

## CASE REPORT

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## Indoor postmortem animal interference by carnivores and rodents: report of two cases and review of the literature

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**Abstract** We present two cases of nearly total skeletization of the exposed face and neck due to indoor postmortem animal interference and a review of the literature. In the case of a 61-year-old man, inspection of the damaged soft tissue margins revealed serrated edges and parallel cutaneous lacerations caused by rats. In the case of a 40-year-old woman, postmortem examination revealed v-shaped and rhomboid-shaped tunneled wounds in the damaged soft tissue caused by a pit bull terrier. The autopsy in both cases identified natural causes of death. While the morphological feature of postmortem soft tissue artifacts caused by rodents can be ascribed to animal incisors, stab wound-like punctured wounds are characteristic of canine dentition of carnivorous origin. Additional morphological criteria for injuries of carnivorous origin are linear scratch-type abrasions from claws in the vicinity of the injuries. In cases of indoor postmortem animal interference damage is primarily caused to the exposed areas of the body, no self-defense injuries can be found on the deceased's body, only a small amount of blood or the total absence of bloodstains should be expected at the scene, an inquiry of pets living free in the house or wild animals having possible access to the scene should be conducted and rodent excrement found at the scene can give the investigator further information.

**Key words** Postmortem injuries · Carnivores · Rodents · Animal scavenging · Tooth marks · Faeces · Death scene investigation

### Introduction

First described by Klingelhöffer in 1898 [1], postmortem animal interference of human corpses or remains is a well known phenomenon to forensic death investigators. How-

ever, it has only been reported sporadically in the forensic literature, leading to a primarily anecdotal rather than systematic approach towards the subject. Although postmortem injuries can be inflicted by all kinds of animals irrespective of their size or environmental origin either from land, sea or air [2–6], the vast majority of case reports on this subject deals with indoor postmortem injuries caused by carnivores and rodents. In the present study we report the morphological features and autopsy findings of two cases of postmortem injuries caused indoors by a pit bull terrier and rats and review the current literature on this subject.

### Case reports

#### Case 1

A 61-year-old man was found dead in an arbor lying fully dressed on the bed in a supine position. His head, neck and the collar region were totally skeletonized in such a manner that all soft tissue was absent exposing the cervical vertebrae, the two superior thoracic vertebrae and both clavicles with opening of the upper thoracic cavity (Fig. 1). The arbor was in a state of disorder with garbage everywhere, but bloodstains were absent at the scene. Small portions of dehydrated faeces, that were identified as rat excrement by the consulted veterinarian, were found beside the head of the deceased. According to the postmortem changes, death occurred 7–10 days previously. To verify suspected postmortem animal interference a forensic autopsy was carried out. Postmortem examination revealed multilobar bronchopneumonia with patchy consolidation and abscess formation in both lower lobes of the lungs. The larynx, thyroid gland, aortic arch and the upper third of the esophagus and trachea were missing. Apart from atherosclerosis, coronary artery disease and a mild fatty liver no other macroscopic abnormalities of the internal organs were present. There was no evidence of blood aspiration or air embolism. Inspection of the damaged soft tissue margins revealed fine serrated edges with distinctive parallel cutaneous lacerations but absence of hemorrhage or reddening of the wound (Fig. 2). The skin next to the wound margins was undamaged. Histological examination of the wound edges showed no vital reactions. Toxicological analysis found no traces of alcohol in the blood. According to the autopsy and histological findings, death was attributed to bilateral bronchopneumonia. Based on the morphological appearance and the finding of rat faeces at the scene, it was stated that the injuries were caused postmortem by rats.

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**Fig. 1** Anterior surface of the victim in case 1: Postmortem skeletization of face and neck due to gnawing by rats. Note the preference for the exposed areas



**Fig. 2** Postmortem injuries caused by rats in case 1: Crenated edges with fine serrated parallel cutaneous lacerations in the margins of the damaged skin. Note the undamaged skin beyond the wound margin

#### Case 2

A 40-year-old woman was found dead in her apartment lying supine on the bed and the upper trunk and legs were fully covered by clothing. The head and neck were almost totally skeletonized apart from a small portion of subcutaneous tissue and facial muscles left on cheek-bones and chin (Fig. 3). The lower partial artificial denture was lying free inside the mouth cavity. Significantly, there was hardly any blood at the scene except for a small amount of dried blood on the head and on parts of the clothing next to the neck region. There was no sign of a struggle and the apartment was secure. A pit bull terrier owned by the partner was inside the apartment. The woman was last seen alive by the partner 37 h before. According to the postmortem changes, the time span between death and the finding of the deceased was about 1 day. A crime was suspected and a forensic autopsy revealed lobar pneumonia with uniform consolidation of the lower lobe of the right lung, histologically appearing as early red hepatization of acute pneumonia. Besides pulmonary edema of the left lung and an acute right-sided dilatation of the heart, a slightly enlarged fatty liver was found. The larynx, thyroid gland, parts of the carotid arteries and the upper fifth of the esophagus and trachea were missing. On the back of the head a large scalping injury was found. Inspection of the injury margins on the neck showed v-shaped and rhomboid-shaped punctured wounds in the immediate vicinity of the damaged soft tissue margins extending up to 1.2 cm in depth and up to 1.0 cm in diameter (Fig. 4). There was no obvious vital subcutaneous bleeding in the ragged wound margins. Histological exami-

nation revealed no vital reactions neither in the soft tissue margins nor in the transected carotid arteries. There was no evidence of blood aspiration or air embolism. Apart from the lungs, no relevant findings attributable to death were found in the other organs by histological examination. Toxicological analysis showed an alcohol level of 194 mg/dl. Death was attributed to lobar pneumonia. According to the autopsy findings and death scene investigation, the injuries were found to be caused postmortem by the pit bull terrier found at the scene.

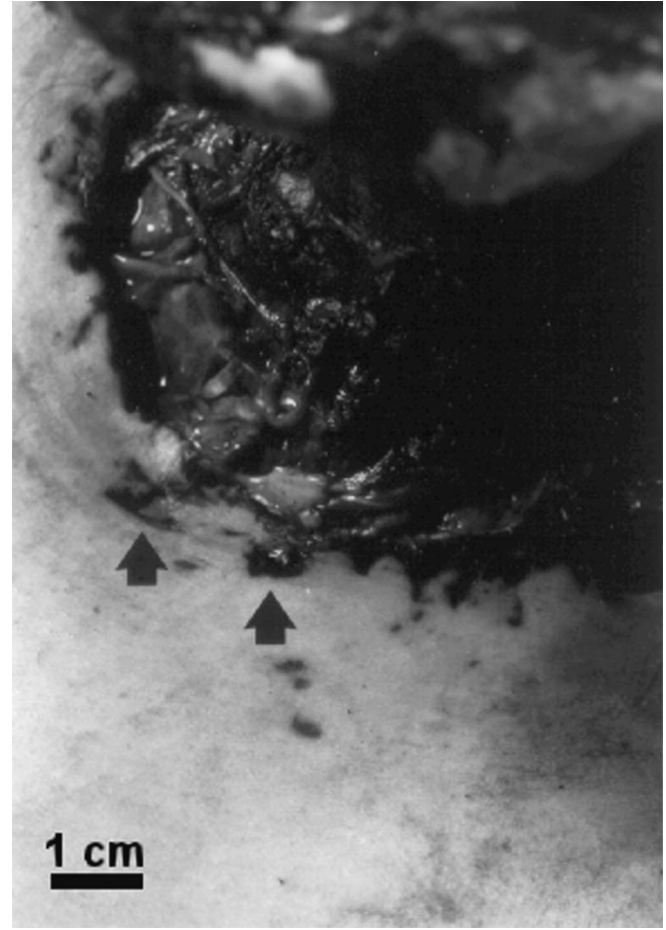
#### Discussion

Although the occurrence of artificial postmortem injuries due to animal scavenging is a well known fact to forensic death investigators, the morphological appearance of these injuries can be misinterpreted by police officers investigating the suspected crime scene [4, 7–12] or by the consulted medical practitioner [12, 13].

Determination of rodent species from the morphological appearance of damage to soft tissue and bones is often unreliable [3, 14, 15]. In cases of postmortem rodent interference the appearance of distinct parallel cutaneous lacerations in the margins of damaged skin can be attrib-



**Fig.3** Postmortem injuries caused by a pit bull terrier in case 2: Nearly totally skeletization of the bare exposed face and neck with some subcutaneous tissue and facial muscles left on cheek-bones and chin



**Fig.4** Postmortem punctured wounds mimicing stab wounds (▲) caused by the canine teeth of a pit bull in case 2

uted to the animals masticatory apparatus [2, 4, 10, 12, 15], namely the pair of incisors (Fig. 5).

In case 1 of our study the diagnosis of postmortem destruction caused by rats was consolidated by the finding of rat faeces in the vicinity of the deceased's head. The finding of rodent excrement as the connecting link for the diagnosis of assumed postmortem rodent interference has been mentioned before [2, 10, 15], thus providing the possibility of distinguishing DNA sequences of the animal itself from those of food residues [12, 16, 17]. The knowledge of the various morphological features of rodent excrement (Fig. 6) can give the investigator further information at the scene.

In case 2, the size and depth of the v-shaped and rhomboid-shaped punctured wounds adjacent to the damaged edges are typical for teeth marks caused by a large dog [18–22] and were inflicted by a pit bull terrier found at the scene. Stab wound-like bite marks are diagnostic for canine dentition of carnivore origin [5, 6, 23, 24]. In contrast to the finely serrated edges found in postmortem damage of rodent origin [6, 10, 12, 15], the wound margin of postmortem injuries caused by carnivores appears less regular

and often rounded [5, 6, 8, 11, 24–27]. Another morphological criterion for injuries by carnivores origin is the potential finding of claw-induced linear scratch-type abrasions in the vicinity of damaged areas as described for dogs [7, 8, 24–27] and big cats [28], in contrast to their absence next to damaged areas of rodent origin [2, 10, 15].

In the reviewed literature (Table 1), no case of a preceding violent offence against the deceased prior to indoor postmortem animal interference has been reported. In four cases only the deceased died of an unnatural cause due to suicide [2, 11, 15, 25].

While the infliction of injuries by a domestic animal to the former owner is mainly attributed to the fact that nothing else is available to appease the animal's hunger [5, 8, 11, 23] and therefore even decay doesn't stop the animal's hunger [27], some authors interpret this way of acting as a kind of substitute or displacement behaviour towards the deceased, mainly motivated by confusion and fear, leading to an affective aggression of the animal without any actual ambition to attack [18, 25, 29].

The observations in our cases support the previous conclusion that predisposing factors for postmortem mutilation by pets are social isolation of the deceased and a predisposing cause of sudden death [11, 12, 26, 27].

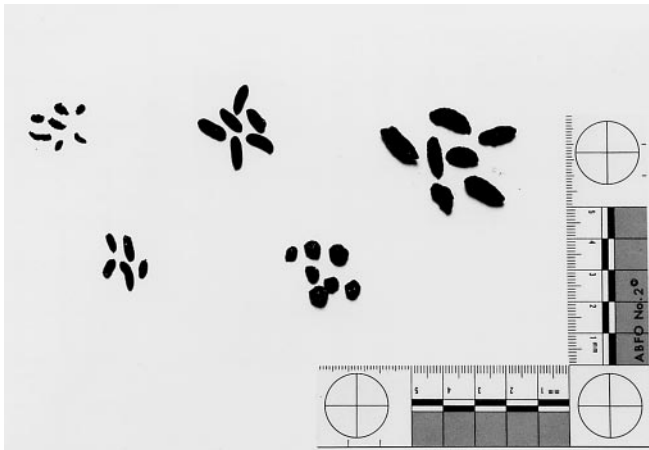
**Table 1** Indoor postmortem animal interference as reported in the literature

Authors	Age (years)/Sex	Cause of death	Interfering animal	Blood alcohol level	Time span between death and onset of postmortem injuries	Localization of postmortem injuries	Blood pattern at death scene
Böhmer (1925)	newborn/n.n. n.n./m	n.n. suicidal hanging	mice rats	n.n. n.n.	n.n. within 3 days	extremities face	n.n. absence of blood
Mittmeyer et al. (1976)	49/m	cerebral hemorrhage (n.s.)	dog (crossbreed)	n.n.	n.n.	penis	bloodstaining on the carpet (spoor of dog paw)
Mätzler (1977)	66/m	natural cause of death (n.s.)	dog (poodle)	n.n.	n.n.	abdomen, penis, anus	absence of blood
Weiler (1978)	77/m	pneumonia	dog (crossbreed)	n.n.	within 8 days	abdomen, true pelvis, penis	absence of blood
	57/m	cardiac failure (n.s.)	dog (German shepherd)	n.n.	within 3 weeks	lower trunk, legs	n.n.
Pötsch-Schneider and Endris (1984)	53/m	cerebral hemorrhage (n.s.)	dog (crossbreed)	n.n.	n.n.	complete decapitation and skeletization of head and neck	large amount of blood
Haglund (1992)	27/m	suicidal inhalation of propane gas	rats	n.n.	within 3 days	skeletization of head, neck and both forearms, mutilation of hands	n.n.
Hayase et al. (1994)	59/m	ischemic heart disease	dog (Akita)	negative	within 3 days	skeletization of head, anterior thorax missing, inner organs of thoracic and peritoneal cavity intact	absence of blood
Rossi et al. (1994)	53/m	combination of bronchopneumonia, diabetic ketoacidosis and ischemic heart disease	dog (German shepherd)	negative	n.n.	skeletization and mutilation of face, neck with absence of inner organs and bones in part	bloodstains (quantity n.s.)
	82/m	myocardial ischaemia	dog (German shepherd)	n.n.	n.n.	skeletization and mutilation of face and neck with parts of inner organs missing	bloodstains (quantity n.s.)
	42/f	combination of pulmonary edema and alcohol intoxication	dog (red setter)	314 mg/dl	within 16 h	face	n.n.
	32/m	suicidal intoxication (dothiepin overdose)	cats	47 mg/dl	within 3 days	skeletization of head, neck and right upper arm, absence of inner organs in part	n.n.
Patel (1994)	n.n./m	ischemic heart disease	rats	n.n.	within 48 h	face	absence of blood
Ropohl et al. (1995)	43/f	pneumonia	golden hamster	< 10 mg/dl	n.n.	face and neck	small amount of blood
Schumann et al. (1996)	65/m	myocardial ischaemia	dog (hound)	n.n.	within 12 h	face and neck	absence of blood
Rothschild and Schneider (1997)	31/m	suicidal shooting	dog (German shepherd)	274 mg/dl	within 45 min	lower half of the face, front and left side of the neck	hardly any blood near the body (apart from the area behind the gunshot exit wound)

n.n.: not noted. n.s.: not specified



**Fig. 5** Lateral view of a rat skull. Note the pairs of incisors responsible for the formation of parallel cutaneous lacerations



**Fig. 6** Samples of excrements deriving from different rodents kept in part as indoor pets. From left to right: shrew-mouse, guinea-pig, common rat (above); golden hamster, rabbit (below)

Death investigators should be aware of the following while undertaking a detailed assessment of the scene of questioned cases of indoor postmortem animal interference: damage is primarily caused to the exposed areas of the body [8, 10, 11, 25, 26, 29, 30], no self-defense injuries can be found on the deceased's body, compared to the large defects a relatively small amount of blood or the total absence of bloodstains should be expected at the scene [2, 10, 11, 24, 26, 27], possibly a spoor deriving from the animal's paws can be detected in bloodstains [7], an inquiry of pets living free in the house or wild animals having possible access to the scene should be conducted and a careful look for animal faeces [2, 10, 15] or rodents nests [12, 15] should be made.

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