

Identifying a victim of alligator attack and scavenger fish in the Brazilian Amazon rainforest using smile photographs: a case report

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ABSTRACT

Reports of deaths caused by alligators or crocodiles are rare in the literature. These deaths may be related to sharp force trauma caused by the teeth of these animals, with or without mutilation, or even drowning after seizure and submersion of the victim. It is difficult to forensically identify bodies in cases of mutilation of the upper limbs during the attack or when the corpse is in an advanced stage of skeletonization. Smile photographs are an important source of *ante-mortem* references for comparison. We report a human identification based on a photograph of a victim, with the absence of limbs caused by an alligator attack and the advanced skeletonization stage due to scavenger fish action in the Amazon within only 36 hours after his disappearance. The description of alligator attacks and the marks observed on the victim's body are essential to help medical and forensic professionals diagnose the injuries found and, consequently, define the cause of death

INTRODUCTION

Human deaths caused by wild animal attacks are common across the world. However, deaths caused by alligators or crocodiles are rare, even though they can cause serious injuries.¹⁻⁴ Such deaths normally result from haemorrhage or drowning and are related to sharp force trauma caused by these animals' teeth, with or without mutilation of limbs. Publications describing these injuries are few,⁴⁻⁶ despite their importance in the diagnosis of these injuries in forensic practice and for a better comprehension of the risks to which riverside populations are exposed.

In forensic practice, it is difficult to identify the victim when one or more limbs of the corpse are missing, especially if the body is in an advanced skeletonization stage. In this context, dentistry is of great value in human identification. Dental information present in *ante-mortem* documentation of the alleged victim, such as dental records, x-rays, and study models, can be compared with dental data found in the corpse for identification.^{7,8} However, this process is hampered when the alleged victim has never undergone any dental procedure or when the family is unable to present dental records. In these cases, casual photographs can be used to compare with dental evidence to identify the victim.^{7,9,10}

Thus, this work aimed to report a case of forensic human identification comparing *ante-mortem* photographs of a missing person with the dental characteristics found in a corpse of a possible victim of an alligator attack, who had his body skeletonized by scavenger fish from the Brazilian Amazon.

CASE REPORT

The victim and three other individuals (two children and an adult) were on the banks of the Madeira River, in the Brazilian Amazon region. The adults were on the beach repairing a small wooden boat and the children playing in the river. A witness reported that one of the children began to drown and the two adults entered the river to rescue them. During the return to the beach, the victim screamed, submerged, and disappeared in the river, as if something had pulled him into the water.

Authorities then began searches and rescued the remains of the corpse 36 hours after the accident

in a shallow area 80 metres away from the disappearance site and close to the riverbank. The rescue group reported the presence of a black cayman of medium size, about 3 metres long, close to the victim's bones. They also reported the presence of several fish around the corpse, which were feeding on the remains.

The necropsy examination found an incomplete corpse, almost completely skeletonized, consisting of a cranium, three ribs, left upper limb, pelvic girdle, and right lower limb (Fig. 1). Anthropological examination showed that it was a single individual with male characteristics in late adulthood.

Figure 1. Human skeleton composed of the cranium, three ribs, left upper limb, pelvic girdle, and right lower limb



The examination verified sharp force injuries in the pelvic girdle, measuring from about 0.7 to 1.9 cm in diameter, representing small, depressed bone fractures in a circular shape. Many injuries were arranged in the form of two symmetrical lines converging with each other, the largest one measuring about 16 cm in length,

which together formed a “V” (Fig. 2).

Some cartilages and the gingival mucosa were preserved, and there were shallow circular puncture wounds on the bone surfaces (Fig. 3), compatible with the action of scavenger fish from Amazonian rivers, such as candiru and piracatinga fish.¹¹⁻¹³

Figure 2. Posterior view of the right iliac bone Sharp force injuries, several of them in a row forming two converging lines, shaped like a “V”, compatible with an alligator bite



Figure 3. Top view of the cranial vault. The arrows point to multiple circular puncture wounds compatible with the action of scavenger fish, such as candiru and piracatinga



In the face of the impossibility of performing fingerprint analysis due to the skeletonization stage of the body, and the high cost and long waiting time for results of DNA analysis at the local institution, searches started for the victim's dental documentation to enable identification. In the absence of medical records and traditional dental documentation, the family provided a photograph of the alleged victim's smile for comparison with the dental data of the skeletonized remains.

Two forensic techniques were employed for the dental analysis of the case: direct comparison and computerized delineation of the incisal edges of the teeth.

For direct comparison, *ante-mortem* and *post-mortem*

images were paired (Figs. 4 and 5), after obtaining them at approximate and stagger angles of incidence, allowing comparison between the dental characteristics found (Table 1).

To analyze the morphology of the smile line, experts drew a line corresponding to the incisal contours of the upper anterior teeth (Fig. 6) in both photographs using the Power Point® software (Microsoft®, Redmond, USA), enabling the comparison between the outlined incisal edges.

The analyzed points were compatible, both in the direct comparison and in the analysis of the computerized delineation of the incisal edges of the upper anterior teeth. These two dento-legal analyses enabled the identification of the victim.

Figure 4. Photograph of the smile presented by the family of the possible victim. The arrows show characteristics described in Table 1

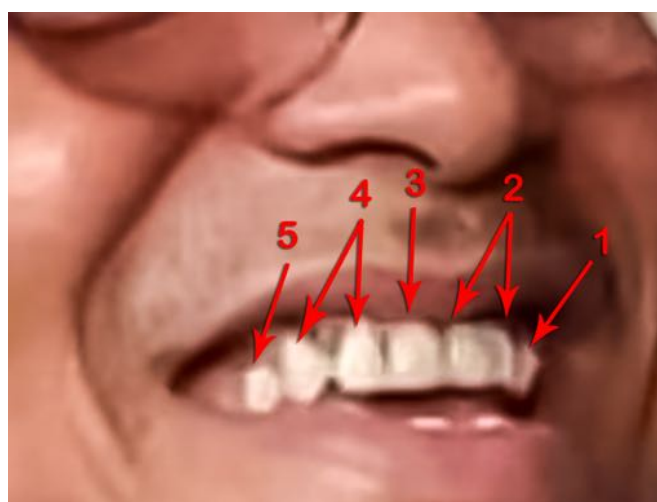


Figure 5. Photograph of the corpse at the same angle as the photograph of the alleged victim. The arrows show the same characteristics found in *ante-mortem* photography, described in Table 1

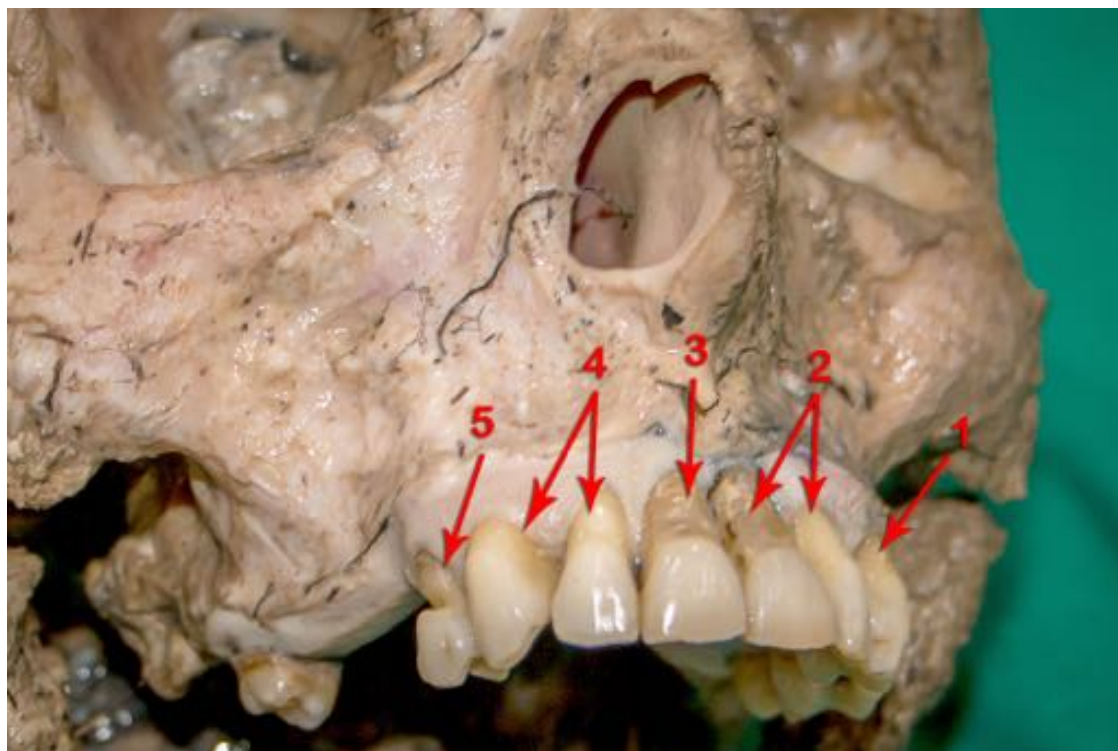
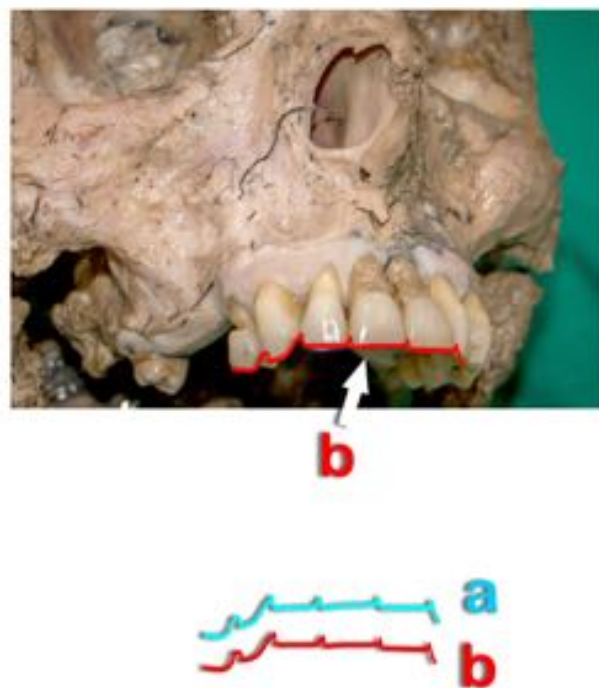
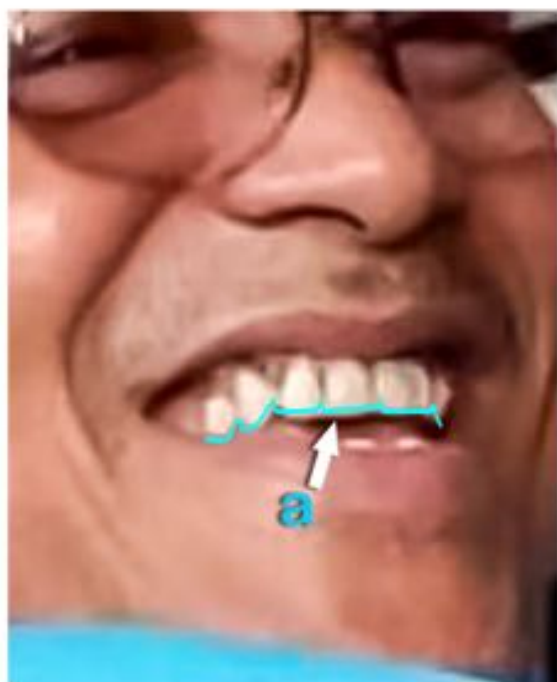


Table 1. Direct comparison between the dental characteristics observed in the photograph of the alleged victim (Fig. 4) and the dental arch of the corpse (Fig. 5)

ANTE-MORTEM	POST-MORTEM
Tooth 23 (upper left canine), proclined (fig. 4, arrow 1);	Tooth 23 (upper left canine), proclined (fig. 5, arrow 1);
Tooth 22 (upper left lateral incisor) slightly longer than tooth 21 (upper left central incisor) (fig. 4, arrow 2)	Tooth 22 (upper left lateral incisor) slightly longer than tooth 21 (upper left central incisor) (fig. 5, arrow 2)
Tooth 11 (upper right central incisor) with quadrangular shape, with greater wear in the mesial third of the incisal edge (fig. 4, arrow 3)	Tooth 11 (upper right central incisor) with quadrangular shape, with greater wear in the mesial third of the incisal edge (fig. 5, arrow 3)
Teeth 12 (upper right lateral incisor) and 13 (upper right canine) slightly diverged in the root apex direction (fig. 4, arrow 4)	Teeth 12 (upper right lateral incisor) and 13 (upper right canine) slightly diverged in the root apex direction (fig. 5, arrow 4)
Tooth 14 (upper right first premolar) with signs of cervical injury compatible with abfraction (fig. 4, arrow 5).	Tooth 14 (upper right first premolar) with an abfraction-type cervical lesion (fig. 5, arrow 5).

Figure 6. Comparison of computerized delineation of incisal contours between *ante-mortem* (a) and *post-mortem* (b) dental images



DISCUSSION

There are two alligator species (Alligatoridae family) with a history of attacking humans in the rivers of the Amazon basin: the jacaretinga (*Caiman crocodilus*), which can reach up to three metres in length, and the black cayman (*Melanosuchus niger*), which can reach up to six metres in length. The latter is known by natives of the Amazon region as “the devourer of men”, given its bite strength and extreme agility in the water environment. The black cayman has about 70 to 80 teeth arranged in a V-shape, which, combined with the strength of its jaw, can hold the prey without allowing any reaction, making its attacks mostly fatal. Smaller crocodiles usually only take a single bite. However, up to a third of attacks involve repeated bites.^{1,6}

The state of Rondônia, in the Brazilian Amazon region, has registered a notorious presence of these alligators in recent years, especially in the Cuniã Lake region, on the banks of the Madeira River. The absence of natural predators and the abundance of food, such as fish and small animals, led to a disorderly growth in the alligator population in the region from 2000 onwards, which increased attacks on humans, especially children and fishermen.^{6,14}

In the present case, the wounds found in the iliac bone during the autopsy were compatible with those caused by multiple black cayman bites.¹ They were sharp force injuries represented by depressed small bone fractures in a circular shape, mostly arranged in two symmetrical lines, forming the letter “V”, compatible with the distribution of the alligator's teeth.

In this context, careful examination of bite marks is essential to exclude other possible forms of injury and to reach a conclusive result. This type of circular wound in the bone caused by an animal bite, when observed in isolation, and the absence of circumstantial evidence may lead to misinterpretations of penetration of foreign bodies, such as projectiles and other sharp objects, or can be mistaken by *post-mortem* damage.^{2,3}

The statements of the witnesses, who saw the victim sink and disappear into the river, suggest that the *cause of death* was mechanical asphyxia by drowning, a common cause among victims of alligators in the Amazon, which usually kill by seizure and drowning, followed by disarticulation of limbs and ingestion.⁶ However, it was not possible to prove the *cause of death* during the autopsy due to the absence of internal

organs and parts of the body that could present other fatal injuries.

The shallow circular wounds found in the cranial vault, in well-delineated shape, are compatible with the action of scavenger fish common in Amazon rivers, represented by candiru fish (*Cetopsis candiru*), baby whale catfish (*Cetopsis coecutiens*), and vulture catfish (*Calophysus macropterus*).¹¹⁻¹³ This explains how the body was found almost totally skeletonized only 36 hours after the victim's disappearance.

Due to the challenges in the use of fingerprint identification techniques, associated with the high cost and long waiting time for results of DNA analysis at the local institution, forensic dentistry analysis was performed.

In the face of the compatibilities found in the anthropological analysis between the body and the disappeared man, and the circumstantial similarities between the corpse and the report of the witnesses of the disappearance, dental technique of analysis and comparison of photographs of the victim's smile was used to identify the body. This is a practical, fast, and reliable method for scientific standards.^{8,10,15,16} Such images are usually available as they are in the possession of family members and/or available on social networks. They may show teeth shape, size, and proportions, biometric characteristics of oral anatomical structures, gingival contours, positioning of long axes of the teeth, contact points, and shape of the incisor teeth of the supposed victim's smile.^{10,15,17} Care must be taken in obtaining as clear images as possible and allowances should be made for different photographic lenses. All these elements allow the identification of a corpse through comparison between *ante-mortem* and *post-mortem* images.¹⁸ Caution should be taken when image quality is compromised, particularly when it becomes blurry when expanded. In these cases, caution should be taken in relying on photographic evidence only and it is prudent that further evidence including circumstantial evidence is utilized to confirm identity.

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In these cases, the expert must record images of the corpse at the same angle of incidence as the photographs of the alleged victim so that the comparison is as accurate as possible. The more teeth visible in the *ante-mortem* photograph, the more detail can be seen and the greater the probability of identification. The use of easily accessible software, such as Power Point® (Microsoft®, Redmond, USA), makes it possible to draw lines that demarcate the teeth limits and the incisal line, adding visual characters to the analysis and facilitating the visualization for lay people of the comparison of characters used to identify the victim.

CONCLUSIONS

The description of alligator attacks and the signs observed on the victim's body are essential to help medical and forensic professionals in diagnosing the injuries found and, consequently, in determining the cause of death. This paper contributes to a better understanding of the risks for people that use water environments for work and leisure, in addition to directing policies for isolation of areas and environmental education in great risk regions.

In identification, the absence of dental records, smile photographs are an alternative tool for obtaining ante-mortem dental information to be compared with post-mortem data. Such photographs can indicate an individual through morphometric characteristics, representing an efficient way to assist victim identification.

PERMISSION TO USE IMAGES

Permission to use images was granted by the victim's relatives through a specific Informed Consent Form.

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