Adder Bites in Aldershot

Major A Hawley
RAMC

23 Parachute Field Ambulance, Rhine Barracks, Aldershot, Hants. GU11 2AX

SUMMARY: Each summer cases of adder bite occur in Aldershot and its surrounding areas. Many of these are brought to the Cambridge Military Hospital. This paper reports three cases that together illustrate the commonest clinical signs and symptoms. These include rapid swelling, malaise and anxiety. An important diagnostic indication is an early and marked leucocytosis. Treatment regimes are also reviewed with the advice ultimately being to "admit and monitor". The danger of early resort to antivenom is also examined and the principles of both treatment and first aid are developed.

Introduction

The adder *Vipera berus* is the only naturally occurring venomous snake in Britain. It is a member of the Viperidae and is a true viper. Its diet includes small mammals, lizards and frogs and its venom is well adapted to the subjugation of these animals. The venom is a complex mixture of proteases which produce cytotoxic and haemotoxic effects¹.

Usually, adult specimens measure 50-60 cm in length and vary in colour from grey to brown, with zig-zag markings along the length of the back. They favour moorland and the edges of woods but can be found anywhere. In the heat of summer their preferred habitat will include access to water. It can be seen that the training areas and picnic sites surrounding Aldershot fulfill these criteria. Hence, it is no surprise that cases of adder bite present to the Cambridge Military Hospital each summer, at an average rate of 3 per year for the last 5 years.

In the United Kingdom annually, more than 100 people are reported as having been bitten². Death, however, is fortunately a rare consequence of adder bites, and in England and Wales between 1950 and 1972 only one death from an adder bite has been recorded. During the same period, there were 61 deaths from bee and wasp stings. Adders, in common with nearly all species of snake, do not make unprovoked attacks. The provocation may, of course, be inadvertent, and usually the snake is being handled at the time of the bite².

Case Reports

Case 1. A 34 year old man was walking through scrub when he felt a sharp pain on the outside of his right foot. He was wearing open toed sandals at the time and he noticed an adder making off into the scrub. When he removed his sock he discovered 2 small puncture wounds. As he presented to hospital 30 minutes later, he felt dizzy and unwell and was clearly anxious and worried. He was admitted and monitored for 24 hours. Blood was taken on admission for a routine full blood count, urea and electrolytes, and cardiac enzymes. All the results were normal. Having shown no further signs or symptoms he was discharged after 24 hours.

Case 2. A 14 year old girl was out playing with friends when they discovered an adder. She attempted to pick it

up and was bitten twice on the left hand. Initially, she was treated at the medical centre with oral erythromycin and Piriton, but two days later she was referred to the Cambridge Military Hospital with a grossly oedematous left arm. The limb was swollen from the finger tips to the axilla and any movement was both stiff and painful. Blood was taken for a full blood count, and this showed a marked leucocytosis of 17.3×10^9 per litre. She was treated with bed rest, limb elevation, IV hydrocortisone and oral antihistamines. Four days later the swelling had largely subsided and she was discharged. On review 2 weeks later, she had completely recovered.

Case 3. A 22 year old man tried to pick up an adder he had found and suffered a bite on the right middle finger. Swelling began 5 minutes after the bite and a little more than an hour later, when he had presented to the Cambridge Military Hospital, it had progressed up to the elbow. He then developed a right axillary lymphadenitis and the swelling reached the axilla. A full blood count was taken and was normal, and clotting studies were also unremarkable. At this stage he was started on oral erythromycin. Three hours after the bite he began to develop intermittent bouts of hypotension when his blood pressure fell to 90/50 and continued at this level for up to 10 minutes. (This was in marked contrast to the blood pressures in cases 1 and 2 which remained normal throughout admission). The patient felt unwell and vomited. A normal saline intravenous infusion was set up and the hypotension gradually resolved over the next 24 hours. Blood samples taken the next day showed a white blood cell count of 16.8×10^9 per litre and a haemoglobin of 12.7g/dl. Clotting studies and electrolytes were normal. The massive swelling began to subside after 36 hours, but the area involved became haemorrhagic with extensive bruising on the medial aspect of the right arm and over the lateral aspect of the adjoining chest wall. He gradually improved until discharge 19 days after the bite, and at review 3 months later he had recovered completely.

Discussion

Two of the 3 cases described suffered bites in July. The other occurred in September. This reflects the usual time of biting. Reid² described a series of 95 victims, 62% of whom were bitten in the months of June, July

and August. Such a finding is to be expected given the hibernation and mating cycle of the snake.

Another common feature of adder envenomation is that 2 of the victims were bitten whilst handling the snake. Under these conditions the victim may suffer multiple bites until the animal is released or killed. It should be noted that even after death and decapitation, the head still presents a danger as delayed head reactions causing bites have been described up to 20 minutes following severance².

Case 1 highlights a number of features. Firstly, it is clearly of protective value to wear appropriate footwear in areas of known risk. Secondly, a bite from a venomous snake is not necessarily accompanied by envenomation³, and the described reaction was one of fright.

The other 2 cases both showed early swelling. This is pathognomonic of envenomation, and the earlier it shows, the more likely is the possibility of serious poisoning. If an individual is bitten and has no swelling after 6 hours, it is unlikely that any venom injection has occurred¹. This is not to suggest, however, that any adder bite should be taken lightly, because the condition is unpredictable and admission to hospital with monitoring is advised^{2,4}.

The oedema can be massive as it certainly was in Case 3. The mechanism is increased vascular permeability possibly related to the cytotoxic nature of the venom³ which allows a variable volume of fluid to collect in a limb. If this is large enough, it could be responsible for hypotensive episodes¹. The early and marked leucocytosis shown in Cases 2 and 3 is also an important indication of envenomation², but, unlike oedema, this is not an invariable consequence of poisoning.

Massive oedema has led some clinicians to undertake surgical decompression of compartments. Lau and Kenna⁵ described a fasciotomy performed upon a 12 year old who had been bitten on the right index finger. Warrell counsels caution in the use of fasciotomy¹, and suggests objective measurements of blood flow to assess any possible impairment before intervention. In the case of this 12 year old, the victim continued to have pain in the limb after use for 20 months after the incident, and, as this is very unusual in adder bite sequelae, it may have been due to the operative intervention. Wild's series of 16 young victims, who had all been treated medically, showed no similar sequelae⁶. Certainly, children usually make a rapid recovery^{2,6}.

Some would consider the incidence of severe poisoning in adder bite to have been underestimated. Workers in Sweden found that 12% of 136 patients admitted to hospital after adder bite had suffered severe envenomation⁷, and this reinforces the requirement to treat all cases of adder bite with care. Only by monitoring such individuals can appropriate treatment be provided, and monitoring remains the most effective way of charting and assessing the hypotensive episodes seen in many cases of serious poisoning. Warrell

suggests that these hypotensive bouts can be partly explained by a cardiotoxic element of the venom¹; such a substance has been postulated by others for viperid envenomation⁸, but no-one has yet isolated or positively identified the agent.

Recommendations for Treatment

There remains a great deal of confusion about the correct treatment and management of adder bite. Broadly speaking, the techniques are the same as those for any snake bite.

The site of the bite should be wiped and covered, but not properly dressed, and no attempt should be made to incise or suck the area. Reid made the point that incision may lead to infection and may actually aid the spread of the venom². Some American workers give different advice⁹, but the overwhelming weight of informed opinion in Europe and the Commonwealth is strongly against the "cut and suck" technique. The limb should be immobilized as this helps to limit intravascular spread of the venom, and the use of a tourniquet is advised by Reid² and Warrell¹. This should not be a tight arterial tourniquet but rather a firm bandage, but because such a distinction may be difficult for the unskilled to recognise, there are dangers in this course of action.

Early referral to hospital is the wisest counsel, and reassurance is most important. Many patients are susceptible to pain and horror at actually having suffered a snake bite, and they should be confidently reassured and admitted. Monitoring the victim, as already noted, needs to be undertaken, and Reid² suggested charting the following – vomiting, diarrhoea and abnormal bleeding; hourly pulse, blood pressure and respiration; white blood cell count, creatine phosphokinase and serum bicarbonate; ECG (twice daily); the extent of local swelling; and urinary protein output and blood urea levels.

Appropriate antivenom administration is the definitive treatment for serious snake bite envenomation and adder bite is no exception. Modern Zagreb antivenom has none of the complications of the older Pasteur type and the statement that the antivenom is more dangerous than the bite is no longer true. The following are indications for antivenom administration – persistent hypotension, leucocytosis (particularly over $20 \times 10^9/\text{litre}$), massive swelling, ECG changes (characteristically non specific such as T wave inversion and ST depression) and raised serum creatine phosphokinase levels.

A known allergic history complicates the use of antivenom and extra care has to be taken. Reid, however, advised against the use of serum sensitivity testing⁴, and instead proposed the careful administration of the antivenom, with readily available adrenaline. The antivenom should be given intravenously, 2 ampoules in 100mls of isotonic saline, at a rate of around 15 drops per minute. Perhaps the only role for steroids is in the management of delayed serum

sickness reactions⁴. Another point to remember, is that the dosage of antivenom for both adult and child is the same; there are no paediatric variations.

It is hoped that this article will serve to dispel some of the confusion surrounding the topic of adder bites. The future will undoubtedly see further envenomations being brought to military casualty departments, especially to the Cambridge Military Hospital. If adder bites cannot be prevented, they can at least be managed correctly.

Acknowledgement

I wish to thank Captain C D Reynolds RAMC for his kind assistance in the preparation of this paper.

REFERENCES

1. WARRELL D A. Oxford Textbook of Medicine Vol 1 Ed D J Weatherall et al. OUP, Oxford; 6. 35-6.42
2. REID H A. Adder Bites in Britain. *Br Med J* 1976; **2**(6028): 153-6.
3. REID H A. Animal Poisons. Manson's Tropical Diseases London, Bailliere Tindall 1982; 544-566.
4. REID H A and THEAKSTON R D G. The Management of Snake Bite. *Bull WHO*. 1983; **61**(6): 885-895.
5. LAU Y L and KENNA A P. Surgical Treatment of Adder Bite. *J R Soc Med* 1985; **78**: 1028-1030.
6. WILD R N. Adder Bites in Children. *Arch Dis Child* 1979; **54**(5):392-5.
7. PERSSON H and IRESTEDT B. A study of 136 cases of Adder Bite treated in Swedish Hospitals during one year. *Acta Med Scand* 1981; **210**(6): 433-9.
8. MARSH N A and WHALER B C. The Gaboon Viper its biology, venom components and toxicology. *Toxicon* 1984; **22**(5):669-94.
9. PATON B C. Treatment of Snakebite in Pye's Surgical Handicraft. Wright 1984. 660-671.

HONORARY CONSULTANTS TO THE ARMY

Professor Teik Ewe Oh, FFARCS, has been appointed Honorary Consultant in Anaesthetics and Resuscitation to the Army in Hong Kong with effect from 1 August 1988.

Mr J R P Gibbons, has been appointed Honorary Consultant in Surgery to the Army at the Military Wing, Musgrave Park Hospital with effect from 1 July 1988.