

Retrospective Study on Complications of Bee Sting in a Tertiary Care Hospital

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ABSTRACT

Introduction: Bee stings entail allergic reactions that can be severe, sometimes even lethal. These reactions can occur immediately or several days after being stung. The aim of this study was to present the complications associated with bee sting.

Material and methods: Demographic patient information and data regarding type of bee, injury site, presence of retained bee stingers, coronary angiographic examination that had been programmed because of episodes of retrosternal pain at rest and signs of myocardial ischaemia on ECG reports were collected from medical records.

Results: 152 patient's data were collected out of which 108 patients were male and 44 were female. Patients' age ranged widely from 30 to 80 years. 25% of the patients were aged 41-50. Local reactions were seen in 79% of the individuals. 14.4% had no reactions.

Conclusion: Various manifestations after bee sting have been described. Local reactions, such as pain, vomiting, myalgia, edema and swelling, are common and generally self-limiting. The chest pain abated over a few hours, and serial ECGs showed the changes of a developing myocardial infarction.

Keywords: Bee Sting, Local Reactions, Myocardial Infarction, Complications

are also seen. The clinical manifestations of bee sting being divided into three groups: local reactions, immunological reactions usually leading to anaphylaxis and systemic toxic reactions caused by large doses of venom.⁴

Local and systemic reactions after bee stings are common, but then there are few reports of severe complications, such as acute coronary syndrome, acute renal failure and stroke.⁵ Vasculitis, glomerulonephritis, nephrosis, serum disease, peripheral neuropathy and renal failure after bee stings are also described in few studies. Neurologic complications after bee sting are even rarer.^{6,7}

Patients with bee stings have delayed cardiovascular events with acute coronary syndrome and/ or stroke. These probably reflect the direct toxic reactions but not allergic reactions. These patients are potentially the candidates for short term anticoagulant therapy at the time of the stings and for thrombolytic therapy if they develop acute CNS ischemic injury after the stings.⁸

Bee venom has the main components hyaluronidase, phospholipase A2, melitin and apamin, contributing to renal damage due to synergistic toxic and hypotensive effects. Also, these substances induce the release of several other components, such as histamine, serotonin, bradykinin and prostaglandin. These components are vasoactive and may lead to a reduction in systemic blood pressure.⁹ In cardiac tissue, these can cause ischemic lesions and acute myocardial infarction, reducing the cardiac output and, consequently, leading to a reduction in renal blood flow.¹⁰ Stroke and multi-organ dysfunction after bee stings are extremely rare and unusual.¹¹ Therapeutic approach of the patient victim of multiple bee stings should be considered a medical emergency. Removal of the causative agent: the removal of previously inoculated stings should, be carried

INTRODUCTION

Hymenoptera characterizes a large group of arthropods whose venom is in general, well tolerated. The allergic reaction being triggered by a single sting, and the greater the number of stings, worse the prognosis because of multiple stings lead to inoculation of a higher amount of venom. Insect venom of the *Hymenoptera* order (bees and wasps) is liable for 14% of the cases of anaphylactic reactions, constituting the second phase among the causes, second only to food antigens (33 to 34%). Effects of poison may be systemic and can eventually cause death among individuals. Mortality rates for multiple bee stings were approximately 15-25% in many published studies. Various poisonous components are melitin, peptide 401, phospholipase A2, histamine, dopamine, hyaluronidase, apamin and norepinephrine, melitin being the primary lethal component of all.^{1,2} Allergic manifestations due to bee stings are well known and yet most incidence continue to be underreported.

In most cases, the sting may cause erythema, edema and local pain. However, the sting may trigger immediate allergic reactions mediated by immunoglobulin E (IgE), with urticaria, angioedema, respiratory symptoms (dyspnea or asthma) and cardiovascular symptoms (hypotension and anaphylactic shock).³ Few cases of stroke related to bee stings

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out as soon as possible. The longer the sting-to-skin contact time, the higher the venom inoculation rate in the patients.

Study Design and Methodology

This study is a retrospective, single-center study involving patients diagnosed with bee sting injury at K R Hospital attached to Mysore Medical College and Research Institute and Hospital during the year 2014-17. Demographic patient information and data regarding type of bee, injury site, presence of retained bee stingers, coronary angiographic examination that had been programmed because of episodes of retrosternal pain at rest and signs of myocardial ischaemia on exercise testing and treatment were collected from medical records. Bee type was based on patient self-report and/or family members. Furthermore, the outcomes of patients stung were reported. The study was approved by the Institutional ethics committee, Mysore Medical College and Research and adhered to the tenets of the Declaration of Helsinki.

RESULTS

152 patient's data were collected out of which 108 patients were male and 44 were female. Patients' age ranged widely, from 30 to 80 years. 25% of the patients were aged 41-50 (Table 1). Local reactions were seen in 79% of the individuals. 14.4% had no reactions (Tab 2). The patients were hospitalized with suspected chest pain. The pathophysiology explaining the associated myocardial infarction is unknown. Hypotension caused by anaphylaxis may certainly induce myocardial ischaemia; An electrocardiogram (ECG) revealed an acute anterior wall infarction. The chest pain abated over a few hours, and serial ECGs showed the changes of a developing myocardial infarction (table-1).

Symptoms of local reactions were seen in 79.1%. 14.4% showed no symptomatic reaction. (Table 2). Local response were seen in 79.6%. Nil response was seen in 14.5%. Both local and systemic response were seen in 2% of the individuals. 3.9% showed systemic response. (Table 3)

ECG was normal in 89.5%. ECG changes with sinus tachycardia were seen in 2% of the individuals. Less than 0.7% showed some ECG abnormalities such as sinus bradycardia, LVH ventricular ectopics, T-wave inversion and ST Depression (Table 4). Statistical analysis were done using SPSS version 21.0, ANOVA was used to compare means between three or more groups.

		N	Column N%
Age	<30	16	10.5%
	31-40	22	14.5%
	41-50	38	25.0%
	51-60	27	17.8%
	61-70	32	21.1%
	71-80	17	11.2%
	>81	0	.0%
Sex	F	44	28.9%
	M	108	71.1%

Table-1: Age and gender distribution

Symptoms	n	%
Local_reactions	121	79.1%
No reaction	22	14.4%
Vomiting	14	9.3%
Myalgia	6	3.9%
Abdominal_pain	6	3.9%
Headache	5	3.3%
Giddiness	3	2.0%
Chest_pain	2	1.3%
Altered_sensorium	2	1.3%
Breathlessness	2	1.3%
Fever	2	1.3%
Itching	2	1.4%
Generalised weakness	2	1.3%
Loose stools	2	1.4%
Loss of consciousness	2	1.3%
Fatiguability	1	.7%
Left upper limb weakness	1	.7%
Nausea, facial palsy right sided	1	.7%
Ptosis	1	.7%
Reduced_urine_output	0	.0%
Convulsions	0	.0%
Anaphylaxis	0	.0%

Table-2: Symptomatic reaction

		Count	Column N%	
Response	Nil	22	14.5%	
	Local	121	79.6%	
	Both local and systemic	3	2.0%	
	Systemic	6	3.9%	
		Age		
		Count	Mean	SD
Response	Nil	22	44.2	15.8
	Local	121	53.5	16.0
	Both local and systemic	3	64.3	28.0
	Systemic	6	61.7	10.3

Table-3: Local and systemic response

ECG_Changes	Count	N%
Normal	137	89.5%
LBBB	1	.7%
LVH, ventricular ectopics	1	.7%
Sinus bradycardia	1	.7%
Sinus bradycardia with ventricular ectopics with compensatory pause in lead III	1	.7%
Sinus tachycardia	3	2.0%
ST depression in I, a VL, V3-6	1	.7%
ST depression in II,III,aVF	1	.7%
ST depression in II,III,Avf	1	.7%
ST depression in II,III,V2-6	1	.7%
ST elevation in V1-3	1	.7%
ST elevation in V1-3, T wave inversion in I, Avl	1	.7%
ST elevation in V3,V4.	1	.7%
T wave inversion in III, aVF, V1-6	1	.7%

Table-4: ECG Changes

DISCUSSION

Bee sting are commonly encountered worldwide. Bee stings can cause severe reactions and have caused many victims in previous years.¹² Local reactions are more common, generally are self-limiting and vanish within a few hours. Allergic reactions to the venom of some stinging insects, such as bees, yellow jackets, hornets, wasps or fire ants can be life threatening also.¹³ The clinical manifestations of bee sting can be divided into three groups: local reactions, immunological reactions usually leading to anaphylaxis and systemic toxic reactions caused by large doses of venom.¹⁴ Multiple stings may lead to various clinical manifestations like vomiting, diarrhea, dyspnea, generalized edema, hypotension, syncope, acute renal failure, and even death. Rarely, they can cause vasculitis, serum sickness, neuritis, and encephalitis. However, only a few numbers of individuals with bee sting allergies suffer fatal reactions. Anaphylaxis is the most severe and prevalent insect sting reaction. There are also rare cases of unusual systemic reactions to insect stings. Local and systemic reactions after bee stings are common, but there are few reports of severe complications, such as acute coronary syndrome, acute renal failure and stroke. Our study also showed symptoms of local reactions in 79.1%. 14.4% showed no symptomatic reaction Myocardial infarctions after insect stings are very rarely reported in the literature. Most of acute coronary syndromes occur with ST segment elevation. Rapid development of symptoms is assigned either to myocardial ischemia or anaphylaxis especially without cutaneous symptoms. Hemodynamic events in the course of anaphylaxis may reduce coronary blood flow, but it should be also remembered that histamine, serotonin, noradrenaline, dopamine released during the allergic reaction is a potent coronary vasoconstrictor and has direct inotropic and chronotropic effects increasing myocardial oxygen demand. Deep hypotension during anaphylaxis might be responsible for myocardial ischemia. Mediators discharged by activated mast cells as a cause of coronary symptoms were defined by Kounis as allergic angina or allergic myocardial infarction. In summary, some patients with bee stings have delayed cardiovascular events with acute coronary syndrome and/ or stroke. These probably reflect direct toxic reactions and not allergic reactions. These patients are potentially candidates for short term anticoagulant therapy at the time of the stings.

CONCLUSION

Bee stings are common causes of medical problems. Various manifestations after bee sting have been described. Local reactions, such as pain, flare, wheal, edema and swelling are very common and generally self-limiting. Unusually manifestations like diarrhea, vomiting, dyspnea, myalgia, generalized edema, giddiness, anaphylactic shock, acute renal failure, myocardial infarction, hypotension, collapse, pulmonary hemorrhage, acute hemorrhagic pancreatitis, and atrial fibrillation may occur. The therapeutic approach of a patient victim of bee stings constitutes a medical emergency condition. Bee stings should be removed from the victim's

body as quickly as possible, aiming at decreasing the exposure time to the venom. Anaphylaxis should always be suspected and treated after bee stings.

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REFERENCES

1. Grisotto LS, Mendes GE, Castro I, Baptista MA, Alves VA, Yu L, et al. Mechanisms of bee venom-induced acute renal failure. *Toxicon*. 2006;48:44-54.
2. Oliveira EC, Pedroso PM, Meirelles AE, Pescador CA, Gouvêa AS, Driemeier D. Pathological findings in dogs after multiple Africanized bee stings. *Toxicon*. 2007;49:1214-8.
3. Mingomataj EC, Bakiri AH, Ibranjic A, Sturm GJ. Unusual reactions to hymenoptera stings: what should we keep in mind. *Clin Rev Allergy Immunol*. 2014;47:91-9
4. Chen DM, Lee PT, Chou KJ, Fang HC, Chung HM, Chen DM, et al. Descending aortic thrombosis and cerebral infarction after massive wasp stings. *Am J Med* 2004;116:567-9.
5. Reisman RE. Unusual reactions to insect stings. *Curr Opin Allergy Clin Immunol* 2005;5:355-8.
6. Temizoz O, Celik Y, Asil T, Balci K, Unlu E, Yilmaz A. Stroke due to bee sting. *Neurologist* 2009;15:42-3.
7. Geraldo Bezerra da Silva Junior, Acute kidney injury complicating bee stings – a review. *Rev Inst Med Trop São Paulo*. 2017;59:e25
8. Weeranun Dechyapirom, Concurrent acute coronary syndrome and ischemic stroke following multiple bee stings. *International Journal of Cardiology* 2011;151: e47-e52.
9. Nandi M, Sarkar S. Acute kidney injury following multiple wasp stings. *Pediatr Nephrol*. 2012;27:2315-17.
10. Ferreira DB, Costa RS, Oliveira JS, Muccillo G. Cardiac noradrenaline in experimental rat envenomation with Africanized bee venom. *Exp Toxicol Pathol*. 1994;45:507-11.
11. Murat Guze et al. Turkish Journal of Emergency Medicine. September 2016;16:126-128.
12. Silva Junior, Geraldo Bezerra da et al. Acute kidney injury complicating bee stings – a review. *Rev. Inst. Med. trop. S. Paulo*. 2017;59:e25.
13. Wani, et al.: Wasp sting induced multiple cerebral infarction. *Annals of Indian Academy of Neurology* 2014;17:125-127.
14. Chen DM, Lee PT, Chou KJ, Fang HC, Chung HM, Chen DM, et al. Descending aortic thrombosis and cerebral infarction after massive wasp stings. *Am J Med* 2004;116:567-9.

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