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MANAGEMENT OF SCORPION STING: COMPARING THE EFFICACY OF COMBINING LOCAL LIGNOCAINE INFILTRATION WITH PRAZOSIN AND PRAZOSIN ALONE

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ABSTRACT
Objective: To compare the efficacy of combining local lignocaine infiltration with prazosin and prazosin alone in improving symptoms, vital data and Electrocardiogram. Subjects: Sixty patients coming to our casualty with definite history of scorpion sting.Intervention: The involved victims were divided alternatively into two groups. Thirty patients were treated with prazosin and other 30 received oral Prazosin combined with local lignocaine infiltration. Outcome measures: Improvement in symptoms, vital data and ECG were noted. Results: In group where local lignocaine infiltration was combined with prazosin, percentage of improvement in symptoms like pain, sweating, average heart rate and ECG were comparatively better than when given prazosin alone. Conclusion: Prazosin when combined with local lignocaine infiltration is slightly better than prazosin alone for management of clinical features of scorpion envenomation.

Keywords: Scorpion sting, prazosin,local lignocaine infiltration, ECG, scorpion antivenom.

INTRODUCTION

In many tropical and subtropical regions of the world scorpions, crab like arachnids are the most important venomous animals after snakes. Scorpions are eight-legged arthropods; order Scorpionida and class Arachnida. The terminal segment, called the telson (bulb containing a pair of venom secreting salivary glands), contains two venom glands connecting with the curved needle sharp sting that is used either for defense or to obtain food. They do not deliberately attack man, but. accidental contact results .

EPIDEMIOLOGY: Out of 1,500 scorpion species known to exist, about 30 are of medical importance Although a variety of different scorpion species exist, majority of them produce similar effects. Most scorpion species produce venom, which causes only minor local reactions in humans, but in certain parts of world including certain parts of India scorpion stings are a serious (sometimes fatal) health hazard. Scorpions capable of inflicting fatal stings are all members of the families Buthidae and Scorpionidae.

CLINICAL FEATURES :Venom is deposited deep to subcutaneous tissue after sting; almost complete absorption of the venom from sting site would occur in 7–8 hours. The severity of envenoming is related to age [1-5]

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(high fatality is seen in children and 50% mortality in less than 4 years old in the past), size of scorpion and the season of sting (April to early June and September to October). Clinical presentation can be divided into local manifestations and systemic manifestations.

LOCAL MANIFESTATIONS: Severe excruciating local pain is the only clinical manifestation seen in 35% of cases radiating along the corresponding dermatomes. Local signs such as swelling, redness, heat and regional lymph node involvement are never extensive. Stings typically do not produce a visible skin lesion, although on rare occasion a small red mark is noted. Local edema, urticaria, fasciculation and spasm of underlying muscles are rarely seen at the site of sting due to persistent stimulation of pain receptors and the liberated serotonin. Positive tap test is present (on tapping increase in paresthesia occurs) in some patients. Due to pain there is transient bradycardia, transient rise in blood pressure and sweating with warm extremities. Most scorpion stings are minor, producing severe local pain and paresthesias without systemic involvement (benign or dry sting) [6].

SYSTEMIC MANIFESTATIONS: Scorpion venom delays the closing of neuronal sodium channels, resulting in "autonomic storm" owing to sudden outpouring of endogenous catecholamines into the circulation [1]. Systemic symptoms may develop within minutes, but may be delayed as much as 24 hours. Features of autonomic nervous system excitation are transient cholinergic and prolonged adrenergic stimulation. Initial parasympathetic excitation is characterized by vomiting once or twice, profuse sweating (skin diarrhea for 3–17 hours), ice cold extremities, hypersalivation and thick mucus secretion due to stimulation of bronchial mucus glands, lacrimation, pin-point pupils, diarrhea, abdominal distension, priapism, bradycardia and hypotension. Prolonged massive release of catecholamines, later produces restlessness, piloerection, marked tachycardia, mydriasis, hyperglycemia, hypertension, toxic myocarditis, cardiac failure and pulmonary edema. All forms of electrocardiogram (ECG) abnormalities are noted and include sinus tachycardia, ventricular premature beats, couplets, transient nonsustained ventricular tachycardia, rarely fatal arrhythmias and ST-T changes closely resemble congenital QT interval syndrome. The outpouring of catecholamines is probably a major factor in the pathogenesis of ST-T changes. The possibility of direct effect of toxin on the myocardium cannot be excluded. The major manifestations include hypertensive crisis and life-threatening pulmonary edema, which may be fatal if not treated timely.. On basis of clinical manifestations scorpion envenomation is graded into four grades in India:

• Grade 1: Severe excruciating local pain radiating along corresponding dermatomes, mild local edema at the site of sting without systemic involvement.
• Grade 2: Signs and symptoms of autonomic storm characterized by parasympathetic and sympathetic stimulation
. • Grade 3: Cold extremities, tachycardia, hypotension or hypertension with pulmonary edema.
• Grade 4: Tachycardia, hypotension with or without pulmonary edema with warm extremities (warm shock)

MANAGEMENT: No scorpion sting should be taken as benign unless observed for 24 hours irrespective of species involved. On the basis of pathophysiology, therapeutic effort should be directed against the venom, overstimulated autonomic nervous system and correction of hypovolemia

LOCAL TREATMENT: Mild pain can be abolished by application of ice packs over the site of sting. Severe excruciating local pain can be transiently relieved by lignocaine (without adrenaline) using ring block. However, oral diazepam and nonsteroidal anti-inflammatory drugs (NSAIDs) with lignocaine block can give prolonged relief from pain. Keeping patient calm, applying pressure dressings and ice packs to the sting site decrease the absorption of venom. Incision at the site of sting or tourniquet application is not advisable at all. Patients suspected of envenomation should be hospitalized for at least 12 hours and observed for cardiovascular and neurological sequelae. Stings of nonlethal species require at most ice packs, analgesics and antihistamines[7].

TREATMENT OF SHOCK :Treatments of shock are: (1) Foot end of bed to be elevated to maintain cerebral circulation in cases of peripheral circulatory failure; but if left ventricular failure is present back rest is advised, (2) Dehydration, electrolyte imbalance due to vomiting, excessive salivation and profuse sweating should be corrected by oral and parenteral fluids. Intravenous glucose, normal saline given in sufficient volume judiciously as there will be heart failure in some cases and (3) Hydrocortisone 100 mg IV repeated every 4 hours helps to tide over the shock and decreases edema of conductive tissues in toxic myocarditis [2].

TREATMENT BY PRAZOSIN :Prazosin is pharmacological and physiological antidote to scorpion venom actions; it is a competitive postsynaptic alpha-1 adrenoreceptor antagonist. Prazosin has 1,000 fold affinity to alpha receptors (alpha receptors stimulation plays a major role in the evolution of myocardial dysfunction and acute pulmonary edema in scorpion sting). Prazosin inhibits phosphodiesterase, thereby enhancing cyclic guanosine monophosphate (cGMP) level, which is one of the mediators of nitric oxide synthesis. It also enhances

insulin secretion that is inhibited by scorpion venom by which it counters hyperglycemia and hyperkalemia. This alfa-1 adrenergic receptor blocker reduces preload, left ventricular impedance without causing tachycardia. It totally reverses the metabolic and hormonal effects of alpha receptor stimulation. Thus, its pharmacological properties can antagonize the hemodynamic, hormonal and metabolic effects of scorpion venom. Prazosin (plain tablet not sustained release form) is administered orally as 1 mg in adults. Prazosin should be given through a nasogastric tube if the patient is vomiting and the patient should be kept in lying posture for about 3 hours (even during examination) in order to prevent the "first dose hypotension phenomenon". Repeat prazosin in the same dose after 3 hours depending on the clinical response and later every 6 hours (not exceeding 5 mg total in a day) till the extremities are warm, dry and the peripheral veins are visible easily. Prazosin can be given irrespective of blood pressure provided there is no hypovolemia. Since the advent of prazosin, the fatality due to scorpion sting has been reduced to less than 1%. Prazosin is a cellular and pharmacologic antidote to the actions of scorpion venom and it is also cardioprotective; it should be the first line of treatment for severe scorpion stings. Prazosin is a poor man's SAV. The time lapse between the sting and administration of prazosin for symptoms of autonomic storm determines the outcome [8].

ADVANCED SUPPORTIVE MANAGEMENT: Close attention to airway is required. Intubation and mechanical ventilation are sometimes necessary owing to venom effects and respiratory depression from the medications to control symptoms. Pulmonary edema is the most important cause of mortality and should be treated with propped up position, nasal oxygen, intravenous loop diuretics and prazosin. Inotropic support with dopamine and dobutamine 5–15 mg/kg/minute is advocated for 36–48 hours in warm hypotensive shock patients. Cardiac arrhythmias are many times self-limiting. Tachyarrhythmias are treated with intravenous metoprolol or esmolol and bradyarrhythmias can be controlled with atropine. Hypertension and pulmonary edema respond to nifedipine, nitroprusside, hydralazine, or prazosin. Defibrination syndrome is managed conservatively or with heparin, fresh blood transfusion or fibrinogen infusions. Captopril, glucoseinsulin-potassium drip, lytic cocktail (pethidine-chlorpromazinepromethazine) have also been tried to alleviate the venom effects but did not stand the test of time

SPECIFIC TREATMENT BY ANTIVENOM :Scorpion antivenom [3] as specific treatment has been a matter of debate and controversy during last 5 years; several previous studies have shown that SAV does not alleviate hemodynamic changes or cardiogenic pulmonary edema, or prevent death and the outcome was the same for victims treated with antivenom and without antivenom. But recent randomized controlled trials have overcome the controversy regarding beneficial effects of early administration of SAV. Commercially prepared antivenins are available in several countries for some of the most dangerous species; however, SAV is expensive and always in short supply. In the opinion of most authorities administration of antivenom is the only specific measure for severe scorpion sting poisoning. They were of opinion that polyvalent antivenin, if prepared, will be effective for scorpion sting cases for use anywhere in the world. They advocated 5–25 mL of antivenom diluted in two to three volumes of isotonic saline to be given intravenously over an hour. If there is no significant improvement, further doses of antivenom can be given (total dose of antivenom required is 30–100 mL in severe envenomation). Scorpion antivenom is effective if a victim is brought at an early stage of scorpion sting (in a stage of acetyl choline excess) ongoing cholinergic phenomenon is suggestive of free circulating scorpion venom, which can be neutralized by SAV. Intravenous administration of antivenom rapidly reverses systemic toxicity features but not pain and paresthesia. No test dose is required as there are high circulating catecholamines and anaphylaxis is very rare. Addition of SAV to prazosin [4] enhances recovery time and shortens hospital stay in patients with grade 2–4 Mesobuthus tamulus envenomation in India.

MATERIALS AND METHODS

The present study is a prospective study conducted in the Department of EMERGENCY MEDICINE, AT KIMS NARKETPALLY . On admission, particulars of the patient were noted followed by thorough physical examination and continuous monitoring of vitals including NIBP and pulse oximetry using a cardiac monitor..

All the patients admitted with the definite history of scorpion sting (scorpion being seen or killed by the relatives or bystander) who are age, sex and weight matched were included in the study.

Patients with age >60yrs and patients with known hypertension, diabetes, heart disease, kidney disease were excluded from the study

All the patients were clinically evaluated for pain, sweating, chest pain, shortness of breath, vital data including heart rate and blood pressure were recorded; All patients were subjected for blood investigations including renal and hepatic profile and serum CPK-MB before starting the treatment in the emergency ward. An electrocardiogram and chest X-ray were done on the day of admission and if found abnormal, were repeated daily, till abnormality got corrected. A 2D-echocardiography was done to find out the cardiac status of the patient including the ejection fraction and any regional wall motion abnormality (RWMA) before starting treatment . 60 patients were enrolled in the study, 30 in each group.

The patients were divided into two groups on alternate basis for treatment. First group was given oral prazosin and another group was given local 1% lignocaine infiltration ring block at the site of scorpion sting along with oral prazosin . Symptoms like pain, sweating, shortness of breath, chest pain; vitals heart rate, blood pressure; ECG were compared between the two groups [9].

STATISTICS

In present study, *p*-value < 0.05 for corresponding value of Chi-square was considered as significant and null hypothesis was rejected, meaning that difference between two proportions was significant.

RESULTS

60 patients were enrolled in the study, 30 in each group. The patients were divided into two groups on alternate basis for treatment. First group was given oral prazosin and another was given local 1% lignocaine infiltration ring block at the site of scorpion sting along with oral prazosin . Two groups are age , sex and weight matched. Symptoms like pain, sweating, shortness of breath, chest pain; vitals heart rate, blood pressure; ECG were compared between the two groups.

		GROUP 1 N = 30	GROUP 2 N = 30	P VALUE
AGE in yrs		35	38	0.592
SEX	M	22 (73.3%)	20 (66.6%)	0.573
	F	8 (26.6%)	10(33.3%)	
WEIGHT in kgs		64	60	0.601

PARAMETER	GROUP 1			GROUP 2			P VALUE
	PRESENT IN	RESPONDERS	%	PRESENT IN	RESPONDERS	%	
PAIN	30	10	33.3 %	30	28	93.3%	<0.001
SWEATING	30	12	40%	30	25	83.3%	<0.001
SHORTNESS OF BREATH	13	10	76.9 %	14	11	78.5%	0.919
CHEST PAIN	8	6	75%	10	8	80%	0.805
HEART RATE IN BEATS PER MIUTE	26 (>90)	12 (<90)	46%	28 (>90)	25 (<90)	89.2%	<0.001
BLOOD PRESSURE IN MM OF HG	20 (>140/90)	16 (<140/90)	80%	22 (>140/90)	18 (<140/90)	81.8%	0.882
ECG (ST-T CHANGES)	18	8	44.4 %	20	18	90%	0.003

P value is measured using chi-square test. Group 1 (prazosin only) is compared with group 2(prazosin with local lignocaine infiltration) with clinical variables including pain , sweating, shortness of breath, chest pain; vitals including heart rate and blood pressure & electrocardiogram.

P value showed significance(< 0.05) with respect to variables including pain, sweating, average heart rate and ECG changes. Thus, prazosin when combined with local lignocaine infiltration relieved pain & anxiety and thus their effect on heart rate and ECG changes.

CONCLUSION

Patients with scorpion sting showed better improvement in pain, sweating, average heart rate and reversal of ECG changes to normal is seen when treated with local infiltration with 1% lignocaine. So, all the patients with scorpion sting when treated with local infiltration along with prazosin will have better results than prazosin alone as a standard treatment.

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