International Journal of Advanced Biochemistry Research

ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2025): 5.29
IJABR 2025; 9(11): 210-212
www.biochemjournal.com
Received: 02-09-2025
Accepted: 06-10-2025

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Emergency stabilization and surgical management of electrocuted non-captive pregnant macaque: An incidental finding

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DOI: https://www.doi.org/10.33545/26174693.2025.v9.i11c.6216

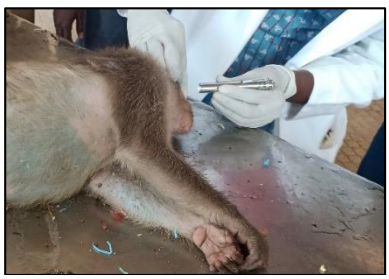
Abstract
An 8 kg female Bonnet macaque (*Macaca radiata*) around 4 yrs old was presented with history of severe shock as reported by the forest rangers. Clinical examination revealed a state of shock with the animal on lateral recumbency. All the vitals were in a subnormal state, a distended firm fluctuating mass was palpable in the caudal abdomen, bilateral epistaxis and halitosis was also evident. Emergency stabilization was done with fluid therapy, oxygen supplementation through mask following which a preoperative ultrasound was performed which revealed a gravid uterus with a non-viable fetus. Hence an emergency caesarean was optioned. Standard safe anesthetic protocol was administered following pre-stabilization against shock. The animal was ascertained a smooth anesthetic recovery following which the animal was handed over to the forest officers and was referred to rehabilitation centre for the further post-operative care. The macaque had uneventful recovery.

Keywords: Bonnet macaque-electrocution-shock-incidental finding-abortion-emergency caesarean section

Introduction
An 8 kg female Bonnet macaque was presented to SAC-OP-surgery unit at VCRI-Theni on lateral recumbency in an unconscious state by the forest ranger suspecting electrocution with the proof of damaged high voltage electrical wire in the area where the macaque was found. For further confirmation a thorough examination was carried out revealing distended abdomen, pale conjunctival mucous membrane, STT and CRT >2seconds, shallow respiration, cyanotic ventral abdomen, severely suppressed cranial reflexes. The macaque evinced singed hair, singing odour form the body, halitosis, earlier evidence of bilateral epistaxis, burn marks on face. Abdominal palpation revealed firm fluctuation mass. Haemato-biochemical profile revealed anaemia, neutrophilia, lymphocytopenia, thrombopenia and increased level of ALP indicative of inflammatory response by the body system which was conclusive of severe hypovolemic that led to circulatory shock due to electrocution.

Treatment
The animal underwent basic protocols of critical management which included airway, breathing, circulation protocol. Airway patency was ascertained with mask under high oxygen flow rate was carried out oxygen therapy, circulation was managed through fluid therapy with Inj.Rl 99ml/kg body weight, along with Adjunct medications : Inj. Nikethamide @ 7 mg/kg b.wt intramuscular, Inj. Dexamethasone @ 1 mg/kg b.wt intravenous, Inj. Adrenaline @ 0.01mg/kg b.wt intramuscular, Inj. Amoxicillin @ 10 mg/kg b.wt intravenous, Inj. Chlorpheniramine malate @ 0.5 mg/kg b.wt intramuscular.following stabilisation pre operative ultrasonography was performed to rule out caudal fluctuating mass at the abdomen which confirm ed gravid uterus with non-viable fetus hence a caesarean section was optioned to prevent further complications to the dam. The dam was pre-oxygenated at 2liter/min followed by pre-medication with Inj.Butorphanol @ 0.2 mg/kg body weight IV and Inj.Diazepam @ 0.5mg/kg body weight intravenously. The animal was induced anesthesia with isoflurane under mask along with carrier gas oxygen and was maintained with isoflurane MAC 2-3% with non-rebreathing circuit.

The uterus was exteriorized, fetal and maternal fluids were suctioned, the non-viable fetus was removed. Uterus was repositioned and the abdomen and the visceral organs were examined for adhesions and any abnormalities, if any. Post operative care of the dam was advised to the veterinarian at the rehabilitation centre wherein regular wound dressing appropriate analgesics, broad spectrum antibiotics and fluid therapy were followed for 12 days as a sequela, the macaque had an uneventful recovery.



Case Discussion

Electrocution is an injury or death caused by electric shock, often from accidental contact with electrical equipment or lightning. Significant cause of injury and mortality in wildlife inhabiting anthropized areas mostly affecting arboreal mammals such as monkeys, opossums, birds etc., (Harita *et al.*, 2016) [1]. Pathophysiology of electrical current injuries involves zone 1, zone 2 and zone 3. Zone 1-is the central area of charring (point of contact). Zone 2-area in which the tissues architecturally identifiable yet non-viable (Schulze *et al.*, 2015) [6] as observed in the present case. Zone 3-is the area wherein partial necrosis (vessels are necrosed) is observed Price and Cooper (2002) [5]. Additionally electrical injuries involve tetanic contraction of muscle that relates to bone injuries. (Singh *et al.*, 2003) [9] Type, Amount, Pathway of current, duration of flow of current, area of contact, resistance offered by the body and voltage are some of the prime factors that leads to the severity of the shock injury. The classical signs of electrocution are shortness of breath, nasal bleeding, Abdominal pain, singeing of hairs, burn marks, unconsciousness, arrythmia, oral bleeding, pale mucous membrane wherein some of the signs were observed and was in corelation with the present macaque (Tufani *et al.*, 2015) [7].

Cardiac arrest, respiratory paralysis, bone fractures, internal organ damage, hypovolemic shock are observed in severe electrocution (Sengar *et al.*, 2014) [2] however in the present case respiratory depression due to mild respiratory paralysis induced, internal organ damage and hypovolemic shock as diagnosed through an aborted foetus with epistaxis from the nostrils due to rupture of capillaries, reduced peripheral blood pressure, reduced elasticity of the skin and increased refilling time were evident. Electrocution can be diagnosed based on history, Clinical examination, Hematological & Biochemical diagnostics, ECG, Radiographic imaging, Neurological tests, Forensic clues (Keshyap *et al.*, 2011 and Rithika *et al.*, 2018) [3, 8]. The present case was clinically confirmed through anamnesis, hemato biochemical values, ECG, neurological signs and ultrasonographic evaluation for the viability of the fetus and multiorgan failure, if any.

Electrocution must be differentiated from chemical burns, lightning strike, epilepsy, tetanus, rabies,

meningoencephalitis, cardiac arrest of other etiology Koumbourlis (2002) [4]. Electrocution at pregnancy causes spontaneous abortion, placental abruption, cardiac arrythmias, foetal burn, intrauterine foetal death in the encountered macaque intrauterine fetal death due to fetal anoxia, placental abruption and detachments observed intraoperatively that may have led to spontaneous abortion and septicaemic shock as a sequalae was prevented from worse through appropriate diagnosis and surgical interventions. Decreased foetal movements, asphyxia, pathological foetal heart patterns, intra-uterine foetal growth retardation and damage to foetal central nervous system may follow if the pregnancy period continues despite electrocution.

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