, United States

ABSTRACT

There are several benefits to group housing non-human primates in the research setting, but it also adds challenges to study procedures. As part of the study, cynomolgus macaques (Macaca fasicularis) required multiple muscle biopsy sites twice over the course of a study. The surgical procedure and postoperative care were modified during the study to reinforce the surgical closure, improve analgesia, and prevent post-operative infection while limiting post-operative single housing duration.

The animals were anesthetized using a combination of ketamine and dexmedetomidine, and provided pre-operative meloxicam analgesia. An incision was made over the muscle, using an 8mm biopsy punch. Two samples per muscle were collected. The muscle and skin were closed using a simple interrupted pattern with 3.0 suture. Surgical staples and surgical adhesive were then applied to ensure that the incision sites would remain closed.

After completion of the procedure, bupivacaine (1 mg/kg) was administered subcutaneously at the incision sites, ceftiofur (20 mg/kg) was administered subcutaneously, and atipamezole (0.25 mg/kg) intramuscularly. Additional doses of meloxicam (0.2 mg/kg) were administered intramuscularly for two days following the procedure.

The previous collection only used sutures and surgical adhesive to close the sites, and ceftiofur was only administered to animals with indications of postoperative infections.

With the addition of the surgical staples and ceftiofur, postoperative complications dropped from approximately 15% to 2%, and animals could be returned to group housing 24 hours after the procedure. For the next six subsequent days, only a brief separation was needed to administer meloxicam and monitor the animals for postoperative complications

EQUIPMENT AND MATERIALS

- 3-0 Polyglycolic 910 synthetic absorbable suture
- 70% isopropyl alcohol
- 8mm biopsy punch
- Atipamezole (5 mg/ml)
- Antiseptic solution (i.e., diluted chlorhexidine solution)
- Ceftiofur crystalline 200 mg/ml
- Clippers with a #40 clipper blade
- Dexmedetomidine (0.5 mg/ml)
- Disposable face shield
- Disposable surgical mask
- Gauze sponges
- Hemostats
- Ketamine (100 mg/ml)
- Meloxicam (5 mg/ml)
- Metzenbaum surgical scissors
- Sterile fenestrated drape
- Surgical blade #15
- Surgical scrub (i.e. chlorhexidine scrub)
- Surgical staples (3.4 mm Closed Position)
- Surgical adhesive
- Tuberculin syringes
- Surgical PPE

PROCEDURE

1. Sterilize all instruments in autoclave prior to procedure
2. Anesthetize the animal with intramuscular ketamine (10 mg/kg) and dexmedetomidine (0.05 mg/kg)
3. Administer pre-analgesics 0.2 mg/kg of Meloxicam
4. Shave area around collection sites and clean with antiseptic solution and alcohol
5. Place the animal lateral recumbency and apply surgical scrub.
6. Put on appropriate surgical PPE
7. Make a skin incision over the selected muscle. Use blunt dissection, as needed, to expose the selected muscle.
8. Place the cutting edge of the punch lightly on the muscle, perpendicular to the intended biopsy site, and depress the muscle with the punch using firm pressure.
9. Rotate the punch until resistance stops and the muscle returns to its original position. Uses Metzenbaum surgical scissors as needed to remove sample.
10. Transfer sample for processing.
11. Apply firm pressure with sterile gauze until the biopsy site reaches homeostasis.
12. Close muscle and skin using a simple interrupted pattern with 3.0 polyglycolic 910 synthetic absorbable suture.
13. Apply surgical staples and surgical adhesive.
14. Administer bupivacaine 1 mg/kg subcutaneously at the incision sites and ceftiofur 20 mg/kg subcutaneously.
15. Administer atipamezole at 0.25 mg/kg to reverse the dexmedetomidine.
16. Administer meloxicam 0.2 mg/kg IM SID for 2 days post-operatively.
8. Observe biopsy site and animal demeanor for approximately seven days following the procedure.

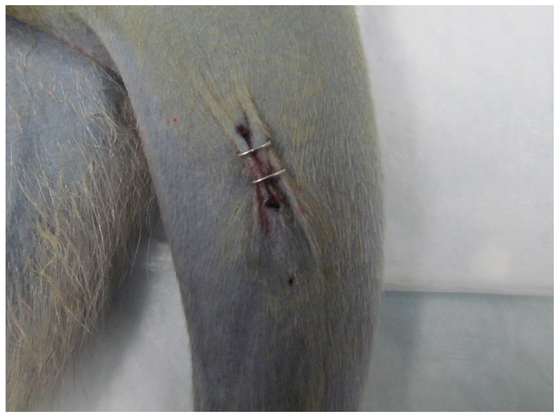

Figure 1. Vastus lateralis immediately following the collection

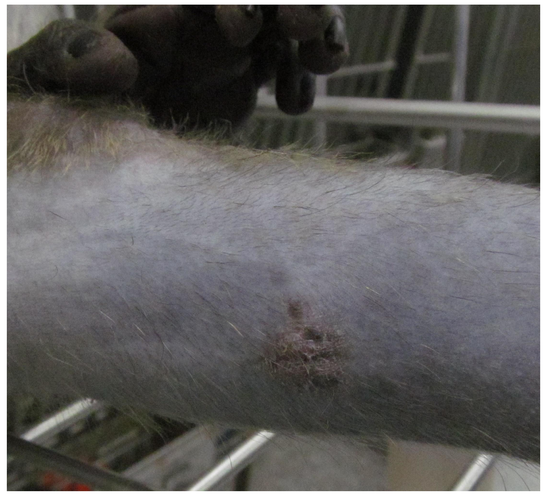

Figure 2. Vastus lateralis 24 days post collection

CONCLUSIONS

In previous studies, sutures and surgical glue had been enough to keep incisions closed until they could fully heal, but with the increased activity and social grooming of group housing, this proved to be insufficient.

Wanting the animals to receive the full benefit of group housing, we updated our already-established procedures to address the two main issues we had seen, dehiscence and infection. Adding surgical staples proved to be secure enough to handle the increased activity, and social grooming and the ceftiofur was sufficient to mitigate any postoperative infections before the greatest treatment was needed.

With minor changes in the muscle biopsy procedure, we were able to see a 13% decrease in postoperative complications while allowing the animals to receive the most benefit from group housing.

© 2021 Altasciences. All Rights Reserved.