Case Report

Tongue viability after snakebite—an unusual occupational hazard

Snakebites are encountered worldwide; of the 3000 species of snake, about 10% to 15% are venomous. Snakebites give hemorrhagic toxin predominately; 97% of snakebites are on the extremities. The venom-induced necrosis is a common local debilitating sequela of bites by many vipers, frequently resulting in severe permanent scarring and deformity. Antivenoms are not effective under these circumstances unless administered within a few minutes of the bite. To report a snake charmer with an unusual presentation of a Taiwan-Chinese cobra (Naja naja atra) snakebite presenting with significant local tissue injury and necrosis of the tongue. The patient received polyvalent snake anti venom almost 1 hour after the bite. At no time did the patient develop respiratory insufficiency, neurotoxicity, or renal failure. Tongue damage rapidly resolved after early and aggressive treatment with polyvalent snake antivenom. The preserved tongue remained well perfused and viable, and tongue mobility was good. The tongue possesses rich blood supply that provides a resistance to necrosis, allows lacerations to heal quickly, and offers these patients the potential for tongue preservation. Therefore, tongue snakebite damage rapidly respond to polyvalent snake antivenom, avoiding tongue amputation and dumbness sequelae.

Worldwide, only about 15% of the more than 3000 species of snakes are considered venomous to humans [1]. The annual report of snakebites is approximately 300 to 600 with mortality of approximately 10% to 20% [2]. In developing countries, snakebite is an occupational hazard for traditional faith healers, snake charmers, and religious men. Males are bitten a little more frequently than females. The dorsum of the foot and the ankle are the most common sites of snakebites.

In general, the vipers tend to have venom that is strongly hemotoxic, whereas the elapids tend to have venom that is more strongly neurotoxic. However, elements of both are often found in all snakes as all elapid venoms possess some degree of neurotoxin, which causes paralysis of systemic neuromuscular system, muscle weakness, dizziness, and death due to respiratory paralysis with little reaction at the site of the bite. We report an unusual tongue snakebite by Taiwan-Chinese cobra (Naja naja atra) belonging to the Elapidae family that produced a distinctive clinical picture characterized by prominent local effect with few neurotoxicity and quick tongue recovery.

A 49-year-old man, a snake charmer, presented to the emergency department of our hospital with tongue snakebite of 1-hour duration. The snake was identified as Taiwan-Chinese cobra (N. naja atra). This is no ordinary place of snakebite. He had initially progressive pain and swelling of tongue. No breathing difficulty was noted. On physical examination, he was conscious, oriented, and orthopnoeic, having a respiratory rate of 20 breaths per minute. His pulse rate was 67 beats per minute; blood pressure was 197/120 mm Hg. The tongue showed fang-puncture wounds exuding bloody fluid, erythematous, ecchymosis, and necrosis (Figs. 1 and 2). The otorhinolaryngologic examination only revealed mild vocal cord swelling. The breath sounds were normal, and there were no or rhonchi. Laboratory investigations revealed a hemoglobin level of 17.7 g/dL, total leukocyte count of 8100/mm³, platelet count of 229 × 10³/μL, and normal peripheral blood smear results. Coagulation profile showed a prothrombin time of 9.2 seconds (control, 14 seconds) with an international normalized ratio of 0.88; partial thromboplastin time was 30 seconds (control, 36 seconds). All results of biochemical investigations including plasma glucose, blood urea, serum creatinine, aspartate aminotransferase, alanine aminotransferase, and serum electrolyte were within normal limits. His electrocardiogram showed normal sinus rhythm, and chest x-ray showed mild pleural effusion on the left side. He was treated with polyvalent snake antivenom immediately. Because of the

Fig. 1  Tongue ecchymosis and myonecrosis along with fang marks and scratches on dorsum of the tongue.
possible airway threat, he was admitted to the intensive care unit for closed observation. He was given antibiotics and relevant supportive therapy. The patient responded well to treatment and repeat oral examination, which showed good tongue perfusion and mobility (Fig. 3). He was discharged from the hospital in good health after 5 days. After this, the patient was followed up with no sequela.

The family Viperidae is the largest family of venomous snakes; and members of this family can be found in Asia, Africa, Europe, and the Americas. The family Elapidae is the next largest family of venomous snakes. In North America the venomous species are members of the families Elapidae, and Viperidae, subfamily Crotalidae. Cobras, mambas, and kraits are also members of the family Elapidae but are not indigenous to the Americas. However, an increasing number of exotic species are kept by both zoos and private collectors, making bites by nonindigenous species increasingly common [3]. In contrast, the tropical Asia is home to more than 150 venomous species, representing 3 snake families: the Viperidae, the Elapidae, and the Colubridae [11]. There are 6 major venomous snakes in Taiwan-China: 4 from the Crotalidae family and 2 from the Elapidae family. The Crotalidae family includes the Taiwan habu (Trimeresurus mucrosquamatus), the green habu or Chinese bamboo pit viper (Trimeresurus stejnegeri or Trimeresurus gramineus), the hundred-space snake or sharp-nosed viper (Deinagkistrodon acutus), and Russell viper (Vipera russelli formosensis) [4]. Except for Russell viper, which produces both hemorrhagic and neurotoxic venom, these snakes produce hemorrhagic venom only. The Elapidae family includes the banded krait (Bungarus multicinctus) and the Taiwan-Chinese cobra (Naja atra), both of which produce a neurotoxic venom [5]. More than half the fatalities due to venomous snakebites in Taiwan-China were caused by cobra bites, although viper bites were 3 to 4 times more common [6,7].

Asian cobra is classified as a neurotoxic snake. Its venom possesses neurotoxic property that may cause life-threatening paralysis and polypeptides that contribute to local tissue damage. However, local tissue necrosis is the main clinical feature of the Taiwan-Chinese cobra bite, aside from neurologic symptoms and sign. According to the 43 patient studies from the Poison Control Center, Taiwan-China, from 1986 to 1998, 94.4% of patients had local swelling, 38.9% had necrosis or wound poor healing, and 19.4% had nonspecific systemic symptoms after a Taiwan-Chinese cobra bite. Both mortality and typical sign of neurotoxicity were absent [8]. The cause of local tissue necrosis can be attributed to direct toxin effect and vascular thrombosis of surrounding tissue. Pressure immobilization is highly effective against neurotoxic venoms such as those of most elapids. Developed by Struan Sutherland in 1978, the object of pressure immobilization is to contain the venom within a bitten limb and prevent it from moving through the lymphatic system to the vital organs in the body core [9]. The dorsum of the foot and the ankle are the most common sites of snakebites and rarely the tongue. Because of the tremendous local tissue destruction, it is usual in severe bites for amputation of the affected limb to become necessary. However, pressure immobilization and amputation may not be appropriate for tongue snakebites.

Most snakebites are defensive bites, an accidental encounter between man and snake, where the victim does not receive a bite with a full load of venom injected. The bites generally take on the ankle and rarely on the tongue [2]. To the best of our knowledge, there was a death case report from snakebite on the tongue that occurred in Russia in 1971 [10]. Gerkin et al [11] described tongue snakebite from the rattlesnake with life-threatening obstruction of upper airway secondary to massive edema of the tongue, and other soft tissue structures quickly followed envenomation. Therefore, poisonous snakebites are medical emergencies, and they can be deadly if not treated quickly; survival of victims depends much on the appropriate first-
aid measures and immediate transportation to the nearest health center where the facility to administer antivenom and supportive care is available.

It is our intention to underline that the tongue is a muscular organ suspended by its intrinsic muscles, which are attached to the surrounding skull base, mandible, and hyoid bone. The lingual arteries supply its rich blood supply; and the facial, inferior alveolar, and buccal arteries make only minor contributions. In tongue myonecrosis, preservation of just one of the lingual arteries is sufficient to maintain adequate tongue vascularity from crossover perfusion by the contralateral lingual artery. Therefore, early and aggressive medical treatment provides it with a resistance to necrosis and allows lacerations and incisions to heal quickly [12-14].

Ta-Lun Kao MD
Department of Critical care Medicine
Show Chwan Memorial Hospital
Changhua, Taiwan, Republic of China

Chi-Wen Juan MD
Department of Emergency Medicine
Show Chwan Memorial Hospital
Changhua, Taiwan, Republic of China
E-mail address: pablopaulkaotaiwan@yahoo.com
doi:10.1016/j.ajem.2007.02.047

References