

# A Retrospective Analysis of a Rural Set Up Experience with Special Reference to Dobutamine in Prazosin-Resistant Scorpion Sting Cases

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## Abstract

**Introduction:** Incidence of scorpion sting is high in west coast of Maharashtra. Scorpion sting gives rise to cardiotoxicity and it is our observation that in spite of using prazosin in initial phases, patients still developed severe cardiotoxicity and dobutamine was effective in reducing the mortality in these patients. So we want to convey this message to many of our doctor friends who practice in rural area.

**Objectives :** Death due to scorpion sting is common in rural parts of India.

Prazosin is supposed to be a physiological & pharmacological antidote of the scorpion venom but we studied efficacy of dobutamine in prazosin-resistant cardiotoxic cases.

**Methods :** This study was a retrospective analysis of 242 patients admitted from January 1999 to December 2006. We classified these patients clinically in three groups Mild, Moderate and Severe Envenomation. For treatment plan 4 groups were made; where patients received Dobutamine + Prazosin / No Do + PR / No Pr + No Do / Do + No PR. Effect of these two drugs was compared on the basis of mortality ratio in all 4 groups.

**Results :** Out of 242 patients 141 patients developed cardiotoxicity. Out of them 96 had received prazosin as a first line of treatment. Out of 96, 23 needed dobutamine to treat cardiac complications. Mortality was highest in only prazosin, no dobutamine group and lowest in prazosin, dobutamine group.

**Conclusion :** In initial phases of autonomic storm i.e. accelerated hypertension one can use prazosin but monitor the patient for left ventricular failure and clinically if patient develops LVF add dobutamine to prevent death.

Addition of Dobutamine can be life-saving.

## Introduction

Scorpion sting is common in rural parts of India. Due to lack of medical ICU facility in rural areas, case fatality rate was upto 30% in pre prazosin era.<sup>1</sup> With the use of prazosin mortality rate has come down to 1%.<sup>1</sup> The usefulness of prazosin therapy in this condition was scientifically established in mid-eighties in India by Bawaskar (Mahad). Now prazosin is the line of treatment in these patients. Our hospital is 200 kms away from Mahad in the same area where Bawaskar has worked.

Present analysis is our experience from a rural set up. This is a retrospective study of reported cases admitted since Jan 1999 to 2006. We found that patients who did not respond to prazosin were successfully treated with dobutamine as an additional measure to treat the cardiotoxicity. Inotropic support with dobutamine is advocated in a scorpion victim with pulmonary edema, hypotension, tachycardia and warm shock.<sup>2-5</sup>

## Methods

We have done retrospective analysis of 242 patients of scorpion sting admitted at our hospital between January 1999 to December 2006. The age group ranged from 1 year to 65 years. According to the signs and symptoms patients were classified into following groups.

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Dist : Ratnagiri  
Received : 6.8.2007; Revised : 12.3.2008; Accepted : 6.2.2009

1. Mild envenomation: Local pain, tingling + sweating and vomiting. No cardiovascular symptoms.
2. Moderate envenomation : Profuse sweating, sinus tachycardia or bradycardia, tall 'T' waves on ECG, reduced LV function on 2D Echo, hypertension, hypotension, LVF (Killips class I & II) + Local signs.
3. Severe envenomation: Pulmonary oedema + signs of moderate envenomation.

Complete blood count, blood glucose, urea, creatinine, serum potassium, CPK-MB, SGOT, chest x-ray and serial 2D echocardiographs were done in all cases. ABG was not done because of non-availability.

Following treatment protocol was followed :

1. Local treatment without cardiovascular symptoms – 2% xylocaine (without adrenaline) at the site of sting for pain relief. Few patients had been prescribed prazosin by local general physicians but it was not administered for mildly toxic group of patients admitted at our hospital. Inj. tetanus toxoid was administered to all.
2. Local treatment with cardiotoxicity such as tachycardia, bradycardia, hypertensions, tall 'T' waves of ECG, LVF class I & II, prazosin 0.5 to 1 mg was administered & repeated depending upon the clinical severity and blood pressure in addition to local measure. If no improvement was noted within 1 to 2 hours in signs and symptoms of LVF, digoxin 0.5 mg and frusemide were administered.

- Local treatment with cardiovascular symptoms and left ventricular failure after 1999, patients who did not respond to prazosin, digoxin and diuretics, inj. dobutamine was administered at the rate of 2.5 to 10 micro gm/kg/min for 48 hrs. Those patients who were in LVF with cardiogenic shock at the time of admission were treated with dobutamine and prazosin was not administered.
- In the year 1999, dobutamine was not administered to prazosin-resistant cases as the facility of echocardiography was not available. 2D Echo became available in 2000. Since then hypokinesia was confirmed on 2D Echo and dobutamine given as a treatment modality. Retrospectively patients were classified into four groups in which prazosin and dobutamine were used in permutations and combinations. Efficiency of these drugs was compared for cardiotoxicity developed and mortality rate in all four groups. Ca channel blockers, ACE inhibitors and beta-blockers were not used.

## Results

Data of 242 patients of scorpion sting have been analyzed. (137 males, 105 females). Of these 84 patients belonged to paediatric age group, 158 patients belonged to adult age group, 58 patients had stings in fields, 147 patients were stung in their houses and 37 were stung on roads.

Table 1 : Talukawise Distribution

Taluka	No. of Patients	Distance from Dervan hospital
Chiplun	169	15 km
S'shwar	29	35 km
Dapoli	24	60 km
Khed	22	40 km
Guhagar	20	40 km

Table 2 : 160 patients had received Prazosin locally before reporting

Total no. of patients	Mild	Moderate	Severe	Prazosin resistant cases
242	101	94	47	96
	41.73%	38.84%	19.42%	39.66%

Table 3 : Monthwise Distribution:

Maximum No. of stings were in the month of October followed by May

Month	No. of Patients
Oct.	79
May	43
Nov.+Dec.	33
Mar.+Apr.	30
Sept.	25
Jun, July, Aug.	26
Feb	6
Jan	0

Table 4 : Signs & Symptoms:

Sign & Symptoms	No. of patients
Sweating	152
Pain	66
Tachycardia	148
Bradycardia	09
Hypertension	26
Hypotension	60
Depressed EF	88
Tall 'T' waves on ECG	62

Table 5 : Relation of Mild, Moderate & Severe envenomation with time lapsed before admission and patient's fate.

		< 2 Hrs	2-12 Hrs	> 24 Hrs
Mild 101	Survived	32	69	0
	Expired	0	0	0
Mod 94	Survived	16	74	3
	Expired	0	0	0
Severe 47	Survived	8	30	12
	Expired	3	2	2

Table 6 : Mild, Moderate & Severe envenomation in relation to drugs used -

Total No. of Patients	Pr+NoDo	NoPr+Do	Pr+Do	NoPr+NoDo
Mild 101	65	0	0	36
Moderate 94	47	11	20	16
Severe 47	6	18	23	0
Prazosin resistant cases 96	53	0	43	0

Table 7 : Mortality in relation to drugs used in severe envenomation

	Pr Only	Do Only	Pr + Do
Severe Env. 47	6	18	23
Expired 7	5	1	1
Percentage	83.3%	5.55%	4.34%

It is evident from Table 7 that mortality is highest in only prazosin and no dobutamine group and it is lowest in those groups where dobutamine was used as an additional measure to save lives.

## Discussion

Prazosin has been reported to be effective in reducing preload and afterload and thus improve LV function and pulmonary oedema.<sup>6</sup> However, cardiotoxicity is due to sustained B-receptor

stimulation which are situated on heart.<sup>7-9</sup> If the alpha receptors are blocked by prazosin there is unmarked simulation of B-receptors leading to exhaustion of catecholamine stores.<sup>7,9</sup> This gives rise to hypotension, tachycardia and warm shock which is known in victims who report too late.<sup>2</sup>

Elatrous and Noura have used Dobutamine in severe scorpion envenomation and studied the effects on standard haemodynamics, right ventricular performance and they have showed that dobutamine infusion improves the hemodynamic performance in patients presenting with severe envenomation.<sup>4</sup> Bawaskar in his study has mentioned that irrespective of early administration of anti scorpion venom and prazosin, cases who had pulmonary oedema and tachy cardia necessitated intravenous dobutamine drip for recovery.<sup>5</sup>

Inotropic support with dobutamine in scorpion victims is reported by C.F.S. Amral, Monica M. Magalhaes in Brazil.<sup>3</sup>

Based on this fact, we have successfully used synthetic catecholamine dobutamine.

Our data shows that only alpha blocking does not revert severe cardiotoxicity and dobutamine is needed in prazosin resistant cases. Scorpions inhabit commonly the crevices of dwellings under ground burrows, under debris or paddy husk.<sup>10</sup> October is the season to cut the paddy so scorpions do not get space to hide and they come out. This may be the reason of maximum number of stings in the month of October. In the month of May because of hot weather scorpions come out of their crevices. Therefore scorpion sting is more prevalent in the month of May.

There are multiple factors, which influence the clinical presentation and final outcome of scorpion sting patients. There are host factors like body mass index, surface area and capacity of the host to neutralize the venom. It also depends upon factors related to scorpion, like species of the scorpion, toxicity of the venom, amount of venom injected, direct entry of venom in to circulation through intravenous stings and number of stings, role of anti scorpion venom in scorpion stings other than *Buthus tamulum* and heterogeneity of scorpions according to the toxicity of the venom, role of tourniquet application to prevent dissemination of the venom in the circulation. These factors need to be studied.

Further studies on use of cardio selective beta-blockers (without intrinsic sympathomimetic activity) at the onset of adrenergic phase are going on.

Prazosin has a role in initial stages of an autonomic storm when there is sustained stimulation of alpha-receptors. Prazosin decreases the after load and pre load and helps to prevent cardiotoxicity. But it has limitations. When the action of alpha-receptor wears off or masked by alpha-blockers there is uncontrolled stimulation of beta-receptors. This gives rise to reduction in cardiac efficiency, dobutamine is needed to control pulmonary oedema, till the body stores are restored (Fig. 1).

In this way in initial phases i.e. accelerated hypertension one can use prazosin. Monitor the patient for left ventricular failure and clinically if patient develops LVF add dobutamine to prevent death. Addition of dobutamine can be life saving.

## Acknowledgement

I am thankful to our chief trustee Shri Ashok R. Joshi for his kind permission & motivation to do this work in this hospital. I would like to acknowledge my immense gratitude to Dr.

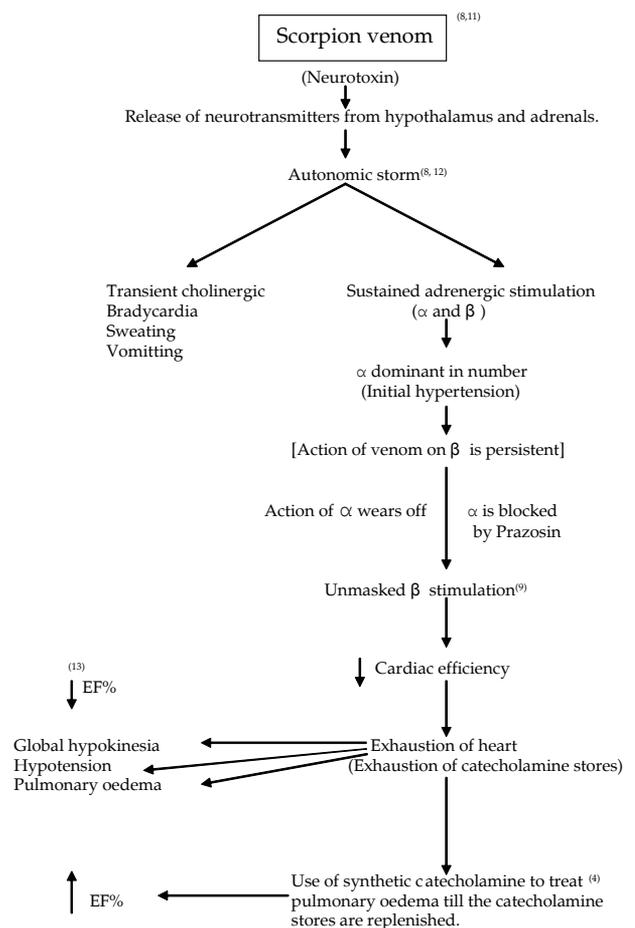


Fig. 1 : Mechanism of cardiac toxicity of scorpion venom and therapeutic algorithm

V.R. Joshi who has encouraged me to finish this work & for his editorial advice.

I am thankful to Dr. Anand Joshi, Dr. Anil Damale & Dr. Nitin Patki for their constant guidance during this study.

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