Surgical Note

Post-Operative Complications: Loss of Incision Integrity and Exposure of the Device Body

DSI implantable telemetry devices have been proven, through years of testing and use, to be very biocompatible. Under normal use and following correct surgical technique, these devices are very well tolerated in the animal of recommended species and size. Occasionally, an investigator will experience problems with animals self-mutilating and removing the devices, or with an incision breakdown (dehiscence) allowing the device to become exposed. Often these complications occur due to improper healing of the incision. There are several reasons why an incision may not heal properly. This situation can be avoided by using proper surgical technique and placement of the device body following recommended procedures.

Infection Prevention

A common cause of poor healing is infection along the incision or within the body cavity around the device. Following surgery, the animal will appear to recover but one to three weeks later it may begin to experience some discomfort. Infection can be identified by the presence of a purulent discharge at or around the device and incision. The animal may exhibit signs of illness (i.e. fever, listlessness, pain). The best solution for this is to prevent it from happening in the first place by maintaining strict adherence to aseptic technique during surgery. The surgical sites should be fully removed of hair and a proper surgical scrub performed on all surgical sites. Placement of sterile drapes will prevent contamination from surrounding tissue. The use of sterile instruments is required for all survival surgeries. The surgeon should also scrub their hands and wear appropriate PPE (gown, cap, and mask, and sterile gloves) when performing the surgery. Pre- and post-operative antibiotics may be advisable when their use does not interfere with the experimental protocol.

Suture Placement

Suture placement may also attribute to incision failure. An animal that opens its incision within the first week following surgery is often responding to discomfort. Tying the sutures too tight is common mistake. When closing muscle tissue or skin, it is only necessary to bring the two edges into contact. Binding them tightly together does not increase the strength of the suture line or speed healing. In fact, it can have exactly the opposite effect. Sutures that are tied very tightly can prevent blood flow to the tissue along the edge of the incision. This will cause the entrapped tissue to die and slow the healing of the incision. It may also cause discomfort to the animal. Many animals respond to this discomfort with excessive grooming, scratching, or even chewing at the site. If these behaviors continue, the result could be loss of the sutures and opening of the incision.

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Suture Selection

When permanent, non-absorbable sutures are to be used, it is important that the material be as non-reactive as possible. Historically, silk has been used when there was a need for non-absorbable suture material, however, it is not recommended because of its reactivity. Synthetic suture materials are far superior to silk in terms of biocompatibility. Multi-filament suture should be avoided when placing external sutures due to their ability to "wick" fluids across the incision line. This can cause contamination of the incision. All suture used must be sterile to prevent bacterial contamination. It is also important to use a suture of the appropriate size for the species in question. Using suture that is too large can cause a tissue reaction associated with the large knots. Using suture that is too small may not provide the strength necessary to hold the incision securely. Please refer to the Large Animal Suture Material and Size Recommendations and Rodent Suture Material and Size Recommendations tech notes on the DSI Support Center for more detailed suture information.

Device Placement

Placement of the device body will also affect tolerance by the animal. In large animals, a device placed into a subperitoneal pocket in the abdominal cavity is well tolerated by the animal. In small animals, where the device is secured to the wall of the abdomen, it is important to suture loosely. Tight sutures can cause pressure necrosis to occur either under the sutures themselves or under the device. By securing the device loosely to the wall of the abdomen with non-absorbable suture, the device will be held securely in place. During the healing process, fibrotic tissue develops will help secure the device to the abdominal wall.

Intramuscular device placement is another option for large animals. Success may depend on multiple factors, including animal size and muscle mass. It involves tacking the device body between two muscle bodies. It is less invasive as it does not require opening the abdominal cavity. The device will reside between muscle layers and be protected from eroding through the skin.

Subcutaneous placement of the device body requires careful selection of the appropriate site and meticulous care in the preparation and closure of the pocket enclosing the device. Site selection requires an area that allows placement of the device against a flat body surface. The device body should be placed on soft tissue such as muscle or fat, not directly on a bony surface. Placement on a bony surface will cause pressure on the underlying tissue that may be damaging. The pocket must be large enough to accommodate the device without pulling the skin tightly over the top. If the skin is pulled too tightly, circulation to the area is compromised and the skin necrosis may occur. Additionally, if the pocket is too large, the device body will be allowed excessive movement and seroma formation may occur (refer to Seromas: Cause and Management in the DSI Support Center for more information). Subcutaneous device placement is not recommended in large animals.

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