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CASE REPORT

Therapeutic Plasma Exchange in High Care Unit for Patient with a Snake bite : a Case Report

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ABSTRACT

Background : Snake bites are one of the commonest occupational hazards in tropical countries and viperine bites are potential to cause systemic toxicity. Hemolitik anemia, coagulopathies, and acute kidney injury (AKI) have been documented, main therapy on snake bite with antivenom, when it combine with plasmapheresis it shown promising result. This case reports highlight the effective use of plasmapheresis for snake bite therapy.

Case Illustration : A 40-year old presented following 7-days at HCU Dr Moewardi Hospital of snake bite with the right hand is swollen, blistered, painful, weakness, nausea, the yellowish body, icteric conjunctiva, and dark brown colored urin. A patient has anemia, leukocytosis, thrombocytopenia, increased total bilirubin, direct bilirubin, indirect bilirubin, elevate liver enzyme, and uremia. The patient was treated for 7 days in the HCU. Patient received 10 cc of antivenom in 500 cc 0,9% normal saline every 8 hours for 3 days. Patient also received one times therapeutic plasma exchange (TPE) on 2nd of admission, TPE with 2.500 ml output of plasma. The patient had received 8 flash 5% albumin therapy, with each flash contains 250 cc of 5% albumin and 1 flash 0,9% normal saline, with each flash contains 500 cc of 0,9% normal saline, with total liquid intake is 2500 cc. Patient with GCS E4V5M6.

Conclusion : Most patients with snake bite present with hemolitik anemia, coagulopathies, and acute kidney injury (AKI). The management of snake bite is mainly with antivenom. In addition plasmapheresis not only eliminate the venom circulating in the blood, would also eliminate the toxins diffused into extravascular spaces and target organs after redistribution phenomenon. Therefore, therapeutic plasma exchange should be utilized as part of a tailored treatment plan that considers the patient's overall clinical condition and needs. This case report a 40-year-old as show evidence for the effectiveness of plasmapheresis treatment.

Keywords : Plasmapheresis; Snake bite; Therapeutic Plasma Exchange.

INTRODUCTION

Incidence of snake bite varies diurnally and seasonally. It is highest during agricultural activities and seasonal rains. Most bites are inflicted on the feet and ankles of bare-footed agricultural workers who tread on snakes inadvertently while walking in the dark or working in fields and plantations. Snake species differ in their inclination to strike when disturbed. On average, about 50% of bites by venomous snake cause no envenoming ("dry bites"), a figure ranging 5-80% with different species. Snake bite epidemics follow flooding, cyclones and invasion of snakes' habitats for road building, irrigation schemes and logging. These activities cause long term changes in climate and ecology and encourage influx of human settlers. Males are more often bitten than females. Peak incidence is in children and young adults. Snake bite is an occupational disease of farmers, plantation workers, herders, hunters, fishermen, fish farmers, snake restaurant workers and snake charmers. Factors contributing to fatal snake bite include problems with choice and dosage of antivenom, delay from visiting traditional healers, transportation difficulties, death in transit, airway obstruction, failure to attempt assisted ventilation or problems in carrying it out, failure to treat hypovolaemia, complicating infections, failure to observe deterioration in hospital. Hours usually elapse between bite and neurotoxic deaths from elapid envenoming and several days or longer, from viper envenoming.[1,8]

Indonesia: Although fewer than 20 snake bite deaths are registered each year in this vast archipelago of more than 18 000 islands, several thousand deaths are suspected to occur. Species responsible for most bites include Trimeresurus (Trimeresurus) albolabris, Bungarus candidus (Kuch and Mebs 2007), spitting cobras (Naja sumatrana and N. sputatrix), Calloselasma rhodostoma (Java, Madura), Daboia siamensis (East Java, Komodo, Flores and Lomblen) and death adders (Acanthophis spp.)(West Irian). The national antivenom producer BioFarma manufactures a trivalent antivenom against Naja sputatrix, Bungarus fasciatus and Calloselasma rhodostoma. No cases of B. fasciatus bites are known but deaths from B. candidus (Java), D. siamensis (Java, Flores, Komodo) and Acanthophis (West Irian) have been reported.[1,8]

Symptoms and signs, general: fear and foreboding are very common. Local envenoming: increasing local pain at the site of the bite (krait bites usually painless), local swelling spreading proximally, tender, painful swelling of regional lymph nodes draining bite site. Other signs: fang mark, persistent local bleeding, bruising, lymphangitis, inflammation (swelling, redness, heat), blistering (blebs, bullae, vesicles), infection, abscess formation, necrosis. Systemic envenoming: nausea, vomiting, malaise, abdominal pain, weakness, drowsiness, prostration. Cardiovascular (Viperidae): visual disturbances, dizziness, faintness, collapse, shock, hypotension, cardiac arrhythmias, myocardial damage. Generalized increase in capillary permeability: facial, periorbital, conjunctival oedema (chemosis), bilateral parotid enlargement, pleural and pericardial effusions, pulmonary oedema, massive albuminuria, haemoconcentration. Bleeding and clotting disorders (Viperidae): local traumatic bleeding from recent and partly-healed wounds and venepuncture sites; spontaneous systemic bleeding (gums, epistaxis, haematemesis, meningism from subarachnoid haemorrhage, lateralising signs and/ or coma from cerebral haemorrhage/ thrombosis), haemoptysis, haematemesis, rectal bleeding or melaena, haematuria, vaginal bleeding, subconjunctival haemorrhages, skin petechiae, purpura, discoid haemorrhages, ecchymoses. Neurological (Elapidae, Viperidae eg Russell's viper D. russelii, Gloydius species): bilateral ptosis, external ophthalmoplegia, descending paralysis progressing to generalized flaccid paralysis. Generalized rhabdomyolysis: muscles stiff, tender, painful on passive stretching, trismus, dark brown urine. Acute kidney injury: loin (lower back) pain, haematuria, haemoglobinuria, myoglobinuria, oliguria/anuria, uraemia (acidotic breathing, hiccups, nausea, pleuritic chest pain, encephalopathy). Acute pituitary insufficiency (Russell's viper): acute - shock, hypoglycaemia; chronic - weakness, loss of secondary sexual hair, loss of libido, amenorrhoea, testicular atrophy, hypothyroidism etc.[1,8]

Antivenom are widely accepted as primary treatment options for snake bite patients. In addition supportive management includes treatment of shock, assisted ventilation, identification and treatment of infections with

prophylaxis antibiotics, pain management, medication to repair impaired liver and kidney function or renal dyalisis, and medication to additional symptom like weakness and nausea.[1,8]

Therapeutic plasma exchange, or plasmaferesis, is a medical procedure where the patient's blood plasma is separated from blood cells and replaced with donor plasma or a plasma substitute solution. This therapy is utilized in various medical conditions, including cases of poisoning from snake bites that induce coagulopathy. Plasma exchange functions by removing toxins from the patient's bloodstream. By replacing contaminated plasma, which may contain snake bite toxins, with clean plasma, this procedure reduces the toxin burden in the patient's body. Thus, therapeutic plasma exchange aids in correcting coagulation disorders caused by snake bites and reduces the risk of serious bleeding complications.

Therapeutic plasma exchange (TPE) is a technique using extracorporeal circuit to separate and remove circulating large molecular weight protein-bound substances such as pathological antibodies and immune complexes.[3,5,6,7]

The extensive and prolonged experience of HCU at Dr Moewardi Hospital affords a unique opportunity to study long-term trends in the referral patterns and outcome of patients with snake bite for specialist Critical Care support. This case report aims is to show evidence benefits of plasmapheresis as a therapeutic management in snake bite cases.

CASE ILLUSTRATION

A 40-year old presented following 7-days at HCU Dr Moewardi Hospital of snake bite with the right hand is swollen, blistered, painful, weakness, nausea, the yellowish body, and icteric conjunctiva, and dark brown colored urin. The laboratory results show anemia (Hb 9.3 g/dl), leukocytosis (Al 21.100 µL), thrombocytopenia (At 84.000 µL), increased total bilirubin (37.03 mg/dl), direct bilirubin (18.28 mg/dl), indirect bilirubin (18.75 mg/dl), elevate liver enzyme (SGOT 428 iu/l and SGPT 269 iu/l), and uremia (ureum 126 mg/dl).

The patient was treated for 7 days in the HCU. Patient received 10 cc of antivenom in 500 cc 0,9% normal saline every 8 hours for 3 days. Patient also received one times therapeutic plasma exchange (TPE) on 2nd of admission, TPE with 2.500 ml output of plasma. The

patient had received 8 flash 5% albumin therapy, with each flash contains 250 cc of 5% albumin and 1 flash 0,9% normal saline, with each flash contains 500 cc of 0,9% normal saline, with total liquid intake is 2500 cc. The results is either laboratory findings or clinical condition is improved. Patient moved to general room on day 8 of HCU and outpatient after 10 th day of treatment in hospital.

Table 1. Laboratory Results

Laboratory Results	Before TPE	After TPE
Haemoglobin	9.3*	10.2*
Hematocryte	15*	30.6*
Leucocyte	21*	16.8*
Thrombocyte	84*	92.4*
Erythrocyte	3.06	3.36
PT	14.1	13.9
APTT	31.4	3.2
INR	1.120	1.110
Glucose	110	100
Ureum	126*	94*
Creatinine	1.2	0.9
Sodium	136	138
Potassium	3.4	3.2
Chloride	103	101
Total bilirubin	37.03*	33.32*
Direct bilirubin	18.28*	16.45*
Indirect bilirubin	18.75*	16.87*
SGOT	428*	385*
SGPT	269*	241*

DISCUSSION

Clinical Syndromes of snake bite in SouthEast Asia: although there may be overlap of clinical features caused by venoms of different species of snake, especially as knowledge advances, a "Syndromeic approach" is useful, especially when the snake has not been identified and only monospecific antivenoms are available. SYNDROME 1: Local envenoming (swelling etc) with bleeding/clotting disturbances = Viperidae (all species). SYNDROME 2: Local envenoming (swelling etc) with bleeding/clotting disturbances, shock or acute kidney injury = Russell's viper; with conjunctival oedema (chemosis) and acute pituitary insufficiency = Russell's viper, Myanmar and South India with bilateral ptosis, external ophthalmoplegia, facial paralysis etc. and dark brown urine = Russell's viper, Sri Lanka and South India. SYNDROME 3: Local envenoming (swelling etc.) with paralysis = cobra or king cobra. SYNDROME 4: Paralysis with minimal or no local envenoming: Bitten on land while sleeping on the ground with/without abdominal pain = krait Bitten in the sea, estuary and some freshwater lakes = sea snake Bitten in Indonesia Maluku or West Papua with/without bleeding/clotting disturbance = Australasian elapid. Syndrome 5: Paralysis with dark brown urine and acute kidney injury: Bitten on land (with bleeding/clotting disturbance) = Russell's viper, Sri Lanka or South India.[1,8]

Our patient had symptoms similar with Syndrome 1 with local envenoming (right hand is swollen, blistered, painful) with bleeding/clotting disturbances (symptoms on hemolitik anemia : yellowish body, icteric conjunctiva, dark brown colored urin) its caused by a viperidae bite.[1,8]

The diagnosis is usually clinical with support of laboratorium examination. Our patiens has anemia (Hb 9.3 g/dl), leukocytosis (Al 21.100 µL), thrombocytopenia (At 84.000 µL), increased total bilirubin (37.03 mg/dl), direct bilirubin (18.28 mg/dl), indirect bilirubin (18.75 mg/dl), elevate liver enzyme (SGOT 428 iu/l and SGPT 269 iu/l), and uremia (ureum 126 mg/dl). Our patient's diagnosis was based on clinical findings and laboratorium examination.

The guidelines for the management of snake bite is mainly with antivenom. In addition supportive management includes identification and treatment of infections with prophylaxis

antibiotics, pain management, medication to repair impaired liver and kidney function, and medication to additional symptom like weakness and nausea.[1,2,9,10]

Plasmapheresis are the addition treatment of snake bite, it not only eliminate the venom circulating in the blood, would also eliminate the toxins diffused into extravascular spaces and target organs after redistribution phenomenon.[3,5,6,7]

These treatments hasten recovery from snake bite. Our patient received one times therapeutic plasma exchange (TPE) on 2nd of admission, TPE with 2.500 ml output of plasma. The patient had received 8 flash 5% albumin therapy, with each flash contains 250 cc of 5% albumin and 1 flash 0,9% normal saline, with each flash contains 500 cc of 0,9% normal saline, with total liquid intake is 2500 cc. Patients recover faster when treated early. After given TPE, the patient symptoms : swollen of the right hand, blistered, painful are reduced. The yellowish body, icteric conjunctiva, dark brown colored urin is also significantly reduce.

A systemic review has shown that therapeutic plasma exchange is better than supportive treatment alone without a significant increase in adverse events. Other similar cases a 66-year old shows the same results, after the patients undergo therapeutic plasma exchange either laboratory findings or clinical condition is improved. Our patient was managed on antivenom, antibiotics, analgesics, medication to repair impaired liver and kidney function, and medication to additional symptom like weakness and nausea[3,5,6,7]

Therapeutic plasma exchange (TPE) is a technique using extracorporeal circuit to separate and remove circulating large molecular weight protein-bound substances such as pathological antibodies and immune complexes, replacing it with fluids such as albumin, fresh frozen plasma (FFP), colloids or crystalloids.[3,5,6,7]

TPE is a relatively safe procedure, complications usually well tolerated. Complications include catheter-related and procedure-related events. The incidence of adverse events declined over time and now ranges from 5 to 36% depending on vascular access used, type of replacement fuid, and anticoagulation.[3,5,6,7]

CONSLUSION

Most patients with snake bite present with hemolitik anemia,

coagulopathies, and acute kidney injury (AKI). The management of snake bite is mainly with antivenom. In addition plasmapheresis not only eliminate the venom circulating in the blood, would also eliminate the toxins diffused into extravascular spaces and target organs after redistribution phenomenon. However, therapeutic plasma exchange is typically only one component of a comprehensive management approach for snake bites. Other treatments include administering antivenom to neutralize snake toxins and providing supportive care such as blood transfusions if necessary. Therefore, therapeutic plasma exchange should be utilized as part of a tailored treatment plan that considers the patient's overall clinical condition and needs. This case report a 40-year-old as show evidence for the effectiveness of plasmapheresis treatment. These treatments hasten recovery from snake bite.

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