THE USE AND ABUSE OF SURGICAL WOUND DRAINS

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Surgical drains of various types have been used, with the best intentions, in different operations for many years and it is controversial whether they achieve their intended purpose. There is very little scientific evidence in human and veterinary surgery that demonstrates an absolute benefit of surgical drains but many veterinarians, the author included, continue to use drains in surgery. This lack of definitive evidence has not helped to resolve most of the controversial issues surrounding the use of surgical drainage.

Indications for Surgical Drainage

Surgical drains are used in a wide variety of procedures and the intention should be to decompress or drain fluid from the area of surgery. The single most important indication for surgical drain placement is to control dead space. Fluid accumulation in a wound or body cavity can lead to failure of the incision or repair, provides a nutrient source for bacteria and rapid colonization of tissues, prevent the ability of neutrophils to migrate into an infected area,be a source of discomfort, and delay wound healing. The ultimate form of wound drainage is open wound management; however, it may not be the most practical, safe, and cost effective in some cases. Drains are not indicated to remove infected, devitalized and contaminated tissue and in fact, cannot do so. Drain materials of all types are considered a foreign body. Foreign body reaction in all tissues will decrease the amount of bacteria required to establish an infection and simultaneously induce regional tissue inflammation. This fact coincides with a contraindication of drain use in patients; drains should not be used in place of aggressive surgical debridement and lavage. Drains are to be used to control dead space and fluid accumulation in a wound or cavity after appropriate surgical management. Drains are also used in some cases as a diagnostic tool in order to assess local wound fluid production, record fluid volume and consistency, and perform cytology. The diagnostic utilization of drains is controversial because the presence of the drain alone will cause fluid production, inflammation to regional tissues, and failure of healing of the surgical site secondary to inflammation.

Drains should never be placed directly under an incision as the inherent inflammation they induce may negatively impact incisional healing. Drains should never exit or be in contact with haired skin and all drains should be protected by a bandage at all times.

Characterization of a Drain

Drains can be characterized as open or closed. Open drains (corrugated and noncorrugated rubber, silicone, or plastic) ideally drain fluid onto a gauze pad or into a wound dressing, a collection bag, or are left unprotected and exposed to the environment. They increase the risk of infection, especially when left exposed to the environment. Closed drains are formed by tubes draining into a bag or bottle, helping to reduce the risk of infection.

Drains can also be classified as active or passive. Active drains are maintained under suction (low or high pressure). The drain can be attached to a suction source. Some suction sources apply a fixed amount of

pressure (grenades, bulbs, vacuum containers); others utilize a suction device in which a prescribed pressure can be selected. Active drain collection canisters usually lose their suction when are about 50% full. Drainage lines, if possible, and collection canisters should be completely replaced every 48-72 hours to reduce drain-related infections. Active drains can be open or closed. Open active drains have an air vent into the wound (sump) but there is significant danger of retrograde contamination of the wounds through the vent. Passive drains have no suction and work according to the differential pressure between body cavities and the exterior environment or rely partially or exclusively on gravity to remove fluid from a wound or body cavity. The most commonly used passive drain in veterinary medicine is the Penrose drain and it should only be utilized to drain the subcutaneous space. Penrose drains are used exclusively in clean wounds and only when the exposed end can be covered at all times by a bandage. They should exit the skin at least 1 cm from the incision and be place at the most gravity-dependent location.

Most commercial drains are made from silastic or rubber. Silastic drains are relatively inert and induce a less severe tissue reaction compared to rubber drains. Some forms of rubber, like red rubber drains, can induce an intense tissue reaction, and should be avoided.

Removal

Generally, drains should be removed once the drainage has significantly decreased, ceased completely due to malfunction or blockage of the drain, or becomes less than about 1-2 mls/kg/day. Consider sedating the patient or providing analgesia as there may be some discomfort when the drain is pulled out. Place a dry dressing over the site where the drain was removed as temporary continued drainage is expected.

Evidence and controversy

Despite the paucity of clinical evidence demonstrating any benefit supporting their use, drains continue to be placed frequently in wounds in dogs and cats. Drains must not be used as a substitute for aggressive surgical debridement. The only proven benefit of surgical drains is to remove fluid from a wound that otherwise would lead to complications associated with healing. Regarding active drains, a recent study concluded that closed active suction drains can be used with low risk of major complications, but they lead to a high rate of infection in clean surgeries in dogs. It is recommended that such drains are kept in place for the shortest time possible and that strict asepsis is adhered to both during placement and management.

In a recent study evaluating different types of active drains, the drainage systems varied widely in their initial suction and rate of loss of suction during filling. However, grenade-type compressible suction drains appear to perform in a safe, predictable, and consistent manner and operate with a lower amount of suction. An increased rate of wound infection or inflammation in association with the use of surgical drains has been documented in a prospective study of surgical site infection in dogs and cats. The use of active suction drains reduces surgical site infection, compared with the use of open passive drains. The constant negative pressure generated by the system minimizes the potential for retrograde flow of bacteria and fluid.

Disadvantages of drains

Drains serve as a retrograde conduit for skin and environmental contaminants to enter the wound. All drain materials impair the local tissue environment's resistance to bacterial colonization and infection by 10,000 fold. Drains made from latex or rubber incite more inflammation than those made of silicone.

Negative pressure wound therapy (NPWT)

Vacuum assisted closure has been shown to be effective in the treatment of traumatic and chronic wounds. The therapy decreases interstitial edema, increases perfusion to the wound and periwound, and the mechanical strain on the fibroblasts appears to increase proliferation and collagen synthesis. Its use in veterinary medicine is extremely promising, with one of the advantages being prolonged time between dressing changes (up to 72 hours). This modality was evaluated in a controlled, experimental setting on open wounds as well as free skin grafts, demonstrating both the beneficial and potentially negative effects of vacuum assisted closure.