

# CHAPTER 10

## POSTOPERATIVE PATIENT MANAGEMENT

CHARLES D. NEWTON

[◀ Prev](#) [Next ▶](#) [Home](#) [Contents](#) [Glossary](#)

- [General Care](#)
- [Care of the Multiple Trauma Patient](#)
- [Care of the Patient with Spinal Cord Injury](#)

The postoperative course begins upon completion of the surgical procedure and continues until the patient achieves the expected end point of recovery.

### GENERAL CARE

#### TEMPERATURE, PULSE, RESPIRATORY RATE (TPR)

The TPR should be taken and recorded every 15 minutes following surgery until the animal has completely recovered from anesthesia. If blankets or heating pads are used to increase body temperature, they should be monitored to prevent burns. Body temperature, specifically, should be monitored until a return to normal or until it levels off at a higher temperature.

Elevations in body temperature may reflect a previous preoperative fever, fever due to the absorption of necrotic debris around the site of trauma, inflammation, infection, or fever of unknown origin. Hopefully, the cause of the fever can be determined and the fever treated appropriately. Aspirin is a very effective antipyretic agent that works well in such cases; it should not be used in the animal on anticoagulant therapy, however.

Most animals with fever following surgery have an elevated body temperature for reasons other than infection. There is no rationale for using antibiotics unless the surgeon knows of infection or suspects that contamination occurred at the time of surgery.

### ANTIBIOTICS

The use or abuse of antibiotics has become a controversial topic. Each surgeon has an opinion that can be supported by the literature. In general, antibiotics are used more commonly to assuage surgeons' and owners' fears of possible infection than for medical reasons.

Known cases of infection (osteomyelitis, infected nonunion, infected fracture site or septic arthritis) should be treated with appropriate antibiotics. A culture and sensitivity will be necessary to determine the correct drug.

Contaminated injuries, such as those contaminated through open fracture, open wound, prolonged surgical time (over 2 hours), or a break in surgical asepsis, should be cultured at surgery and an antibiotic sensitivity performed. If the contaminated wound is properly flushed, debrided, and drained, antibiotics may be unnecessary. If the surgeon questions the efficacy of cleaning the wound or of the surgery itself, a broad-spectrum antibiotic should be given until the culture results are known. If the culture is positive, antibiotics can be used according to the sensitivity. If the culture is negative, antibiotics should be stopped.

Clean, elective surgeries of less than 1 1/2 to 2 hours duration require no antibiotics postoperatively.

### ANALGESICS

Most animals do not require analgesics postoperatively. If handled with care to prevent manipulation of the surgical area, animals evidence little apparent discomfort. Acute pain or discomfort evidenced by crying while lying unmolested does require medication. Aspirin and phenylbutazone (Butazolidin) administered at appropriate doses are the first line of treatment, and if ineffective are followed by narcotic or narcoticlike drugs. The narcotics are used to effect and then gradually withdrawn. Continued need for analgesia after one week usually reflects a problem associated with surgery and necessitates re-evaluation.

### EXTERNAL FIXATION

External fixation may be the primary form of orthopaedic management or may be only supplementary to an operative procedure. If external devices are used, they must be applied while maintaining the limb in proper midrange position. The splint or cast should be kept dry and clean, which can be facilitated by a large plastic bag (e.g., trash can liner) over the external fixation. The limb should be observed every 4 to 6 hours to be certain that the device has been applied properly, i.e., is not loosening or constricting the vasculature in the limb. Any alterations may require removal of the device and reapplication. (For a complete description of external fixation see Chapter 16.)

When the animal is ready for discharge, owners must be educated in the proper care of the cast or splint. A written description of proper splint care should be given to the owner.

### HOME CARE OF ANIMALS WITH SPLINTS OR CASTS

It is of extreme importance for the well-being of your pet that a splint or cast be well cared for at all times. You, as the pet

owner, must assume this responsibility.

It should be realized that under certain conditions (i.e., getting wet, slippage from its original position, etc.) the splint or cast may not perform its function properly or may even do severe damage to the animal, such as causing gangrene of the foot. Examine the splint or cast daily. Watch for swelling of the leg above the splint, and pinch the toes through the splint daily to ensure the animal has good sensation in them and that the toes have not become swollen.

Keep the splint or cast dry at all times. When the animal must go outside during wet weather, a plastic bag can be used to keep the splint or cast dry. Remove this when the animal is back inside.

Talcum powder or cornstarch helps to prevent friction sores that may occur where the splint or cast rubs in the groin or the armpit of the animal.

If any of the following events occur, return the animal to the hospital that day, where you will be attended to by either the orthopaedic staff, if available, or someone from the emergency service:

1. Any change in position or shape of the splint or cast on the limb
2. Any excessive chewing of the splint or cast by the animal
3. Any sign of excessive discomfort
4. Any unusual or bad odors coming from the splint or cast
5. Any unexplained soiling of the splint or cast that was not present before
6. Any pronounced sores that develop at the top of the splint or cast that do not respond to talcum powder or cornstarch application
7. Swelling of the toes, or the leg above the splint
8. Inappetence, depression, or fever in your pet

Be sure to make and keep an appointment to have the splint or cast examined and adjusted by the doctor in charge.

No splint or cast can be worn in complete comfort by the animal, and minor licking or chewing is to be expected. A few animals will persist in mutilating even the most carefully made and fitted splints or casts. If there is even a suggestion of trouble, it is always best to have the animal examined right away.

---

#### INTERNAL FIXATION

Owners become a critical part of postoperative care when the animal returns home. They tend to be more lax if the animal has internal fixation rather than external fixation. If a splint is not present, the assumption is that the animal may return to normal function. Proper aftercare should be discussed with the owner and reinforced with a set of written instructions.

Animals should be restricted to the house, cage, small run, or leash walks until there is radiographic evidence of union. A return to normal function, namely, free running, prior to union will result in complications. This is true of all fractures.

---

#### POSTOPERATIVE RADIOGRAPHS

Radiographs should be taken immediately following surgery and every 2 to 5 weeks until union. Films should be taken following removal of internal fixation.

---

#### REHABILITATION

Most ambulatory dogs do not require active rehabilitation. Animals should be encouraged to continue limited exercise (e.g., leash walks) as soon as possible. Passive manipulation of the affected limb can be effective; swimming is also beneficial in most instances.

---

#### DIET

Following orthopaedic surgery the animal's diet should be of adequate quantity and well balanced. The addition of supplementary vitamins and minerals is of doubtful value. If pathologic fractures are present as a result of osteoporosis, calcium phosphorus and vitamin D are indicated (For a more complete discussion see Chapter 59.)

---

#### CARE OF MULTIPLE TRAUMA PATIENT

The multiple trauma patient is any animal having bony, articular, or soft tissue trauma involving two or more body parts. Typically, the problems involve more than one limb; however, an animal having a hip fracture and hock dislocation of the same limb is considered a multiple trauma patient. These patients require special attention to their multiple orthopaedic problems and often have complicating soft tissue or medical problems as well. The following discussion highlights several problems seen commonly.

---

#### DECUBITAL ULCERS

Prolonged periods of lateral or sternal recumbency may produce decubital ulcers over bony prominences. These commonly occur over the lateral surface of the shoulder, elbow, carpus, greater trochanter, knee, or hock. Dogs may develop sternal ulcers if they are uncomfortable in other positions. Prevention of ulcers includes frequent turning, adequate padding, or standing in a sling. When possible, "water beds" may be made by filling industrial dunnage bags with water. Placing a dog in deep straw may also provide excellent support and avoid ulcers. However, all incisions must be healed or covered if this method is used.

Prevention of ulcers also requires meticulous care of hair and skin over bony prominences. The areas must be kept dry and

free of urine or feces. Desitin (zinc oxide) may prove helpful in keeping the skin pliable and protected from urine.

Once decubital ulcers form, they are managed by debridement of dead or necrotic skin and soft tissue and careful wound management. Closure by primary intention is rarely possible. An intensification of the preventive measures is necessary to prevent enlargement of the ulcer. Total patient rehabilitation is the best treatment if prevention fails.

Once the animal is ambulatory and capable of caring for itself, the decubital ulcers will granulate and heal.

---

#### HYPOSTATIC CONGESTION/PNEUMONIA

The multiple trauma patient tends to lie for long periods of time in lateral recumbency. If heavy splints are used, they may prevent the animal from changing body position. Such animals must be turned from side to side at least every 4 hours. It is preferred that such animals be positioned sternally or allowed to spend prolonged periods of time in a sling. Without such care, the animal is prone to hypostatic congestion in the dependent lung lobes. The likelihood of pneumonia is very high in an animal who may already be compromised as a result of surgery.

---

#### DISSEMINATED INTRAVASCULAR COAGULATION (DIC)

DIC is a clinicopathologic syndrome of variable expression resulting from uncontrolled simultaneous activation of the coagulation and fibrinolytic systems.<sup>(1)</sup> The disease process may be initiated by sepsis, hyperthermia, malignant neoplasms, or hepatic disease, and it is a common sequela to trauma. DIC is not a primary disease entity but rather a biologic process that is initiated by other contributing influences and most commonly manifested by bleeding. Although death may be the result of bleeding into a body cavity, more commonly the lesions of DIC are fibrin-platelet thrombi, large and small vessel thrombosis, and hemorrhage. The disease process most frequently occurs in the kidney, brain, pituitary gland, lungs, liver, adrenal glands, and the gut mucosa. If DIC is undetected and untreated, death will occur.

DIC should be suspected if a severely traumatized patient, either preoperatively or postoperatively, displays shock, hemolysis, hemorrhage, or evidence of thrombosis.<sup>(3)</sup> Laboratory diagnosis may be difficult, since often the prothrombin time (PT), the partial thromboplastin time (PTT), and the thrombin time (TT) will be normal. <sup>(3)</sup> Platelet numbers may be decreased, and often the platelets seen are large and bizarre.<sup>(3)</sup> Evaluation of blood clotting factors may be helpful in that Factors V and VIII and fibrinogen are usually reduced.<sup>(3)</sup> Treatment requires correction or elimination of the inciting factor or factors, volume replacement, anticoagulation, and the use of antiplatelet drugs such as aspirin.<sup>(3)</sup> Replacement of clotting factors may be considered; however, its value is a matter of debate.<sup>(5)</sup>

---

#### MULTIPLE FRACTURES

When two or more bones of a single limb are fractured or two or more limbs have fractured bones, aftercare is complex. Hopefully, all the fractures have been rigidly fixed using devices that allow the animal to stand or walk. In this instance, careful rehabilitation of the patient, by walking, can begin immediately. Walking must be slow and on nonslip surfaces. Early ambulation will help prevent fracture disease, which is described as stiffness in joints, muscle atrophy, fibrosis, limb edema, and resultant disuse or impaired use of the limb.<sup>(4)</sup>

Animals unable to walk or stand must be managed carefully to prevent decubital ulcers, hypostatic congestion, incision dehiscence, joint stiffness, or problems associated with external fixatives. The best aftercare is accomplished on a water bed, in deep straw, or by having the animal spend long periods daily in a standing position supported by a sling. Rehabilitation of limbs not immobilized should begin soon after surgery. This can be as simple as repeatedly moving the limbs through a complete range of motion. Swimming, when external fixation has been removed, is beneficial in restoring range of motion and returning atrophied muscles to their original size.

---

#### FRACTURE/SOFT TISSUE TRAUMA

Patients with combinations of fracture trauma and soft tissue trauma in the same area are best managed if the orthopaedic problem has been rigidly fixed internally. This allows the soft tissue trauma to be managed without constant concern for bony stability. The same principle applies to joint trauma with soft tissue injuries over the area. If the joint is managed by external fixation, the joint will be further traumatized each time the fixation is removed to manage the soft tissue wound. Joint injuries are best handled by internal reconstruction, thus making them stable so that they are not affected by management of the overlying soft tissue injury.

---

#### MULTIPLE JOINT TRAUMA

Patients with multiple joint trauma of the same limb require special aftercare. In most instances, the traumatized joints require additional external fixation to ensure successful treatment. In many instances this poses a unique problem in external fixation:

**Shoulder/Elbow.** This injury sometimes requires a flexed shoulder and an extended elbow, which can be accomplished by placing the elbow in extension and the shoulder in a Velpeau sling. The result is awkward, and in male dogs the paw often is contaminated by urine. If both shoulder and elbow can be extended, a shoulder spica can accomplish fixation of both the shoulder and the elbow.

**Shoulder/Carpus.** This injury presents the same problems as the shoulder/elbow combination. If extension of both joints is appropriate, a shoulder spica solves the problem. If the shoulder necessitates flexion, a Velpeau sling for the shoulder coupled with an extension coaptation for the carpus is desirable but difficult to engineer.

**Elbow/Carpus.** Since both joints are usually externally fixed in extension, any form of external coaptation of both joints works well.

Hip/Knee. This combination is very difficult to manage. The hip requires flexion, abduction, and internal rotation to be stable; the knee requires extension. It may be possible to accomplish both by the ingenious use of coaptation; however, it is very difficult. Most surgeons will treat the knee as the primary problem and allow the hip to fail, since the dog is more likely to rehabilitate successfully with a second surgery on the hip than on the knee. The salvage procedure of femoral head and neck resection may be the ultimate fate of such an animal.

Hip/Hock. The same problems exist as in the hip/knee combination. The hip requires a flexed position while the hock requires a midrange or semi-extended position. Most surgeons will treat the hock and allow the hip to fail.

Knee/Hock. The knee and hock are most stable in a midrange semi-extended position, and both can be adequately treated in the same coaptation splint.

---

#### CARE OF THE PATIENT WITH SPINAL CORD INJURY

Animals with spinal trauma or disk disease require special consideration. Their immediate postoperative needs include anti-inflammatory agents to decrease inflammation around the surgical site and antibiotics. Antibiotics are used prophylactically to prevent cystitis secondary to urinary stasis in the incontinent bladder.

Bowel and bladder functions are lacking. The bladder must be manually expressed every 4 hours. The animal must be kept clean to prevent dermatitis or decubital ulceration.

Upon discharge, care of the animal becomes the responsibility of the owner, who must be made aware of all nursing care required. Home care can be made easier by confining the animal to a small area (e.g., a playpen). Explicit written instructions are helpful. Re-examinations should continue every 2 weeks to monitor the animal's recovery until resolution of the problem.

---

#### NURSING CARE OF THE PARALYZED DOG

The ultimate recovery of your animal may depend on your care and observation. You have an important responsibility to see to the needs of your paralyzed dog during the convalescent period.

Food and Water-Your dog will probably be more hungry and more thirsty than usual as a result of medication. Have water available at all times but do not overfeed. A highly nutritious diet is important. Place food and water bowls within reach.

Decubital Ulcers (Bedsore)-Ulcerations may develop on the skin over pressure points. These ulcers heal very slowly and may lead to severe generalized problems. It is best to prevent them by keeping the skin dry and free of urine and feces. This may require daily bathing. A soft surface should be provided for a bed. Clean blankets over a foam rubber pad provides adequate bedding. Blankets may need to be changed daily. Confinement to a small area is mandatory until 10 days after all medication is finished. A playpen is ideal for this purpose, as is an airline flight cage.

Urination-Bladder infection can occur as the result of the inability of your animal to fully empty the bladder. Prevention is best, since it is difficult to cure cystitis in the paralyzed animal. The best way to prevent infection is to fully empty the bladder three or four times daily. To accomplish this, apply gentle steady pressure with both hands on the abdomen with the dog in a standing position. If the dog is urinating, it is not necessary to do this. Urine function usually returns before limb function.

Defecation-This is not usually a problem. The dog should have one or two bowel movements daily. If constipation occurs, mix 1/4 teaspoon of psyllium hydrophilic mucilloid (Metamucil) per 15 pounds of body weight into the food twice daily.

Medication-Give all medication as directed and until finished. Antibiotics are used to prevent cystitis, and steroids are used to prevent swelling of the spinal cord. The steroids will cause an increase in appetite and thirst and frequency of urination.

Sutures-To be removed 10 to 14 days following surgery.

---

#### REHABILITATION

Hydrotherapy-A daily 10- to 15-minute swim in lukewarm water may speed recovery time by encouraging the animal to use the paralyzed limbs. This also stimulates urination and defecation, gives the dog some exercise, and helps keep the coat clean.

Towel Sling-With the dog in a standing position, place a towel across the abdomen close to the hindlegs and support the weight of the dog from above. With his toes barely touching the ground, walk the dog for 10 to 15 minutes two to three times daily. This is a form of physical therapy for the hindlegs and may stimulate the dog to urinate.

If you notice any problems such as blood in the urine or bowel movement, problems with the suture line, vomiting, decreased appetite, or the like, please call and speak to the clinician in charge of your animal. If it is at night or during a weekend, call the emergency service.

---

#### REFERENCES

1. Bell WR: Disseminated intravascular coagulation. Johns Hopkins J 146:289, 1980

2. Carter HE: Limb fractures in the dog and cat: III. Postoperative therapy and management. J Small Anim Pract 7:147, 1966
  3. Greene C: Disseminated intravascular coagulation. In Bojrab MJ (ed): Pathophysiology in Small Animal Surgery, pp 471-473.. Philadelphia, Lea & Febiger, 1981
  4. Muller ME, Allgower M, Schneider R et al: Manual of Internal Fixation, 2nd ed, p 3. New York, Springer- Verlag, 1979
  5. Palmer RL: Intravascular coagulation and fibrinolysis. Postgrad Med 62, No. 1: 181, 1977
-