

Prevalence of Emergency Traumatic Injuries in 100 Wild Boar Hunting Dogs

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Abstract : To investigate patterns and severity of hunting-related emergency traumatic injuries in wild boar hunting dogs. One hundred wild boar hunting dogs with emergency traumatic injuries sustained during wild boar hunting as a result of wild boar attack and accidental shooting of ensnarement in a trap. The retrospective study involved 100 dogs brought to CAMC for treatment of emergency traumatic injury sustained during wild boar hunting in Jeon-buk province from August 2007 to April 2008. Medical information obtained from the medical records included signalment; cause of injury; number, location and severity of injuries; and mortality. The 100 patients displayed 136 injuries (single injury in 71 dogs and multiple injuries in 29 dogs). Causes of the emergency traumatic injuries were wild boar attack (n = 92), accidental shooting (n = 7), and entrapment (n = 1). The thoracic area was the most common site of injury. The most common injury severity score (ISS) was code 2. The mortality rate was 9%, and all deaths involved thoracic injury. Emergency traumatic injuries sustained during wild boar hunting are most commonly thoracic injuries caused by prey attack. The nature of the injuries can differ from those typically encountered by small animal veterinarians.

Key words : Prevalence, emergency, traumatic injuries, wild boar, hunting dog.

Introduction

Twenty-seven sub-species of wild boar (*Sus scrofa*) are found in Asia, Europe and North Africa (4). Wild boars are one of largest mammalian animals native to Korea. They have few natural predators (1). Their reproduction is prolific; under ideal conditions, a sow can breed up to three times annually. Most litters average six piglets, but up to 10 are possible. Without population control, wild boars can quickly reproduce to the point of overpopulation. Maintaining wild boar numbers at a more manageable level is an important concern for state wildlife biologists in Korea; activities primarily focused in game parks include assessment of wildlife populations, tagging and monitoring of endangered species, feeding of wildlife, and study of the impact on at-risk human settlements (1). Wild boars are notorious for rooting, which involves turning up the top layer of soil to find roots and tubers. This activity often destroys desirable native vegetation. Hogs also consume large amounts of food that would otherwise be eaten by animals that are indigenous to the area (11).

In South Korea, the hunting of wild boars using dogs is permissible for 4 months during the year (November-February). Hunting by means of a shotgun is also permissible, and is a recreational activity for some people. In general, wild boar hunting is conducted using several strong and well-trained

dogs, to minimize the risk of injury to both the dogs and hunter (3).

Most knowledgeable hunter using hounds agree that a dog is born with natural ability and drive to hunt game. Nonetheless, a burgeoning hog dog still requires training to ensure a hunt is conducted safely and effectively (11).

Despite the typically careful training, injuries can occur during a hunt as emergency. Although small animals with emergency traumatic injury are typically treated by veterinarians in an emergency fashion, the training for many veterinarians concerning emergency traumatic injuries in dogs and cats is limited to accidental wounds such as bite wounds sustained in a fight with another dog or cat, and the aftermath of traffic accidents (2,5,7-8). There is little information concerning emergency traumatic injury that can be sustained during hunting. Intuitively, it seems that hunting-related injuries could differ in nature and severity from the more everyday injuries encountered by a small animal veterinarian. The present retrospective study was undertaken to clarify the emergency traumatic injuries sustained by dogs during big game hunting. Specifically, we examined the causes of injury; number, location and severity of the injuries; and mortality.

Materials and Methods

This report was a retrospective study conducted in Jeon-buk province from August 2007 to April 2008 of 113 dogs brought to the emergency service of Chonbuk Animal Medical Center

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(CAMC) with emergency traumatic injuries sustained during wild boar hunting. Thirteen dogs were euthanized at arrival by owner's request prior to examination. The study population was 100 dogs. Retrospective information from the medical records included signalment, cause of injury, site of injury, number of injured sites, severity of injury and mortality. The cause of injuries in wild boar hunting dogs was divided into three categories; wild boar attack, accidental shooting and miscellaneous causes (i.e., impact with sharp object, entrapment). To assess the site of injury, seven body areas were examined: head (Hd), neck (Nc), thorax (Tx), abdomen (Ab), pelvis (Pv), forelimb extremity (Fl) and hind limb extremity (HI). The pelvic region included the Pv as well as the sacral and perineal areas, and HI included the limbs and tail (7,10).

The severity of injury was assessed according to a modified human injury severity score (ISS) rating system. Degrees of severity, in order from code 1-6, included minor, moderate, severe, severe life-threatening, fatal after 24 h and fatal within 24 h (6). ISS code 0 ("no definable injury") was excluded because the absence of physically- or radiographically-definable injury was not germane to the study. ISS was ascertained immediately upon patient arrival at CAMC. Mortality was based only on animals that died in the hospital or were euthanized at the hospital. Animals dying before arrival at CAMC were not considered in the study (7). Statistical evaluation was performed using the Chi-square test. Significance was determined at $P < 0.05$ and statistical significance was considered if $P < 0.10$

Results

The median age and weight of the dogs was 3.02 years and 25.1 kg, respectively (all dogs exceeded 20 kg). The gender distribution of the 100 dogs was 88% male and 12% female. Ninety-three dogs were cross-breed and seven were pure-bred (German pointer, $n = 3$; Hound, $n = 3$; Jindo dog, $n = 1$). The overwhelming majority of dogs (92 of 100) were injured by wild boar attack, while seven dogs were injured by gunshot and one dog was accidentally caught in a trap.

The percentage of injured sites

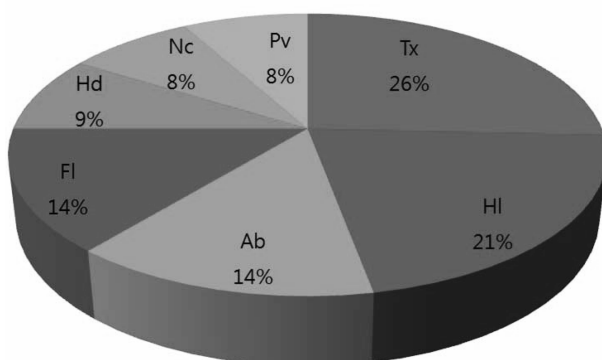


Fig 1. The rate of total injury site (%). Of the 136 injuries, there were Tx ($n = 35$), HI ($n = 29$), Ab ($n = 19$), Fl ($n = 19$), Hd ($n = 12$), Nc ($n = 11$) and Pv ($n = 11$) injuries.

The 100 dogs presented with a total of 136 injuries. 71 dogs were injured in one body area and 29 dogs had multiple injuries. Wild boar attack accounted for 123 of the 136 injuries. Of those dogs injured by wild boar attack, 65 (58.5%) had a single injury site and 27 (41.5%) had multiple injuries (58 injured sites). Of the seven dogs injured by gunshot, five were injured at one site and two had multiple sites of injury (seven injured sites). The entrapped dog was injured in one body area.

Of the 136 injuries, there were 35 Tx (25.7%), 29 HI (21.3%), 19 Ab (13.9%), 19 Fl (13.9%) 12 Hd (8.8%), 11 Nc (8.1%) and 11 Pv (8.1%) injuries (Fig 1). Of the 100 dogs admitted to CAMC alive, the location of the 123 injuries in the 92 victims of wild boar attack were Tx ($n = 32$, 26%), HI ($n = 26$, 21%), Ab ($n = 16$, 13%), Fl ($n = 16$, 13%), Hd ($n = 12$, 10%), Nc ($n = 11$, 9%) and Pv ($n = 10$, 8%) (Fig 2). In dogs injured by gunshot, the location of the 12 injuries was Tx ($n = 3$, 25%), Ab ($n = 3$, 25%), Fl ($n = 3$, 25%), HI ($n = 2$, 17%) and Pv (pelvis) ($n = 1$, 8%) (Fig 2). In order of involvement, the location of the 65 injuries which are the single injuries was: Tx ($n = 18$, 27.7%), HI ($n = 11$, 16.9%), Fl ($n = 10$, 15.4%), Ab ($n = 8$, 12.3%), Pv ($n = 7$, 10.8%), Nc ($n = 6$, 9.2%) and Hd ($n = 5$, 7.7%) (Fig 3).

The distribution of injury severity in the 100 dogs is presented (Table 1). The highest ISS score was moderate injuries (ISS code 2), which was evident in 38 of the dogs. Twenty-two dogs each displayed ISS code 3 (severe, not life threatening), ISS code 4 (severe, life threatening), ISS code 5 (fatal after 24 h). Injuries scored as minor (ISS code 1) and fatal within 24 h (ISS code 6) were present in nine and four dogs, respectively. In dogs injured by wild boar attack, the highest ISS was code 2 ($n = 34$, 37%), followed by code 3 ($n = 22$, 24%), code 4 ($n = 19$, 21%), code 5 ($n = 9$, 10%), code 1 ($n = 4$, 4%) and code 6 ($n = 4$, 4%) (Table 2). In dogs injured by gunshot, ISS codes were 2, 4 and 1 ($n = 3$, 3 and 1, respectively) (Table 3).

The rate of injured site according to caution of wound

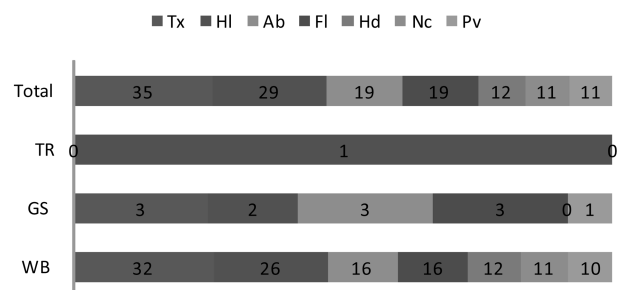


Fig 2. The rate of injured site according to caution of wound. Of the 100 dogs admitted to CAMC alive, the location of the 123 injuries in the 92 victims of wild boar attack were Tx ($n = 32$), HI ($n = 26$), Ab ($n = 16$), Fl ($n = 16$), Hd ($n = 12$), Nc ($n = 11$) and Pv ($n = 10$). In dogs injured by gunshot, the location of the 12 injuries was Tx ($n = 3$), Ab ($n = 3$), Fl ($n = 3$), HI ($n = 2$) and Pv ($n = 1$). The entrapped dog was injured in HI ($n = 1$).

The rate of the single injury

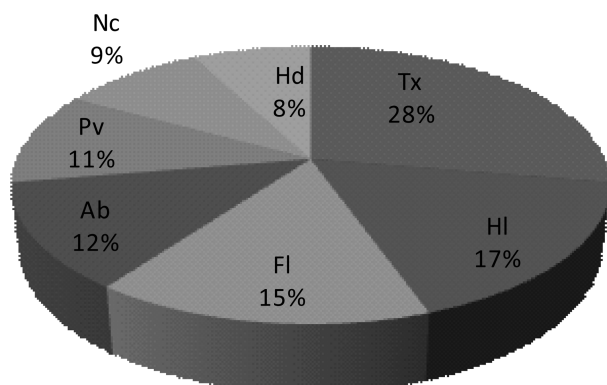


Fig 3. The rate of the single injury site (%). In order of involvement, the location of the 65 injuries which are the single injuries was: Tx (n = 18), HI (n = 11), FI (n = 10), Ab (n = 8), Pv (n = 7), Nc (n = 6) and Hd (n = 5).

The trap-related injury was ISS code 1 (Table 4).

There were 35 cases in which injury was life-threatening (ISS codes 4-6). Of these, 24 dogs (69%) had Tx injuries and nine dogs (26%) had Ab injuries. In the 92 dogs injured by a wild boar attack 32 (35%) presented with ISS 4-6. Of these 32 cases, Tx injury occurred in 22 dogs (69%) and Ab injury occurred in eight dogs (25%). In the seven dogs injured by gunshot, injuries scored as ISS 4-6 were present in three dogs (43%; Tx, n = 2 and Ab, n = 1). The general mortality rate for the 100 dogs was 9%. These dogs were not euthanized

and got severe life threatening status. Of the nine dogs that died, all had thoracic injury, compared with 28.5% (26 dogs) of the dogs that survived. Of the nine dogs that died, three had Ab injury, compared with 17.5% (16 dogs) of the dogs that survived. Three of the nine dogs that died had both Tx and Ab injury, compared to 0% of the dogs that survived. All the dogs that died had either Tx or Ab injuries. Multiple injuries were found in seven of the nine dogs (77.7%) that died. Seven of these deaths occurred soon after first-aid was begun, with the remaining two dogs dying after multiple organ dysfunctions developed (cardiac arrest during surgical thoracotomy, n = 1; failure to recover from surgery intestinal perforations, n = 1). Twenty-five thoracotomies were performed. Of these, death occurred in nine dogs (36%) with ICC 4-6 that underwent an exploratory thoracotomy. Two of the dogs had an Ab injury and six had both Tx and Ab injuries. On the other hand, 10 dogs with Tx injury of ICC 1-3 did not undergo exploratory thoracotomy, and all survived. Eight laparotomies were performed. Of eight dogs with Ab life-threatening injuries (ISS 4-6), three (37.5%) died. On the other hand, all 11 dogs that underwent Ab surgery for an injury considered as non-fatal (ISS 1-3) survived, and did not undergo an exploratory laparotomy. Out of the 15 animals that had an Ab injury without Tx injury, five dogs (33.3%) that died underwent exploratory laparotomy, as did three of the four dogs that had both Ab and Tx injuries. Death occurred in nine of 31 dogs (29%) with ISS 4-6 that underwent exploratory thoracotomy and/or exploratory laparotomy. Immediate death occurred in four of 35 (11.4%) of cases involving Tx injury. Finally, injury due solely to wild boar attack produced an ISS code 6 in four dogs.

Table 1. The distribution of injury severity in the 100 dogs. Degrees of severity, in order from code 1-6, included minor, moderate, severe, severe life-threatening, fatal after 24 h and fatal within 24 h

Code of ISS	I	II	III	IV	V	VI	Total
Distribution according ISS code grading system (n)	5	38	22	22	9	4	100
The rate according to ISS code (%)	5	38	22	22	9	4	100

Table 2. The distribution of injury severity in the wild boar hunting dogs

Code of ISS	I	II	III	IV	V	VI	Total
Distribution according ISS code grading system (n)	4	34	22	19	9	4	92
The rate according to ISS code (%)	4	37	24	21	10	4	100

Table 3. Traumatized patient by gunshot. In dogs injured by gunshot, ISS codes were 2, 4 and 1 (n = 3, 3 and 1)

Code of ISS	I	II	III	IV	V	VI	Total
Distribution according ISS code grading system (n)	1	3	0	3	0	0	7
The rate according to ISS code (%)	14	43	0	43	0	0	100

Table 4. Traumatized patient by trap. The trap-related injury was ISS code 1

Code of ISS	I	II	III	IV	V	VI	Total
Distribution according ISS code grading system (n)	0	1	0	0	0	0	1
The rate according to ISS code (%)	0	100	0	0	0	0	100

Discussion

The present study sought to clarify the emergency traumatic injuries sustained by dogs during big game hunting. Since small animal veterinarians are not often confronted with such cases. Specifically, we examined the causes of injury; number, location and severity of the injuries; and mortality. The wild boar hunting dogs tended to be young (median age of about 3 years); this is understandable, since the tendency by wild boar hunters in Korea is to use large dogs that have the vigor, bravery and quick reflexes of youth. Such dogs are able to hunt down and attack the large game, while avoiding the aggressive defensive responses of the prey.

Likely because of this choice of dog by hunters, the injured population consisted predominantly of males (male: female ratio of 7.3:1). It has been reported that aggression is lessened in hunting dogs following castration (5). When castration is done, the intent is to minimize the hormonal influences that fuel undesirable aggressive sexual interactions (i.e., fights over females) and inter-male aggression (10). Interestingly, even in human victims of dog bites men are bitten twice as much as women (12). However, the aggressive traits of non-castrated dogs are valued by hunters. Thus, not surprisingly, all the dogs in this study had not been castrated. The females had not been spayed, since maintaining fertility is desirable in the breeding of future hunting dogs and since a common view among hunters is that neutering renders a female dog less adept at hunting.

Four different breeds of dogs were among the injured dogs presently examined. The fact that cross-bred dogs overwhelmingly dominated is also not surprising, since cross-breeding is more apt to produce the larger and stronger dogs that are prized as hunting animals.

The present study clearly shows that emergency traumatic injury in boar hunting dogs is likely to arise from attack by the prey. Wild boars are well-equipped to inflict injury, courtesy of their tusks. Moreover, an aggressive response by wild boar is more likely as the dogs inflict injury. When injured, a hog may use its formidable tusks to attack a hunter, his dogs, or whatever else gets in the way (11). In general, wild boars have their own aggressive behaviors. The male lowers its head, charges, and then slashes upward with his tusks. The female, whose tusks are not visible, charges with her head up, mouth wide, and bites.

The occurrence of gunshot injuries, which were likely the result of a mistake on the part of the hunter or a miscommunication between hunter and dog, emphasizes the need for training, both in gun handling and in training of the hunting dog. Training should begin with basic obedience. Basic commands include "sit", "stay", and "come". A dog should be able to perform these commands without hesitation before further training is considered (11).

The occurrence of single injuries and multiple injuries may reflect the nature of the injury (i.e., biting tends to produce localized damage) and body characteristics of the dog. The latter is equivocal, as studies have produced different findings

regarding the occurrence of single and multiple wounds as related to body size and weight (10).

The present data concerning the patterns of injury that can occur during wild boar hunting, which demonstrated the involvement, to varying degrees, of the thorax, abdomen, and the fore- and hindlimb extremities as sites of a single or multiple wounds, is quite different from other reports of injuries resulting from biting wounds and traffic accidents (7,10). Wounds caused by fighting between two dogs tend to differ from the injuries noted presently, because the combative dogs tend to attack each other head-on (9). The combat that occurs in a hunt may be different, involving twisting and turning motions, and attack from behind, which will produce different injuries. Wild boar hunting dogs are prone to offensive and defensive movements of their prey during the course of the hunt. Dogs who are not fast enough to escape a boar can suffer injuries of the thorax, hindlimb extremities and abdomen. Veterinarians who are called upon to treat hunting dogs should be prepared for injuries that may be unlike those they typically encounter.

In addition to the location of injury in wild boar hunting dogs, the severity of injury can differ from those sustained in non-hunting dogs. For example, presently, the 34 dogs who sustained ISS code 2 injuries rather than ISS code 1 had deep lacerations or abrasions, consistent with the charging and upward slashing combat behavior of wild boars, particularly males. Blunt trauma with or without penetrating trauma can be caused by wild boar attacks including stabbing, crushing and lacerating. Therefore, when it comes to injury by wild boar attack, hunters and emergency veterinarians should make preparations for first aid and emergency treatment based on ISS code 2 severity rather than ISS code 1. The presently observed general mortality rate (9%) is similar to that previously reported for dog bite wounds (2,10). Presently, death was related with thoracic trauma, even when another injury was sustained, supporting the view that mortality from severe wounds is more likely when the injury involves the thorax. This agrees with bite-related mortality (2,10).

All patients had thoracic injuries in ISS code 4-6 were performed exploratory thoracotomies because of fatal condition. Only 9 out of 25 dogs (36%) that went through exploratory thoracotomy died. Mortality rate in this study was a much higher than that presented (10) had 11% death rate after exploratory thoracotomy although they couldn't assess proper comparison because of different causes, respectively (10). Nevertheless, 36% of the mortality rate was quite surprising. In addition, this result may be related with the most frequent injury region in this study such as Tx by wild boar attack behaviors (33 dogs) and gunshot mistake (2 dogs). Also, in terms of the number of injury, 6 out of 29 dogs (21%) that had multiple injuries died and had thoracic injuries.

Conclusion

The high mortality rate in dogs with severe (ISS codes 4-6)

thoracic injury undergoing exploratory thoracotomy supports the relationship of thoracic injury to a worsened prognosis.

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100마리의 야생 멧돼지 사냥견에서 응급 외상성 질환의 분류

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요 약 : 전북지역에서 야생 멧돼지 사냥 시 발생한 응급 외상성 질환을 치료하기 위하여 내원한 사냥견 100마리를 외상의 정도에 따라 분류 하였다. 분류는 응급 외상성 질환의 경향과 정도를 부상의 원인, 부상 부위의 숫자와 위치, 부상의 중등도, 치사율과 같은 의료 기록들을 통하여 정보를 수집하였고 이를 토대로 후향성 조사를 실시 하였다. 사냥견 100마리의 환자에서 136개 (71마리의 단일 응급 외상성 질환과 29마리에서 복합 응급 외상성 질환)의 응급 외상성 질환이 발견되었다. 응급 외상성 질환의 원인으로는 야생 멧돼지 공격에 의한 응급 외상이 92마리, 오발로 인한 응급 외상이 7마리 그리고 뒷에 의한 응급 외상이 1마리로 조사 되었다. 흉부는 응급 외상 질환이 가장 잘 발생하는 부위이며, 부상심각점수(ISS)는 2단계로 판단되었다. 치사율은 9% 였으며 사망에 이르게 된 증례는 모두 흉강에 외상을 입고 있었다. 야생 멧돼지 사냥 시에 발생하는 응급 외상성 질환은 사냥물을 공격할 때 대부분 발생하는 것으로 특히 가장 흔한 부위는 흉부였으며 이것은 임상 수의사가 흔히 접하는 일반적인 응급 질환들과는 매우 다른 특징을 나타내고 있었다. 본 연구를 통하여 야생 멧돼지 사냥견에서 응급 외상성 질환의 치료 경과, 발생 형태, 예후, 치사율 등 임상 응급 진료에 필요한 정보들을 알 수 있었다.

주요어 : 야생 멧돼지, 사냥견, 응급, 외상성 질환