

## **Surgical treatment of a deep knife-cut injury in the neck of an adult Nigerian indigenous bitch**

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### **ABSTRACT**

Trauma, in all its categories, is the main cause of external injury in domestic animals generally and dogs in particular. Traumatic injuries may be due to gunshot, kicks, falls from heights, knife cut and bites of other animals. Such wounds may be treated conventionally, medically and or by surgery. The objective of this clinical case study was to present a successful treatment of a deep knife-cut in an adult female Nigerian Indigenous Dog. The patient was examined generally and stabilized with fluid administration. Surgical intervention was given by stitching the gaping wound using various suture patterns and materials according to standard technique. Drug treatment comprised injection of antibacterial, anti-tetanus, anti-inflammatory, and analgesic agents. The surgical wound was cleaned with an antiseptic solution and irrigated with topical antibacterial spray. The wound was dressed on alternate days resulting in a successful treatment. The patient recovered and resumed normal life a few weeks following the surgical treatment. Clinically, the present article is relevant in small animal practice as it has demonstrated the effectiveness of surgery in treatment of deep cutlass-cut in the cervical region of the dog.

**KeyWords:** Deep wound, knife-cut, surgical treatment, Nigerian dog.

### **INTRODUCTION**

Wound is a bodily injury caused by physical means associated with disruption of the normal continuity of anatomic structures (Blood & Studdert, 2005). In other words, wound refers to lesion on the skin, underlying tissues or organs due to a blow, cut, missile or stab including skin injuries by chemicals, cold, friction, heat, pressure, rays and manifestation of internal conditions as observed in pressure sores and ulcers (Roper, 1994). Wound may be an open injury due to a separation of the skin, mucous membrane or an organ surface, or a closed lesion as a result of haematoma caused by damage to a blood vessel resulting in blood collection beneath the skin or crush injury cause by a great compressing force. Trauma is the main cause of external injury in domestic animals generally and dogs in particular. Trauma is any lesion, wound, injury or damage inflicted by an external force including blunt force, penetrating, crushing, accelerating, or decelerating injuries (Blood *et al.*, 2008; Simpson *et al.*, 2009). Traumatic injuries may be due to gunshot, kicks, falls from heights, knife cut, bites of other animals, poisons, burns and vehicular accidents (Kolata, 1992; Akinrinmade, 2014). Wounds may also be classified

based on degree of contamination as clean wounds (Class I) e.g. surgical incisions into non-hollow organs, clean wounds with a high infection risk (Class II) such as a wound due to a cut or tear into a hollow viscus. Others are contaminated wounds (Class III) e.g. accident and knife-cut wounds, and dirty/infected wounds (Class IV) e.g. wounds containing necrotic tissues, pus, and faeces contaminated wounds (Class III) e.g. accident wound, knife-cut wound, and dirty/infected wounds (Class IV) e.g. wounds containing necrotic tissues, pus, faeces, etc (Mickelson *et al.*, 2016). Dog attacks cause wounds to the skin and soft tissue ranging from minor to severe injuries. Deep wounds may affect the underlying tissues, including the muscles, body wall, and even bones, and can affect the head, limbs, chest, abdomen and other body regions (Mickelson *et al.*, 2016).

Wound healing is the restoration of the normal structural continuity to a disrupted tissue area and the correct application of the principle of wound management helps to avoid unnecessary complications (Kahn & Line, 2005; Mickelson *et al.*, 2016). Open wounds may be managed for several days, weeks, or months until they are closed surgically or they heal by granulation. Although the care of

wounds can be challenging occasionally, most traumatic injuries heal without complications (Mickelson *et al.*, 2016). In small animals, the treatment of large traumatic wound can be complex and difficult due to the involvement of severe tissue damage and necrosis, elimination of local and or systemic infection, safeguard of the neighbouring tissues and ensuring proper management either by surgical closure or second intention healing, minimizing pain as much as possible (Williams, 2009; Pavletic, 2010). In that case, complete healing and recovery is usually achieved by surgical and medical treatments.

### CASE PRESENTATION

A Nigerian Indigenous female dog, 2½-year-old, weighing 18 kg, was presented to the Veterinary Teaching Hospital of the Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria about 8–12 h after being knifed by an irate neighbour who claimed the dog ate up his roasted chicken. The dog was conscious, well oriented in space and cooperating, but presented a compound, bleeding wound in the dorsum of the cervical region (about 6 × 3 cm, length x depth). The wound passed through the skin, subcutaneous tissues, and superficial muscles into the deeper, underlying, tissues. However, the cervical vertebrae were not affected. There was no tissue loss and the lesion was classified as a Class II wound (clean but contaminated wound), being not more than 6–12 h old (Pavletic, 2010).

The patient had no history of anti-rabies vaccination or any form of previous medical treatment. Physical examination revealed a large, circular, incised, deep bleeding wound in the dorsal aspect of the root of neck probably caused by a sharp cutlass (Figure I). The deeper muscle layer was not severed and none of the cervical vertebrae was involved in the trauma. Extremities were slightly cold, and there was presence of ticks and fleas in the inter-digital spaces, ears, and all over the animal's body. However, some vital parameters of the patient (as seen in Table I) were within normal ranges known of the canine species. The dog was very weak and in severe pain demonstrated whenever the neck region was touched. The animal remained laterally recumbent with slightly laboured breathing; it resisted attempts to get it on its four feet (Figure I).

**Table I: Vital Parameters of the Dog on Presentation**

Parameter	Finding	Normal range
Rectal temperature	40.1°C	37.9°C - 39.9°C
Heart rate	84 beats/minute	70 - 120
Pulse rate	82 beats/minute	70 - 120
Respiratory rate	32 cycles/minute	18 - 34
Mucous membrane colour	pale	pink

### SURGICAL AND MEDICAL TREATMENTS

The female dog was immediately placed on fluid therapy for stability using 500ml 5% dextrose saline infusion (Fidson Healthcare PLC, Nigeria) and 2 ml iron dextran (Hebei Huarun Pharmacy Co., China) administered intravenously. Active bleeding was controlled by vasoconstriction using adrenaline hydrochloride, clamping with artery forceps, and digital pressure with sterile gauze on bleeders. In preparation for surgical intervention, wound edges and the area bordering the lesion was carefully clipped, and then cleaned with sterile gauze soaked in an antiseptic solution, chlorhexidine gluconate 0.3% w/v (Purit®, Saro Lifecare, Ibadan).

The wound was quickly lavaged using a large volume of normal saline to wash off both visible debris (e.g. blood clot) and microscopic debris. Premedication was achieved with intramuscular injections of atropine sulphate (Paucop Atropine®, Jiangsu Huayang Pharmaceutical, Jiangsu China) given at the dose of 0.02mg/kg i.m. and xylazine hydrochloride (XYL-M2®, VMD, Belgium), a sedative given at the dose of 0.2 mg/kg i.m. Anaesthesia was induced with ketamine hydrochloride (Ketaniir®, Aculife Healthcare, India), at 10mg/kg i.m., equally administered intramuscularly. Following anaesthetic induction, the bitch was transferred to the surgical table, placed on sternal recumbency, steadied with soft padding, and draped for wound closure. Aseptic technique was used when stitching the wound; only sterile surgical instruments/tools and accessories were utilized.

Chromic catgut size 1 was used to appose tissues in two layers (deep muscles/deep fascia and superficial muscles/superficial fascia) in a simple continuous suture pattern. Subcutaneous tissue was also closed with chromic catgut in a simple continuous suture pattern, while the skin was approximated with nylon, a non-absorbable material, in an interrupted horizontal mattress suture pattern with (Figure II A & B).

Postoperative care consisted of administration to the dog of dexamethasone (Dexona®, Goodfaith Pharma Impex-Enterprises, India) given at 0.3 mg/kg i.m. bid 3/7, anti-tetanus toxoid at 0.5ml im, and a single treatment of diclofenac sodium (Philodic®, Hubei Tianyao Pharmaceutical Co., China) at 1 mg/kg i.m. The sutured wound was cleaned with alcohol (50% ethanol solution) and dressed topically with antibacterial spray (Oxytetravet aerosol®, The Arab Pesticides and Veterinary Drugs Manufacturing Co., Jordan). A broad spectrum bactericidal antibiotic namely, oxytetracycline hydrochloride (Oxytetra 200 LA®, Pantex, Holland) at 10 mg/kg im stat was injected to the patient. Bandaging was applied on the dressed wound but Elizabethan collar was not placed

on the animal to avoid mutilating the wound. The animal was followed up and the wound dressed on alternate days until it was completely healed after 14 days. Skin sutures were removed and the dog, then fully recovered, was discharged after vaccinated against rabies.

detract the clinician’s attention from a subtle but more potentially life-threatening health issue. The patient in the present case report lost so much blood, and that was why we initially stabilized the animal with fluid containing both colloid (blood expander) and crystalloid (electrolytes). The



**Figure I: The patient showing the deep wound (arrow) after haemostasis.**

wound was cleaned and debrided without any trace of blood clot or fluid left behind; because accumulation of fluid (seroma) or blood (haematoma) in the wound will inhibit fibroblast migration, encourage infection, delay wound healing and strength formation (Cornell, 2012; Fossum & Hedlund, 2007).

The wound was irrigated to reduce bacterial load in the tissue and also to diminish the chance of wound complications. Normal saline is an isotonic solution and non-toxic to healing tissue; the fluid was used for wound lavage to facilitate removal of debris from the injury. Without unnecessary delay, the wound was quickly debrided and closed to avoid further bacterial contamination and tissue devitalization. Wound edges were sutured beginning with muscle-to-muscle apposition using catgut, followed by subcutis-to-subcutis approximation still with catgut, and finally the skin was stitched by eversion using nylon. All sutures



**Figures II: (A) The patient draped and ready for suturing (B) End of surgical closure.**

were firmly placed without leaving a dead space in tissue. Surgeon’s knots were used to tie off internal stitches whereas triple knots were used to interrupt the skin (horizontal mattress) sutures. The antibiotic and toxoid administered to patient pre-empted bacterial proliferation, tetanus and other secondary infections. An agent with triple activities was also given to reduce pain, excessive inflammatory process, and fever. Elizabethan collar was not placed on the patient to avoid mutilation of the sutured wound and interference with wound healing process. The primary closure and medical treatments were effective and the wound healed without any complication. The patient resumed normal life following the complete healing, suture removal, recovery, and discharge of the animal.

The client was advised to avoid repeat attacks in future by keeping the pet indoors and on a leash during the day. The dog owner was also told to desist from allowing his animal to roam the streets.

**DISCUSSION**

In both man and animals, it is easily seen that the skin is very important considering its role in the protection of the body against microorganisms, sun, heat, and other assaults. In both man and animals, it is general knowledge that the skin is very important considering its role in the protection of the body against microorganisms, sun, heat, and other assaults. Trauma is one of the most common medical emergencies associated with dogs occasionally causing multiple injuries, both internal and external, usually resulting in secondary microbial contamination and invasion of wound as was observed in the present case (Simpson *et al.*, 2009). The purpose of open wound treatment is to prevent further contamination of the wound and to convert contaminated or infected wounds into clean wounds for surgical closure or second intention healing.

In wound management, the first treatment step is the evaluation of the overall stability of the patient (Kahn & Line, 2005). Keep in mind that obvious open wound can

**CONFLICT OF INTEREST**

The authors of this paper report no relevant conflict of interest.

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