

Medicine in the 1950s in South Sudan: Amputation for a puff adder (*Bitis arietans*) envenomation in a child - 1954

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Introduction

Diaries spanning three decades (1943-1964) have been discovered that tell the story of the life of missionary nurses, doctors and surgeons working at the Lui and Leer Hospitals in South Sudan (then known as Southern Sudan). The medical facility at Leer during this period covered a 300 miles radius serving approximately 60,000 of the Nilotic Western Nuer tribe [1]. It was among these records that the following case description was found.

The puff adder (*Bitis arietans*) is one of the commonest African snakes, causing more bites in animals and humans than all other species of snake put together in sub-Saharan regions. It commonly inhabits the banks of the Nile [2].

The venom of the puff adder causes specific cytotoxic, fibrinolytic, platelet-inhibiting, pro-thrombotic, vasodilating, cardiodepressant, and neurotoxic effects [3-8]. When envenomation occurs in a human tissue necrosis, coagulopathy, hypotension, thrombocytopenia and spontaneous bleeding have all been reported [9].

Case Report

In 1954 a Nuer boy presented to Leer Hospital with a large wound on his lower right leg. The injury was such that the fibula was exposed and the foot gangrenous with necrosis spreading halfway to the knee. The injury arose from a puff adder bite while walking on the bank of the Nile. The father took four days to transport the patient in a basket to the hospital downriver in a canoe (see Figure 1). There was no anti-venom available at Leer and no records of any drugs being administered. There was access to penicillin. The child underwent a below knee amputation from which he recovered (see Figure 2). He remained at the hospital to work. The procedure that was performed is summarised below from the operative textbook used at the time.

"Below-knee amputations should leave a stump 6-7½ inches long in a man; longer stumps only increase the risk of circulatory troubles. The patient is in the dorsal position with a tourniquet applied to the thigh. A single anterior flap



Figure 1. Dr. James West (Grandfather of Charles and Stephen West) examining the child (West family photograph).

is marked out at the appropriate level and its length made equal to the diameter of the limb and its width half the circumference at the point of bone section. The corners of the flap are rounded and the skin reflected proximally. A transverse incision across the back of the limb at the level of the base of the flap cuts everything down to bone. The muscles and interosseous membrane are divided and the tibia bared of periosteum for 1 inch before being cut transversely with a saw. The tibia is rounded anteriorly and the fibula cut 1 inch above the tibia. Vessels and nerves are treated as already described, but the muscles are not sutured and the skin is closed.

Messrs. Desoutter recommend a course of exercises with an elastic accumulator and advise a crepe bandage applied to the stump from above downwards. Muscular development is thus encouraged, and a firm, tapered stump made ready for the permanent limb in six to eight weeks from the date of uncomplicated amputation [10]."

Discussion

Envenomations from puff adder bites remain an important presentation for African medical centres and there are a few reported cases in Europe and the USA [11-15]. Warrell et al [16] recommend 80ml of South



Figure 2. The child after the operation with hospital orderlies and father (West family photograph)

Africa polyvalent antivenom intravenously. This results in an 80% survival among patients with dangerous envenomations. It relieves hypotension and bradycardia reduces the degree of necrosis.

The successful administration of anti-venom is not always straight forward. Warrell et al [16] also describe a case where no anti-venom was available and amputation was refused by the patient's family. They presented only three hours after the bite and received dextrose saline to maintain blood pressure. Two days later the limb was cold, anaesthetic and pulseless below the knee. Amputation was eventually attempted on the twenty-third day but the patient died post-operatively. Lavonas et al [9] report a case where a bite to the right ring finger eventually caused necrosis, despite administration of anti-venom. The finger was amputated and the patient's condition improved markedly afterwards.

Bey et al [17] published a case from the USA where administration of anti-venom was delayed due to difficulty identifying the exotic nature of the bite and logistical issues locating and transporting anti-venom from a zoo 950 miles away. This resulted in a 20 hours delay and the patient developed necrosis around the bite site on their right index finger. Debridement of the affected area was carried out and viable tissue was found underneath, so amputation avoided.

Necrosis is more likely to occur when anti-venom is either unavailable, its administration delayed or envenomation too severe for it to be effective. If necrosis occurs then wide surgical debridement should be performed [16]. If the tissue is not viable amputation should then be considered urgently. The case reported here demonstrates that even in the most difficult situations it is still possible to preserve life.

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