

CASE REPORT

Close Encounter With a Prickly Soccer Ball: An Injury From an Indian Crested Porcupine

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The Indian crested porcupine, *Hystrix indica*, is a large rodent with the unique feature of long quills. These quills are an integral part of its defense mechanism against predators. Injuries resulting from human contact with quills may cause pain, bleeding, and swelling. Quill-related injuries are common among animals such as dogs, cats, and some wild animals. The mechanism of injury, consequences, and management of injuries to humans from *H indica* quills are rarely described. In this report, we describe the injuries and management of a man who sustained injury from *H indica* quills.

Keywords: *Hystrix indica*, quills, penetration injuries, accidental injuries

Introduction

The Indian crested porcupine, *Hystrix indica* (Figure 1, A), is a large rodent that has been recorded from southwest and central Asia including India, Nepal, Pakistan, China, and Sri Lanka. It is also found in Turkey and the eastern Mediterranean region.^{1,2} It is a nocturnal, mostly vegetarian mammal.³ Porcupines are covered in multiple layers of quills, which are essentially modified hair and play an important role in defense against predators.²

Injuries caused by quills range from minor peripheral penetrating injuries (eg, limbs) to internal organ penetration subsequently leading to death from peritonitis.^{4,5} Injuries related to porcupine quills are common among several species of animals,⁶ and reported quill-related injuries to humans are most typically from relatively small quill-bearing porcupines (Table 1). However, the mechanism of injury, sequelae, and management of *H indica* quill-related injuries in humans are rarely described.

We describe the case of a man who sustained injuries from contact with *H indica* quills and recovered

with appropriate management without subsequent complications.

Case Presentation

A 50-year-old farmer was on his way home, riding a motorbike at high speed. His left foot collided with a porcupine that was crossing the road, and 6 quills were embedded in the dorsum of his left foot. He experienced severe pain and mild bleeding from the wounds. He sought medical care from a primary care hospital (Galnewa District Hospital) within half an hour of the incident. At Galnewa District Hospital, the quills were removed with pliers, and prophylactic intravenous cefuroxime 750 mg and metronidazole 500 mg were administered every 8 h. Diclofenac sodium (100 mg every 12 h orally) was provided for analgesia.

The patient was transferred to a tertiary care hospital (Teaching Hospital Anuradhapura) the next day due to persistent swelling of the foot. The examination at the Teaching Hospital Anuradhapura revealed that the left foot was swollen, and 6 quill marks were found on the dorsum of the left foot (Figure 1, B and C). No infection, bleeding, or groin lymphadenopathy was observed. Apart from mild pain at the site, the patient was conscious, rational, and all other vital parameters were stable. The previously prescribed medications were continued, and he was advised to keep the foot elevated. Four days later, his symptoms and signs

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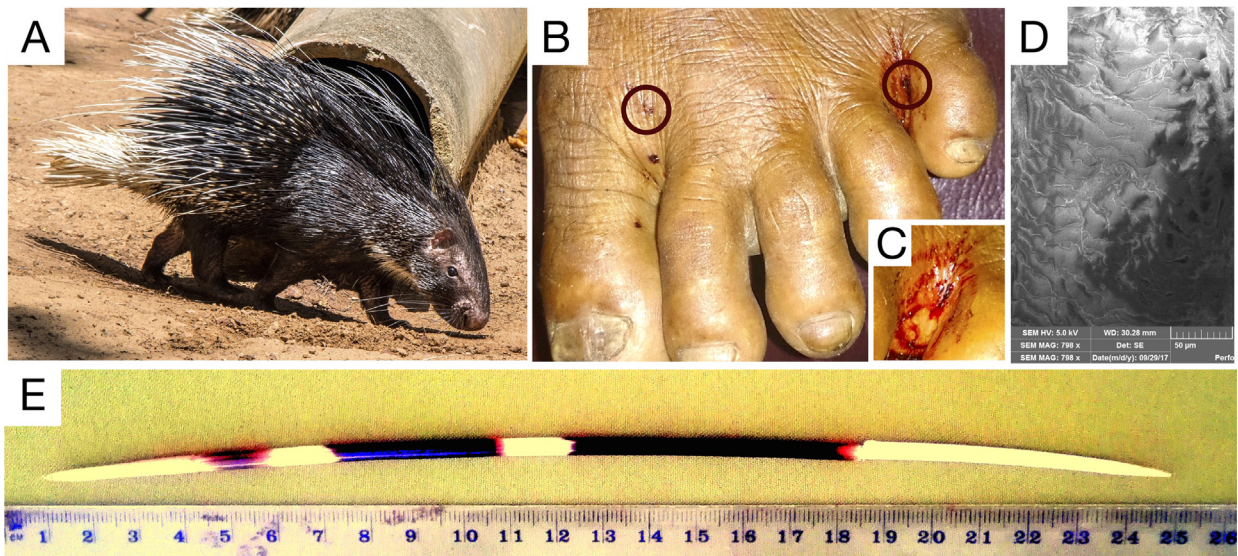


Figure 1. A, Indian crested porcupine *Hystrix indica*. B, Injured left foot of the patient. C, Close-up of the injury in B. D, Scanning electron microscopy images of the structure of a *Hystrix indica* quill with scales on the cortex surface of the black tip. E, *Hystrix indica* quill.

abated and he was discharged. He was reexamined after 3 weeks and no complications from the injury were noted.

Discussion

Porcupines belong to 2 main families: Old World (African or Indian crested porcupine; *Hystricidae*) and New World (*Erethizontidae*).⁷ The Indian crested porcupine can adapt to a wide range of habitats and food types.¹ Average adults weigh 11 to 15 kg with a length of approximately 66 to 77 cm (with the tail measuring 13-18 cm).² Quills are typically 15 to 30 cm in length but can grow up to 51 cm (20 inches; Figure 1, E).² The longer quills are located on the neck and shoulder region, and the smaller, more rigid ones are packed on the back and rump.³ Quills are made of keratin and connected to a muscle at the base, which allows the porcupine to raise the quills when threatened and make the porcupine appear bigger.^{2,3,8}

Furthermore, the porcupine can stamp its feet, growl or grunt, and rattle the hollow quills at the back of its tail.⁹ These actions will deter most predators. Sometimes porcupines swing their quill-covered tails toward the potential threat and move backward.² These mechanisms enable the porcupine to release the quills into the offending animal's body.⁹ Contrary to popular belief, porcupines cannot shoot their quills when agitated.¹⁰ The barbs on the quills of the North American porcupine permit easy penetration into the victim's tissue.¹¹ The strong adhesion in the tissue is due to the backward-facing spread of the scales, which makes removal difficult.¹¹ The scales on the tip of the quills of the *Hystrix* spp are irregular,⁷ which may make removal difficult compared with foreign objects that have smooth surfaces (Figure 1, D).

The incidence of *H indica* quill-induced injuries in humans is rare in the literature.¹² The reported cases of porcupine quill injuries are summarized in Table 1. The majority of cases reported in the literature are from North and South America, and there is one from Turkey. Some reports describe accidental swallowing of quills, leading to penetrating injuries in the gastrointestinal tract. The smaller size of the quill could be the reason for unknowingly swallowing the quills. Other described external injuries have been less severe, and it is notable that these were primarily caused by New World porcupine species (Table 1). External injuries caused by contact with *H indica* quills can be more serious because of its proportionately larger size.

Porcupine quill injuries often lead to pain, bleeding, swelling, and probably an increased risk of secondary infection due to environmental exposure of the wound to bacteria. Therefore, the affected skin surface should be thoroughly cleansed, and the patient should be administered antibiotics to cover both gram-positive cocci and anaerobes.^{12,13} Tetanus toxoid is also recommended. Quills should be firmly gripped with pliers and removed by applying a strong force directly opposite to the direction of penetration without twisting or breaking the quills. Radiography (x-ray or computed tomography) may assist in assessing the depth of the penetration and rule out any internal injuries before careful removal of the quills.

Pain management should be based on the severity of pain (visual analogue scale can be used to assess the level of pain). If there is evidence of bleeding, it can be stopped by applying firm pressure on the site or elevating the affected area.⁵

Table 1. Summary of reports on porcupine quill-related injuries to humans

<i>Location and year of incident</i>	<i>Species</i>	<i>Patient age, sex, and occupation</i>	<i>Incident and injury</i>
Adıyaman, Turkey; 2017 ^{12a}	Possibly Indian crested porcupine; <i>Hystrix indica</i>	17 y; male; NR 5 y; female; NR	Quill penetration on the dorsum of the foot while walking on land Fell on porcupine quill while playing with it and the quill penetrated the periumbilical area
Rio de Janeiro, Brazil; 2016 ^{5a}	Possibly orange-spined hairy dwarf porcupine; <i>Sphiggurus villosus</i>	52 y; female; NR	Porcupine dropped from a lamppost onto to the patients' head while walking
Espírito Santo, Brazil; 2016 ^{5a}	Possibly orange-spined hairy dwarf porcupine; <i>S villosus</i>	20 y; male; NR	Kicked porcupine with right foot while riding a motorcycle
Texas, USA; 2016 ^{16a}	NR	49 y; female; NR	Unknowingly ingested a porcupine quill, which caused a perforation in the esophagus and aorta, and bleed caused pericardial effusion
Niterói, Brazil; 2016 ^{17a}	Brazilian porcupine; <i>S. villosus</i>	50 y; male; NR	Hit porcupine with right hand to frighten it away
São Paulo, Brazil; 2010 ^{13a}	South American porcupine	34 y; male; NR (tourist)	Saw a porcupine in the woods near holiday house and tried to capture it with right hand
Vermont, USA; 1954 ^{4b}	NR	51 y; male; woodsman	Unknowingly swallowed quill with food and perforated small intestine
Montana, USA; 1954 ^{18a}	NR	87 y; female; NR	Unknowingly swallowed quill with food and quill embedded in esophagus
Maine, USA; 1951 ^{19a}	NR	58 y; female; farmer's wife	Unknowingly swallowed quill with food and quill became stuck in laryngeal region
	NR	23 y; male; telephone linesman	Unknowingly swallowed quill while drinking water from a jug and quill became stuck in laryngeal region
Montana, USA; 1935 ^{20b}	NR	23 y; male; NR	Unknowingly swallowed quill while drinking water or eating food and quill perforated small intestine
New Hampshire, USA; 1934 ^{4b}	NR	30 y; male	Ate porcupine meat sandwich and quill perforated stomach and intestine, resulting in diffuse peritonitis. Patient died 8 days after surgery.

NR, not reported.

^a Year of publication.^b Year of incident.

H indica is considered an agricultural pest in some regions because it may be destructive to gardens and agricultural crops.² Porcupines are widely hunted for meat and for medicinal use.^{14,15} The individuals who are most prone to sustaining porcupine injuries are hunters, hikers, backpackers, and those who visit forests to gather medicinal herbs, honey, firewood, or livestock. All risk groups should be aware of unexpected contact with porcupines because this may cause quill-induced injuries.

People who travel at night should be aware of the nocturnal habits of porcupines and be alert to their potential presence in immediate surroundings. Travelers should carry a light source (head lamp) to visualize the animal at a distance and avoid it. Although porcupines have a keen sense of smell, they have poor eyesight and should be given a wide berth.¹⁰ Indian crested porcupines are terrestrial animals; hence, most injuries may occur to the lower limbs. Therefore, it is advisable to wear footwear that is impervious to penetrating injuries when traversing the jungle. If faced with an aggressive porcupine, it is advisable to walk slowly away from the porcupine, leaving plenty of room and time for the porcupine to leave the area.

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