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Original Research Article

Case Series of Acute Myocardial Infarction following Hymenopteran Sting and Critical Survey of Literature

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Abstract
The occurrence of Acute coronary syndrome concomitantly with hypersensitivity reactions triggered by an allergic event was first described by Kounis and Zavrasin in 1991, called as Kounis Syndrome. Various mechanism have been explained and explored regarding the same. Here, we present a case series of 3 individuals who had no prior history of cardiac or allergic disease, presented with Acute coronary syndrome (ACS) following multiple wasp stings.
Key words: Acute Coronary Syndrome, vasospasm, Kounis syndrome.

Introduction
Anaphylactic Shock after an insect bite usually presents with hypotension, bronchospasm, and laryngeal oedema. The pathophysiological determinant seems to be related to the chemical composition of hymenopteran venom, basically made up of vasoactive and thrombogenic substances which can lead to vasospasm and coronary thrombosis. Our report refers to a series of 3 individuals who had no prior history of cardiac or allergic disease, presenting with Acute coronary syndrome (ACS) following multiple wasp stings. We bring forward this case series as there are limited evidence of such case reports from our population subset.

Case 1
57-year-old gentleman presented with history of multiple wasp stings while feeding cattle in the forest; he was found unconscious and was brought to our hospital by his relatives almost 5 hrs following the event. On evaluation in our hospital, he was drowsy and complained of severe abdominal pain; his pulse rate was 138 beats/min and his blood Pressure (BP) was 70 mm Hg systolic, his peripheries were cold and clammy, his oxygen saturation at time of admission was 90% and his chest was clear and he had no angioedema or laryngospasm. On examination he was conscious by drowsy, there were multiple wasp stings all over the body, His renal function test, Liver function test and complete hemogram was unremarkable. He was having

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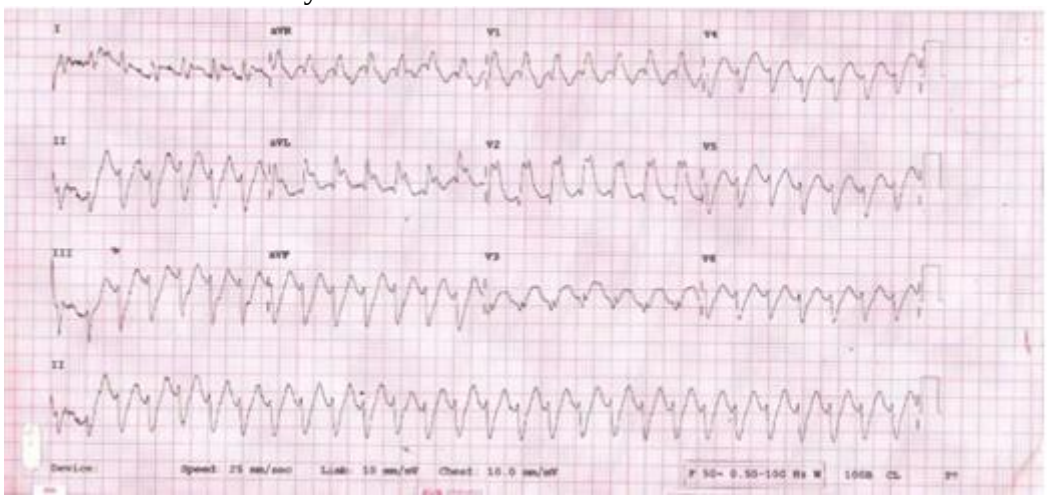
hypokalemia (2.8mg/dl). His ABG showed severe metabolic acidosis PH -7.1. ECG showed ST elevations in leads v1-v6,I avL and ST depressions in inferior leads. Bed side Echocardiogram regional wall motion abnormality in LAD territory with LVEF of 35%, He was admitted to ICU with provisional diagnosis of wasp sting with anaphylactic shock with acute coronary syndrome (Extensive anterior wall Myocardial infarction}; Possibilities of Stress cardiomyopathy and Acute myocarditis were also considered. He was started on Adrenaline Infusion, IV Steroids along with fluid resuscitation. Coronary angiogram was suggested but deferred as relatives were not consenting. Hypotension persisted in spite of maximum doses of inotropes and patient was intubated and mechanically ventilated, In spite of all the efforts, he deteriorated and eventually succumbed to his illness.



Case 2

53-year-old gentleman presented with history of multiple bee stings while working at a field. On arrival, he was in altered sensorium, with multiple stings over face and scalp. His Glasgow coma scale was E1V1M6, central pulses were feeble, blood pressure was unrecordable. He was intubated and mechanically ventilated and started on Injection Adrenaline infusion, IV steroids. He was admitted to MICU, around 100 stings were removed from his body. In ICU, he sustained a cardiac arrest which was successfully resuscitated. Post ROSC, ECG showed ST elevations in Inferior leads with reciprocal changes. A diagnosis of Acute inferior wall MI was made and patient was immediately shifted to Cath lab. Coronary angiogram showed acute occlusion of Right coronary artery, other vessels were normal, RCA was successfully revascularized, Patient had multiple episodes of VT and asystole during the procedure and TPI was inserted for same. During the procedure, he experienced multiple episodes of Ventricular Tachycardia alternating with Bradycardia, he then developed Complete Heart Block, Temporary Pacing was done. He was managed further, eventually he got better and was discharged to home.

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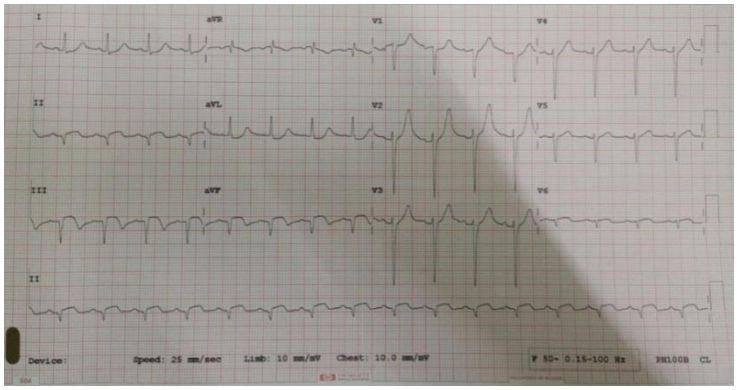
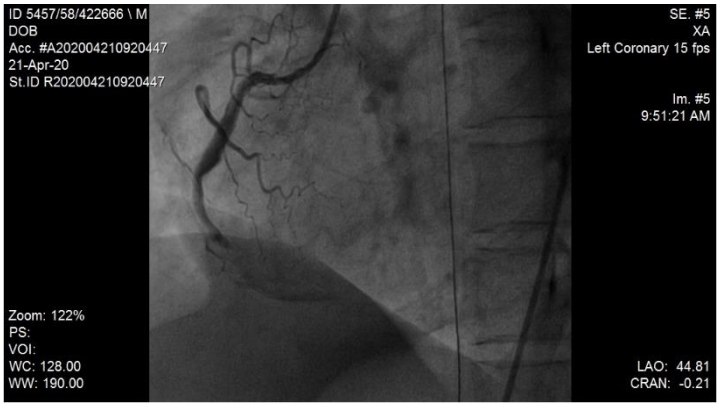
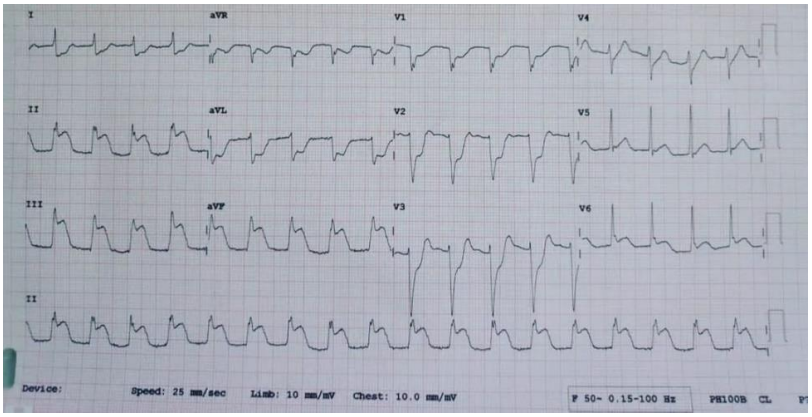




Case 3

48-year-old gentleman, diabetic comes with alleged h/o wasp sting while being at home; comes with c/o dizziness, tightness in chest, and generalized swelling followed by multiple episodes of vomiting. Initially, he was taken to a local hospital where his BP was not recordable, given IM adrenaline injection, IV steroids and antihistamines and brought here. At presentation, his Glasgow coma scale was E3V4M2, his vitals showed – 110/70 mmHg, RR – 20 /min, Spo2 – 96% room air, Chest Examination revealed bilateral crackles. He had an episode of Ventricular Tachycardia, he was cardioverted, and then his ECG showed ST elevation in II, III, aVF with reciprocal changes. Immediately, he was taken for Coronary angiogram which showed Mid Total Occlusion of RCA (ATO – 100%), Proximal LAD showed 60 % lesion. He underwent Percutaneous Coronary Intervention and was shifted back to ICU, there were multiple episodes of Ventricular Tachycardia which was managed accordingly, he even went into asystole and revived after a cycle of CPR. After shifting to ICU, Re-inspected for stings, continued the management, eventually he got better and was discharged.



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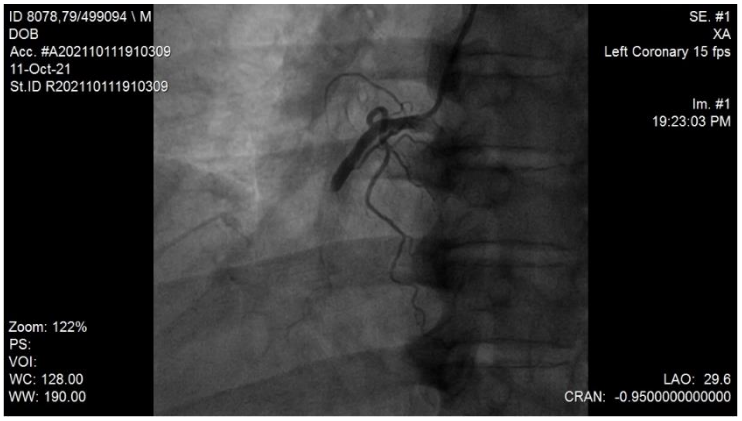

Discussion

The symptoms of all the 3 cases were developed following the wasp stings and could be attributable either to anaphylaxis or to acute coronary syndrome or both. Eventually coronary occlusion was confirmed in 2 of cases by a coronary angiogram. Considering the temporal relationship, it was likely that (might be) the wasp sting related reaction led to the ACS.The reaction to a wasp sting can be prolonged or severe in allergic individuals and in some cases, anaphylaxis may ensue, with urticaria, circulatory collapse, and bronchospasm . This can happen as a result of a sequence of events including the release of serotonin, histamine and leukotrienes. These vasoactive peptides along with noradrenaline and dopamine in the venoms may stimulate further release of endogenous catecholamines. All these substances can provoke myocardial ischaemia either via profound hypotension or by increasing myocardial oxygen demand through direct inotropic or chronotropic effects in the presence of a compromised myocardial blood supply. Platelet aggregation is also induced by serotonin and adrenaline , which can promote thrombus formation possibly by increasing the factor V activity, Adrenaline has been shown to release thromboplastin-like substance from the walls of blood vessels in animal studies. Moreover it causes both coronary vasodilatation and increased myocardial oxygen demand by direct inotropic and chronotropic effect.

A case report by Elizabeth et al, explored the possibility of chances of myocardial infarction on administration of adrenaline in patients presenting with anaphylaxis with suspected coronary insufficiency. There is a similar case report from France (reference) where a patient presented with ST-segment elevation consistent with myocardial ischemia after a single wasp sting. Urgent cardiac catheterization revealed normal coronary arteries with a normal Left ventricular function.

The reported cases are attributable to severe hypersensitivity, and are referred to as the Kounis syndrome, with two identified subdivisions: type I, occurring in patients with angiographically normal coronary vessels; and type II, occurring in patients in whom concomitant atheromatous lesions are found .

Among the two previously reported cases of acute myocardial infarction after wasp stings, chest pain occurred after the administration of adrenaline and diagnostic electrocardiograms were subsequently obtained . In our patients, out of the 3 cases, 2 of them had angiographic evidence of coronary thrombosis, and the third one with clinical evidence of myocardial infarction. The literature suggests various possibilities, and it is yet to be proved whether the administration of adrenaline, or pre-existing coronary insufficiency or both led to the frank myocardial ischemia.

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Conclusion

Being located in the Hilly Forest terrain of Kerala, Wayanad is prone for such Arthropod related diseases, due to the admixture of Forest, Animals and people co habituating the same place.

In the literature we can find case reports of myocardial infarction after bites of hymenopterans, attributed to multiple causes, either due to the administering of exogenous adrenaline, a powerful vasoconstrictor, or due to the vasoactive peptides that's released into the blood through hymenopteran venoms or maybe both are playing their part.

As there are only case reports and small case series available from various parts of the world, a conclusive association between wasp sting and Myocardial ischemia and the possible aetiology cannot be established. This topic warrants further evaluation by studying various hymenopterans, their geographical distribution, venom composition and any species predilection for cardiac events etc to postulate an association. But from the limited experience from our centre we strongly recommend detailed cardiac evaluation in all patients presenting to Emergency Department with history of wasp sting , as Acute coronary syndrome in these subset of patients had a very stormy course with refractory cardiac arrhythmias probably due to high catecholamine levels in circulation and early revascularisation may be life saving in them.

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