

**Post-Operative Cares of Surgery (Cannulated or Catheter) Animals, such as the Pig in Biomedical Research**

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**Abstract.** Post-operative cares of the animal are very critical for animal successful surgeries and survival. Post-operative cares start at the termination of surgery and anesthesia. This phase of surgery is the last phase and as such comes with a lot of monitoring the patient until full ambulation and pre-surgery appetite status are regained or attained. Therefore, monitoring both day and night until the attainment of full recovery is at the center of the success in the post-operative care phase of animal surgery. It involves giving some injections, checking for dehydration, surgery area, temperature, feed intake, urine and feces outputs. These records are very helpful in identifying areas of post-operative concern that requires immediate attention in managing the animal to full recovery. Furthermore, other major areas that also require effective attention and monitoring are the animal environment, nutrition and pain management. This paper articulates the pieces of the puzzles and puts them in a comprehensive format to better guide in the post-surgery cares of the animal for successful surgery in the field of biomedical research.

**Key words:** Post-operative cares, Successful recovery surgery, Biomedical research and the Pig

### **Introduction**

The recovery period begins with the termination of surgery and anesthesia and is just as critical as the surgery itself. Careful monitoring during the post-operative period would aid to prevent complications following surgery (Rutala & Weber, 2008). Optimal attention must be given to ensure the animal is comfortable and well cared for. Animals must be monitored continuously post-operatively until they are able to hold their heads up at least hourly until they are fully ambulatory and have their normal post-operative activities health-wise (Schofield, 1994). If complications do arise, appropriate treatment is to be administered to minimize their discomfort. Furthermore, to ensure that animals attain their normal activities without any discomfort and stress on attaining full ambulatory they still need to be checked at least every three to four hours and at least once overnight (Schofield, 1994). It is very important to know that experimental subjects should receive the same intensity of care, attention and affection given to any human patient. The regulation requires the provision of post-surgical/post-anesthetic care for research animals and maintenance of records for the life of the animal (Rutala & Weber, 2008; Schofield, 1994). Daily observation and recording of the following: body temperature, food intake, urine and feces output, condition of operative site, behavior (does the animal appear bright, active, alert or depressed and lethargic) (Bernal et al., 2009). Overall, during post-surgical care the major components are environment, nutrition and pain. This paper covers the different aspects involved in post-surgical care in respect to the animal's environment, nutrition and pain.

### **Environment**

Recovery from anesthesia of surgery requires frequent monitoring using animal monitoring sheets. Under no circumstance should an animal be allowed to recover unattended to. It is required that animal should recover in an area that is safe, quiet, comfortable and appropriate for its needs (Brown, Pearson & Tomson, 1993). Animals must be housed individually during recovery.

During post-surgical care, four threats to recovery are hypothermia, dehydration, nutrition and pain. Therefore, the animal's temperature, pulse and respiration must be systematically monitored. If cooled, then the animal is hypothermic and requires supplemental heat. However, this must be carefully managed as to avoid burns and over-heating. The incision site must be checked at regular intervals for bleeding, swelling and dehiscence. All medications must be available in the event of an emergency. As earlier stated, the animal will recover more quickly in a familiar environment free of loud noises and unusual disturbances. The required ambient room temperature must be set to the comfort of the animal. The animal must be handled gently to minimize their discomfort. Fluid therapy must be employed to keep the animal hydrated. The degree of dehydration is usually used to calculate fluid replacement needs. One way of assessing this is by picking up the loose skin over the shoulder blades to form a tent and releasing it. The skin will immediately return to its normal position in a healthy animal (Brown, Pearson & Tomson, 1993; NRC, 2011). The most commonly used fluids are saline and fluids formulated for specific research needs. Fluids can be administered subcutaneously, orally, intraperitoneally or intravenously. It is very important to calculate both the volume and flow rate when using the intravenous route to avoid volume overload and its associated side effects, including death. Fluids must always be warmed prior to administration to avoid hypothermia (NRC, 2011).

### **Nutrition**

The animal should be offered feed and water during recovery. However, the feed must not be offered until ambulatory (Baumgardt, 1974). It is important that the animal begin to eat and drink water via a low-pressured nipple as soon as possible. This would improve healing, immunological competence, catabolic tissue losses and patient survival (Baumgardt, 1974). Nevertheless, during the first day of recovery little amount of feed should be offered after regaining its consciousness. Thereafter feed allowance can gradually increase by the next feeding period until they attain their pre-surgery appetites fully as the appetite center of the animal is always depressed during surgery located in the hypothalamus (Baumgardt, 1974) and thus affected by anesthesia. On attaining full appetite status following recovery animal must be provided with adequate feed and free access to water to facilitate quick recovery (Baumgardt, 1974; Kuklman et al., 2008; Gwen, 1995).

### **Pain**

There are both ethical and scientific reasons why pain and distress must be minimized. Ethically, the public expects research organizations to follow acceptable and humane practices in the course of their researches (Kuklman et al., 2008). Scientifically, pain, discomfort and distress are capable of altering various physiological variables and thus invalidate data results (Gwen, 1995). This further explains why pain relief is mandatory. Therefore, eliminating or minimizing pain on the animal minimizes physiological stress and increases data validity of studies. Thus, pain and animal discomfort can be minimized by effective monitoring. This can also be better achieved by employing the services of well-knowledgeable technicians for night surveillances (Gwen, 1995).

Adequate space should be provided for the animal to turn around during their voluntary activities. Anti-cholinergics and analgesics should be used to minimized pain and discomfort. Additionally, antibiotic, Depocillin (Penicillin G Procaine 300, 000 IU/ml) at a dose of 1 ml per 20 kg body weight should be given 24-hour and 48-hour post-surgery, respectively for the prevention of post-surgical infection (Gwen, 1995; Conour, Chou & Anderson, 2008). Furthermore, betadine should be applied to the surgery site to prevent rashes and infection (Conour, Chou & Anderson, 2008). Animal cages and pens should be washed daily to enhance the animal's health.

### Conclusions

Overall, all phases of surgery, that is, pre-surgery-, surgery- and post-surgery-cares are all equally important for any successful surgery procedure. Therefore, they must be considered together as a single process in embarking on any surgery. Inadequacies at any stage in any of the three phases put the animal at risk and therefore must be avoided and prevented just by adequate preparations and strict adherence to surgery procedures. These underscore the fact that protocols for surgeries must be strictly followed and implemented in surgery procedures as deviations can cause surgery complications and thus put the health of the animal at risk.

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