

Snakebites

CHARLES SAVONA VENTURA MD

"..... After we had escaped, we then learnt that the island was called Malta. And the natives showed us unusual kindness, for they kindled a fire and welcomed us all, because it had begun to rain and it was cold. Paul gathered a bundle of sticks and put them on the fire, when a viper came out because of the heat and fastened on to his hand. When the natives saw the creature hanging from his hand, they said to one another: "No doubt this man is a murderer. Though he has escaped from the sea, justice has not allowed him to live." He, however shook off the creature into the fire and suffered no harm. They waited, expecting him to swell up or suddenly fall down dead; but when they had waited a long time and saw no misfortune come to him, they changed their minds and said that he was a god....."

Acts of the Apostles 28;1-6

Introduction

All snakes currently present on the Maltese Islands belong to the family Colubridae, all members of which are non-poisonous to man. Some colubrids, exemplified by the local *Cat Snake*, have fangs at the back of the mouth. Though technically venomous, bites from these snakes are harmless to humans. The other Maltese snakes include the harmless *Black Whip Snake*, the *Leopard Snake* and the *Algerian Whip Snake*. Snakes are usually fairly timid creatures and they only bite humans in defence, when touched, trodden upon or cornered. When they strike, they do so with amazing speed, usually at the legs or hands of their attacker. In the majority of instances snakes prefer to avoid human contact.

History and Folklore

Since the Maltese *Ophidea* species are harmless to man, the Maltese practitioner expects few problems from snakebite. However, the doctor may have to quench the effects of doubt and superstitions associated with apodal reptiles since time immemorial. The superstitious association of snakes on the Maltese Islands is seen in the snake image sculptured on an altar slab in the Neolithic Temple at Ġgantija in Gozo. This temple has been dated to 2800 - 2500 B.C.

The first written reference to the Ophidea of the Maltese Islands is in the Acts of the Apostles c.60 A.D. This refers to a 'viper' biting the apostle Paul, who came to no harm even though the natives expected him to swell up or suddenly fall down dead. Local swelling is an invaluable sign of viper envenoming, starting within minutes. Swelling is also a feature of poisoning by bites from the Asian cobra, though this usually appears one to two hours later. Collapse occurs with systemic poisoning after a variable period depending on the dose of venom received.

It would appear that Paul's snake was a viper or alternately a snake closely resembling a viper in its general appearance. The interpretations of this event

in the light of the present resident snake species have been various. Folklore has it that from that moment, as a result of the apostle's intervention, the poison ceased to exist in the mouth of Maltese snakes. A further assertion which has been handed down through the generations is that the apostle banished all poisonous animals from the Islands, to an extent that vipers brought from abroad died on arrival (Lanfranco, 1956). In addition, it was held that fossil shark teeth known as tongues of St. Paul, fossil fish vertebrae known as serpent eyes, saliva of persons born on the feast of the Conversion of St. Paul, earth from St. Paul's Cave at Rabat, Malta, and powdered Maltese rock were efficacious in the cure of snakebites (Cassar, 1964).

More sensible authors have suggested that Paul's viper was an accidental imported visitor or that the poisonous species became extinct on the Islands with the growth of civilization. Others have maintained that the viper which bit the apostle was none other than the harmless *Leopard Snake*, which has very close superficial affinities to the *European Viper*. The symptoms and signs expected by the natives were a result of the influence of the Roman rulers of that time, who would have been familiar with the true viper (Lanfranco, 1956).

Whatever the explanation of the apostle's viper, the Maltese doctor will very likely be presented with harmless bites which at the very most only need treatment as puncture wounds. However, there always remains the possibility that the bite is caused by species imported from abroad. Exotic species of snake have been occasionally recorded from Malta, these being imported with merchandise. The now naturalised species of *Algerian Whip Snake* and possibly the *Cat Snake* are thought to be species brought over from North Africa along with firewood consignments during the First World War (Borg, 1939). The introduction of an exotic poisonous species, probably a viper, has been recorded in the 16th century. In July 31, 1566 a ship arrived at Malta from Venice laden with timber and iron. While

the pine planks were being unloaded, a poisonous serpent fixed its fangs into a seaman's hand. The bite was treated by a Maltese layman who advised the seaman to make the sign of the cross over his hand and cover the hand and snake with powdered Malta rock. The serpent died forthwith, whereas the seaman remained hale and hearty. The author records this experience to prove the efficaciousness of ground Malta rock in the treatment of snakebite (Bosio, 1621).

This experience, if true, seems to prove one aspect of Maltese folklore. However, it may be argued that poisonous snakes have two types of bites; a business bite which the animal uses to kill its prey wherein it injects a deadly amount of poison, and a defence or warning bite which the animal uses to escape when threatened. Hence, poisonous-snake bite is not necessarily the same thing as snakebite poisoning (Reid, 1972). This would explain why not all cases of poisonous snakebite require the administration of an antivenom.

Poisonous Snakebite

The poisonous snakes of the world may be broadly classified, medically, into three major groups depending on the type of toxicity elicited by the venom (vide infra). The clinical features of systemic poisoning usually occur secondary to the primary emotional response which comes on rapidly within minutes of the injury. The commonest symptom following snakebite - whether the snake is poisonous or harmless - is fright. The frightened patient may appear semi-conscious, with a cold, clammy skin, feeble pulse, and rapid, shallow breathing. Local pain may also be a reaction to the emotional response. Fright reactions are those which may be encountered by the Maltese practitioner and are more likely to be present in adult patients, rather than young children who are rushed to the doctor by their parents.

The onset of systemic effects of snakebite poisoning occurs at a time dependant on the dose of venom injected, usually a half or one hour after the injury. The initial signs of systemic poisoning depend on the type of poison injected. Laboratory experiments show that snake venom contains a mixture of toxic factors including proteases, phosphatidases, neurotoxins, cardiotoxins, hyaluronidase and cholinesterase (Paton, 1977). Fortunately the main clinical patterns of snakebite poisoning in humans are distinctive and divisible into three main groups.

The **neurotoxic** group of venomous snakes include the *Elaphinae*, to which belong the cobras, mambas, kraits, coral snakes and all the poisonous Pacific-Australian land snakes. Elaphid bites usually result in few local effects, except in bites by the Asian Cobra which give local swelling one to two hours after the injury, and is followed later by blisters and local superficial necrosis. Early important diagnostic signs of systemic poisoning include ptosis and glossopharyngeal palsy. Severe poisoning is assumed if these signs occur within one hour, or less, of the bite. Rapid progression to respiratory failure and mental

confusion occurs. Shock, possibly cardiotoxic, may also be a feature of severe poisoning. Death occurs as a result of the respiratory failure caused by the respiratory muscle weakness that occurs, complicated by the inhalation of secretions or vomitus. The neurotoxic features, if not fatal, resolve in about two or three days, but may exceptionally persist for as long as two weeks.

The **myotoxic** group of venomous snakes include the *Hydrophinae* or sea-snakes common in Asian-Pacific coastal waters. Sea-snakes bites have no local effects. The first signs of systemic poisoning include general myalgia, followed three to five hours later by myoglobinuria. Severe poisoning is diagnosed if myoglobinuria occurs as early as one to two hours after the bite. It is followed within a few hours by the development of respiratory failure, which is often the cause of death 12 to 24 hours later. The electrocardiogram (ECG) is a useful investigative tool, giving early warning of impending death or acute renal failure. The muscle damage that occurs with these bites gives rise to a hyperkalaemia characterised by tall peaked T-waves on ECG. Full recovery after non-severe poisoning is prolonged to several months.

The **vasculotoxic** group of venomous snakes include the *Viperidae* or vipers. Viper bites are characteristically followed by local swelling and discolouration within a few minutes. If the dose of venom received is large, serous or sanguineous blisters may follow. The early diagnostic signs of systemic poisoning include haemoptysis due to a defect in the clotting mechanism. Severe poisoning is suspected if the local swelling reaches the knee or elbow within two hours of the bite. Shock and haemorrhagic signs, such as gum bleeding, ecchymosis and haemoglobinuria, develop. The severe shock and bleeding into vital organs result in a protracted death over two or three days. In less severe poisoning, the shock and haemorrhagic features resolve within a week. ECG changes in severe systemic elaphid and viper poisoning are similar with T-wave inversion and ST segment deviation.

Management of Snakebite

The management of snakebite in the Maltese Islands is in the large majority of cases very simple and aimed at the fright and emotional reactions. As noted earlier, these reactions are variable in severity, so that some patients will suffice with reassurance that the offending animal is harmless while others will require tranquillisers and placebo treatment. Local treatment as for small puncture wounds should be instituted. The mouths of all snakes are infested with bacteria and a wide-spectrum antibiotic should always be given as part of the treatment. A booster of toxoid is given with suitable precautions (Paton, 1977)

One must, however, keep in mind rare possibility of an exotic introduced species, particularly for bites from the Grand Harbour area. Poisonous species which are most likely to be introduced to the Maltese Islands include the vipers, which are the only poisonous forms of snake in Europe. Elaphine species may be introduced from the African coast. Patients

bitten by snakes often bring the dead offending animal along with them. A medical practitioner familiar with the local four snakes will very easily recognise the specimen as local or otherwise. If the species is unfamiliar, a careful search for the presence of fangs should be undertaken. Vipers have long erectile fangs, whereas elaphids and sea-snakes have short fixed fangs. It is important that the mouth and fangs of freshly killed snakes are examined with care since reflex action in a dead snake has been known to cause a severe bite. Should the offending snake not be captured, an examination of the bite-mark may be of help in distinguishing a non-poisonous form from a poisonous one. The bite of a non-poisonous snake is doubled U-shaped impression of small teeth marks. Characteristically a double fang mark with or without additional teeth marks suggests a poisonous species. The early diagnostic signs of systemic poisoning may be present.

The therapeutic measures for systemic poisoning include supportive measures to combat shock, respiratory failure and acute renal failure. Considerable controversy still exists over the best management of poisonous snakebite. This is probably because most bites are not fatal and the low mortality may mistakenly be ascribed to the treatment. If envenoming is minimal the chances of serious consequences are slight and therefore the most

energetic therapeutic measures are unnecessary. Therapeutic measures include the administration of the specific antivenom made from horse serum. Antivenom is available for most species of poisonous snake throughout the world. Since all antivenoms are made from horse serum, their use carries a significant risk of allergic reactions including anaphylactic shock. Antivenom is indicated for bites causing local necrosis to prevent or minimize this unpleasant complication; and for potentially serious systemic poisoning as evidenced by hypotension, ECG changes, neutrophilia, and acidosis, along with abnormal bleeding after viper bites or, ptosis or glossopharyngeal palsy after elaphid bites.

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