

## **Post-Surgical Complications: Loss of Incision Integrity and Exposure of the Transmitter Body**

***Occasionally, following implantation of the DSI transmitter, an animal may experience poor wound healing and even extrusion of the transmitter. This situation can be avoided by using proper surgical technique and placement of the transmitter body following recommended procedures.***

DSI implants have been proven, through years of testing and use, to be very biocompatible. Under normal use, 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.

A common cause of poor healing is that an infection has occurred along the incision or within the body cavity around the transmitter. Following surgery, the animal will appear to recover but one to three weeks later it may begin to experience some discomfort. The infection can usually be identified by the presence of a thick, cloudy exudate at or around the transmitter 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. This can be done by maintaining strict adherence to aseptic technique during surgery. It is very important to carefully clip the hair and scrub the surgical site with a proper surgical scrub. Placement of sterile drapes will prevent contamination from surrounding tissue. The use of sterile instruments is now mandatory in all survival surgeries. The surgeon should also scrub, gown and mask, and wear sterile gloves when performing the surgery. Post-surgical antibiotics may be advisable when their use does not interfere with the experimental protocol.

Other causes of incision failure are due to suture placement and suture type. An animal that opens its incision within the first week following surgery is often responding to an uncomfortable incision. A common mistake made by both inexperienced and experienced surgeons is to tie sutures too tightly. 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 actually prevent blood flow to the tissue along the edge of the incision. This will cause the entrapped tissue to die, slowing the healing of the incision. It is also a source of discomfort for the animal. During the first few days following surgery, the tissue along the incision line will experience mild to moderate swelling due to the tissue damage caused in making the incision. If the sutures were tied very tightly to begin with, this swelling will cause the tissue trapped

between the sutures to be compressed even more, further interfering with circulation to the area. The result will be a very painful incision site for the animal. Many animals respond to this pain 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. Closing the incision with sutures tied just tightly enough to bring the two edges together will allow room for tissue swelling and prevent the problems associated with loss of circulation. Apposition of the tissue is all that is required to allow healing to occur.

The choice of suture material is also critical. When permanent, non-absorbable sutures are to be buried in a body cavity, 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, most veterinary surgeons do not recommend the use of silk as a buried suture because of its reactivity. Synthetic suture materials have been introduced that are far superior to silk in terms of biocompatibility. These advanced materials have almost eliminated the use of silk from veterinary surgery. Two commonly used non-absorbable synthetics are nylon and polyester. They come in many different sizes and types and they avoid most or all of the problems inherent with silk. When suturing abdominal organs, a monofilament suture such as nylon is commonly used. These materials are strong, very non-reactive, and prevent transport of fluids, "wicking", across the suture line. Polyester materials commonly come in braided forms and they tend to have superior knot holding properties. However, because they are braided, they will be more likely to "wick" fluids across the incision line. This can cause contamination of the incision. Braided polyesters are occasionally used for suturing deep tissue layers where permanent support will be needed and secure knot placement is a concern. 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. In rodents, it is common to use 4-0 or 5-0 suture. In larger animals, such as dogs and primates, 3-0 or 2-0 suture is commonly used. 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.

Placement of the transmitter body will also affect tolerance by the animal. When the transmitter body is placed into the abdominal cavity the animal generally will tolerate it with very little problem. The relative expandability of the abdomen allows the internal organs to arrange themselves around the transmitter comfortably. The organs most likely to be damaged by compression from the transmitter would be the liver or spleen. The intestines, stomach, bladder, and uterus generally are able to move well and seldom experience any problems. It is generally recommended to place the transmitter low in the abdominal cavity to prevent compression on the liver. In large animals, where the transmitter 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 transmitter. By securing the transmitter loosely to the wall of the abdomen with either absorbable or non-absorbable suture, the transmitter will be held securely in place. During the healing process, the body lays down fibrotic tissue on and through the suture tabs and pads. Eventually this fibrotic tissue will help secure the transmitter to the abdominal wall.

Subcutaneous placement of the transmitter body requires careful selection of the appropriate site and meticulous care in the preparation and closure of the pocket enclosing the transmitter. Site selection requires an area that allows placement of the transmitter against a flat body surface. The transmitter 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.

Try to avoid a surface that the animal commonly lays on. In thin-skinned animals such as rabbits or primates, the weight of the animal lying on the transmitter can cause the skin over the transmitter to die. The pocket must be large enough to accommodate the transmitter without pulling the skin tightly over the top. If the skin is pulled too tightly, circulation to the area is compromised and the skin may die. At the same time, it is important not to make the pocket too large. If the pocket is too large, the transmitter body will be allowed excessive movement. This can be irritating to the tissues and will increase the chance of seroma formation (see Technical Note on Seromas). The subcutaneous tissues can generally be sutured tightly. This will help to close the dead space within the pocket and secure the transmitter within the pocket.

If the animal spends time manipulating the transmitter in the pocket, there is a chance the catheter(s) or leads may become twisted or broken.

If you have further questions regarding this situation, we would be happy to discuss them with you.