

Case Study

TOTAL SCAPULECTOMY IN DOG: A CASE OF HIT AND RUN

S. Basnet¹, A. Aryal²

Agriculture and Forestry University, Rampur, Chitwan

E-mail: vet.drसानिब@gmail.com

Abstract

The objective of this case report is to describe the scapulectomy as a limb amputation procedure in dog. A 2-year-old, 8 kg, intact, mongrel dog was presented with the complete anatomical damage of right metacarpals. Diagnostic radiograph of lateral and medial plane of the affected limb revealed fused and anatomically distorted metacarpals. Preserving the glenohumeral joint and the scapula as limb sparing procedure in this case could result in elephant leg condition from stump thus complete scapulectomy was considered. Forelimb amputation is a salvage procedure usually performed for severe neurologic or ischemic lesions of forelimbs, certain congenital deformities, uncontrolled infection, invasive neoplasia or traumatic injuries (irreparable fracture, soft tissue wounds). Amputation can be performed on animals of all ages and breeds. Recovery was uneventful except some mild temporary inflammation of the operated wound. Although limb sparing surgeries is a newer and more complicated procedure, it was concluded that total scapulectomy in this case was the better remedy than partial or sub scapulectomy.

Keywords: Scapulectomy, Amputation, Dog, Scapula

Introduction

Hit and run is an act of crime when a person knowingly flees the scene of the accident, where there has been an injury to the other person or living being. Many such families have lost their loved ones when their pets get involved in a tragic vehicle accident. In the majority of cases, scapular fractures are the result of vehicular trauma, accounting for 68% to 95% of canine cases (J Kirpensteijn, 1994). Limb amputation is a surgical procedure commonly performed in dogs & cats to remove a congenital defect, necrosed, paralyzed, cancerous or severely injured limb, either front or rear.

Canine scapula, also referred to as 'shoulder blade' is a large, flat bone with longitudinally running flat spine; a neck and the glenoid or articular surface which serves as an anchor point for various tissues and forms rear portion of shoulder girdle. As a remedy to the problems affecting tissues of foreleg or the shoulder such as crush injuries, septic fractures, gangrene etc. it may become necessary to surgically remove the scapula, resulting in reduction in pain and discomfort, stabilization of the condition and ceasing

the potential spread of the disease through the body. Amputation is commonly only viewed as a last resort.

History, Clinical Observation and Diagnosis

A 2-year-old non-castrated Mongrel dog, brownish yellow in color, weighing 8 kg was hit by a car near Sanepa resulting in a complete anatomical damage of metacarpals. The dog was brought to the Animal Welfare Sanctuary at Chovar, Lalitpur in order to address the condition of dog by the onsite passerby. Physical examination revealed open fracture of right forelimb, major trauma, swelling, pain, or abnormal movement at the affected site. Despite the agony, the dog was however conscious but standing up with affected limb held up. This dog was a stray animal with no other recorded history however the physical examination showed flea infestation, dehydration, rough, dry hair coat and pale mucous membrane. The body temperature, heart rate, respiration rate and capillary refill time of 102.6°F, 102/min, 22/min and 2 sec, respectively.

Complete scapulectomy was indicated because of severe trauma to the right metacarpal and to prevent dragging of the remnant stump during progression.

The dog was hit by a car near Sanepa, Lalitpur resulting in a complete anatomical damage of metacarpals. The dog was initially taken to Animal Medical Centre, BoudhanathSadak, Kathmandu by the onsite passerby in order to address the condition of dog. Being a street dog, it lacked enough sponsors for the surgery it required. Normal emergency protocol was however followed at AMC to address the condition of the dog including bandaging and the case was referred by Dr. Sushil to Animal Nepal Treatment Center at Chovar, Lalitpur.

Clinical Findings

- 1) Physical examination indicated open fracture of right forelimb
- 2) Major trauma, swelling, pain, or abnormal movement at the affected site
- 3) Toe-touching to non-weight bearing right forelimb lameness and
- 4) Scab of dried blood located cranial to the point of the right shoulder.
- 5) Withdrawal reflexes, proprioception and pain sensation was present in all other limbs.
- 6) Despite the agony, the dog was however conscious but standing up with affected limb held up. This dog was a stray animal with no other recorded history however the physical examination conducted revealed flea infestation, severe dehydration, rough, dry hair coat and even anemic to some extent.

Confirmatory diagnosis was made by radiography. The radiographic examination of lateral and medial plane of the affected limb revealed fused and anatomically distorted metacarpals.

Blood report of the dog showed increased total leucocytes count (TLC) and neutrophils indicating infection resulting from open wound, reduced hemoglobin from blood loss, hyperproteinemia and slightly elevated ALP. The details about the hematological and biochemical parameters have been shown in the Table-1.

Hematological test	Result	Units	Reference Range
Total Leukocyte count(TLC)	28600	Thousands/ μ L	5000-16000
Differential Neutrophils	102	%	58-85
	4	%	8-21
	-	%	2-10
Lymphocytes Counts(DC)	-	%	0-9
Monocytes	-	%	0-1
Eosinophils			
Basophils			
Hemoglobin	8.6	Gm/dl	12-19
PCV	29	%	35-57
Platelets	241	Thousands/dl	211-621
Biochemical Tests			
Glucose (Random)	65	Mg/dl	70-125
Blood Urea Nitrogen (BUN)	13	Mg/dl	7-27
S. Creatinine	1.0	Mg/dl	0.5-1.8
S. Bilirubin (Total)	0.2	Mg/dl	0.1-0.3
S. Bilirubin(Direct)	0.0	Mg/dl	0.0-0.1
Alkaline Phosphatase (ALP)	162	U/L	10-150
SGOT(AST)	24	U/L	5-60
SGPT(ALT)	28	U/L	5-60
S. Protien(Total)	4.2	g/dl	6.0-7.5
S. Albumin	2.8	g/dl	2.7-4.4

Table 1: The hematological and biochemical findings of the dogs

Surgical Procedure

The dog was withheld for few hours to stabilize its condition by rehydration with fluid therapy and intramuscular injection (IM) of 0.8 ml of Meloxicam as a preemptive analgesic.

Site of incision

The incision site is dorsal border of the scapula, over the scapular spine, to the middle third of the humerus. In case of forequarter amputation, the incision should be made up to proximal third of the humerus.

Anaesthesia and Control

The dog was sedated with Xylazine-HCl (1mg/kg body weight, IM) and induction with Diazepam (0.25mg/kg body weight) and Ketamine-HCl (5mg/kg body weight) in 1:1 ratio intravenously (IV) following placement of butterfly cannula. A dose of Ivermectin (0.2mg/kg BW) subcutaneously (S/C) and Benzylpenicillin (40000 IU/kg BW) IM was also given.

The hair around the site was carefully clipped and the remaining part of the limb below was completely covered with sterile gauze. The surgical site was made sterile by painting with Povidine iodine and alcohol. Scrubbing was done and site was carefully draped.

Procedure

- 1) The skin was incised in the above-mentioned site in the shape of inverted "Y". A semicircular incision was made on the outer as well as inner aspect of the limb, about 2 to 3 inches below the shoulder joint. The skin flaps were then reflected upwards.
- 2) The important muscles divided includes:
 - a. Deltoid muscle where it is inserted on to the deltoid tuberosity of humerus;
 - b. Infra-spinatus where it is attached to lateral tuberosity of humerus;
 - c. Teres minor where it is inserted onto a tubercle on the upperpart of the deltoid ridge;
 - d. Coracobrachialis, Latissimus dorsi, and Teres major inserted on the proximal third of the medial surface of humerus;
 - e. Supra-spinatus inserted on the lateral and medial tuberosity;

- f. Sub scapularis inserted on to the medial tuberosity of humerus
 - g. Biceps brachii where it is originating from the tubar scapula
 - h. Long head of trachii and Tensor faciae antibrachii inserted onto olecranon
- 3) Soon after reflecting the skin and before dividing the muscle, the cephalic vein seen superficially and the brachial artery, vein and median and radial nerves are ligatured and severed (Local anesthetics are applied on the nerves to reduce pain and are then severed and their ends crushed) which are noticed while separating pectoral and latissimus dorsi muscles.
 - 4) The joint capsule was then incised and the supraglenoid tubercle was osteotomize to remove the scapula. The synovial surface of the glenoid cavity of scapula was scraped.
 - 5) The cut ends of the muscles were brought together with catgut 2-0 starting from the ends of the inverted "Y" towards the center in interrupted cruciate pattern. Dead space was completely obliterated. Vicryl 2-0 was used for suturing the subcutaneous layer and intradermal suture to close the skin.
 - 6) Nebanol powder was sprinkled over the wound and regular bandaging was done. The surgery took about 1.5 hours including the needed time for preparation and anesthesia.

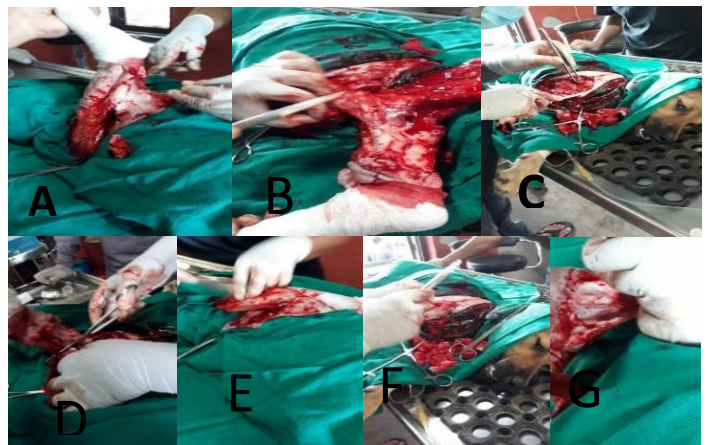


Fig: Procedure of scapulectomy performed in dog.

A. Initial incision over the scapular spine beginning at the dorsal most aspect and proceed down to just above the acromion.

B. Dissection of tensor fasciae antebrachia muscle and any remaining subcutaneous tissue, and isolation of the superficial and deep pectoral muscles to remove scapula

C. Closure by apposing the pectoral muscles to the scalenus muscle

D. Removal of additional tissue around the closure site

E. Manipulation of skin edges to evenly distribute the incised edges and reduce dog-ear formation.

F. Closure of remaining muscle planes

G. Subcutaneous closure with several equally spaced simple interrupted tacking sutures

Post-Operative Care

- 1) After completion the surgery, the dog was taken to the post-operative room where it was monitored till its recovery.
- 2) Elizabeth collar was applied to prevent self-mutilation for a week.
- 3) Amoxicillin (20mg/kg BW IM) was administered for 5 days.
- 4) Analgesic drug were given for 3 days (Meloxicam 0.5mg/kg BW, IM)
- 5) Rehabilitation therapy was also provided for the dog to adjust its locomotor balance in three legs.

On first day, the dog felt uncomfortable and found it extremely difficult to adjust its balance. The wound site was thoroughly cleaned with normal saline, the debris of wound was removed, and the analgesic drug, antiseptic dressing with povidine iodine, fly repellent was applied topically.

The wound scoring was done to 1 and pain score level to 1. By day 3, the dog began to pick up some pace in adjusting its balance and completely regained its appetite. After continued regulation and monitoring, the dog completely rehabilitated.

Discussion

Amputation can be performed on animals of all ages and breeds. Older animals may take a longer to adapt to life on three legs, depending on the underlying reason for the amputation. Indications for limb amputation includes osteosarcoma, soft tissue sarcomas, crush injuries, gangrene, severe trauma,

Gradual Suture Healing



septic fractures, multiple fractures and extensive trauma to the muscles, tendons and ligaments of the limbs and also when primary repair is too costly. There are two ways the case could have been approached surgically- either performing partial scapulectomy leaving a stump or total scapulectomy. Partial or subtotal scapulectomy is a limb sparing procedure which involves removal of a portion of the scapula while preserving the glenohumeral joint (Zemer, 2012).

It has been demonstrated that up to 90% of the scapula can be excised with good to excellent function of the forelimb (Trout, 1995). A partial limb would cause balance and gait problems if the animal tried to use the stump. Stump management and prosthetic use requires diligent daily care and attention. Total Scapular removal (forequarter amputation) is often preferred because muscular atrophy around the scapular spine is eliminated (Fossum, 2013). This complete removal creates a smooth, well-padded amputation site on the side of the chest that will not get pressure sores or interfere with movement in anyway. The success of partial scapulectomy of up to 90% of the proximal scapula or 60% of the craniodorsal aspect of the scapula has been reported whereas total scapulectomy has been reported to result in fair limb function (Kirpensteijn, 1994).

Elephant leg due to excessive edema is a common symptom that has been encountered in similar other

cases where caudal scapulectomy was performed without the use of prosthetic legs. This might be due to improper stump management and continuous dragging of the stump in addition to weight bearing causing postural imbalance.

Out of 5 such cases reported in Animal Nepal Sanctuary, 4 tripod dogs in which total scapulectomy was performed got completely rehabilitated and one case in which glenoid tubercle was preserved had a condition of elephant leg. In this case, total scapulectomy reduced pain, allowed full function of the forelimb and resulted in an acceptable disease-free interval.

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Conclusion

Limb amputation is as a salvage procedure to prevent pain or suffering by removing a damaged body part or to prevent the spread of infection and certain aggressive forms of cancer. Scapulectomy was successfully performed in this dog's hit and run case thereby improved its quality of life. Total scapulectomy was a necessary remedy in this case of dog lacking any responsible ownership.

The dog then got adopted with all necessary documentation and is currently living a healthy and happy life. The case indicated that total scapulectomy for severe leg trauma is a viable option in dog with proper rehabilitation