

Abdominal injuries caused by a horse kick - rescue procedure

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Abstract

Kicking by the horse can cause very serious injuries to the victim. The groups of people particularly vulnerable to such an injury are: veterinarians, farmers, sport riders and stables.

The aim of this article is to present the proceedings with the victim, who was kicked by a horse with special attention to abdominal injuries.

Injuries caused as a result of horse kick are paradoxically quite frequent. Early call for help, precise gathering of the interview according to the SAMPLE algorithm and patient's observation in the direction of shock symptoms may later help the ambulance crew and emergency medicine physician in treatment and in faster, targeted diagnostics in the emergency department.

Key words: horse, trauma, abdomen, first aid

Introduction

Kicking by the horse can cause very serious injuries to the victim. The groups of people particularly vulnerable to such an injury are: veterinarians, farmers, people who have direct contact with horses, for example sports and recreational riders as well as people involved in caring for the hygiene of horses and stables. Injuries resulting from contact with the horse are a frequent phenomenon, which in effects can lead to serious injuries, even to the victim's death. In a study conducted in Australia, it was shown that such accidents constitute 3.5% of deaths in people over 15 years of age in relation to contacts with animals [3]. In Germany, in 4 months period, in 9 trauma centers, there were 22 accidents related to horse contact with riders and most of them had head injuries [6]. Injury associated with contact with a horse in children assessed on the Modified Injury Severity Scale occupy the second place in terms of heaviness after injuries as a result of the pedestrian's car hit [5, 7]. Research conducted by Canadian physicians shows that work with horses and horse riding is more dangerous than riding a motorcycle, skiing, playing football or rugby [12]. Even the rider's position causes a high risk of injury. While riding on a horse, the rider's head is more than three meters above the ground, and the animal itself weighs about 500 kg or even more. The horse's kicking power is about 1 ton and the rear hooves reach a speed of over 70 km/h. An additional risk factor is that horses are less predictable than, for example, a motorcycle [12].

Purpose of work

The aim of this article is to present the proceedings with the victim, who was kicked by a horse with special attention to abdominal injuries.

Description of knowledge

The mechanism of injury in each case with the horse should be strictly recorded as it may be important for further diagnostic and therapeutic procedures. More dangerous are injuries, resulting from dropping a rider from the back, because it often happens not only to fall, but also to be trampled by an animal [14].

Injuries caused by contact with the horse affect 54% of chest injuries, in 48% of head and face injuries, in 22% of abdominal injuries, in 17% of upper and lower limb injuries, but relatively rarely, because in 4% there is a spinal injury [11].

Table 1. The most common injuries in individual age groups

| 0 - 18 years old | 19 - 49 years old | 50 years and more |
|---|--|---|
| 1. Fractures of the upper limbs (1.6%) | 1. Brain concussion (13.5%) | 1. Rib fractures (12.1%) |
| 2. Brain concussion (15.2%) | 2. Injuries of soft tissues of the lower limbs (9.9%) | 2. Spinal and spinal cord injuries (9.7%) |
| 3. Injuries of soft tissues of upper limbs (10.3%) | 3. Spinal and spinal cord injuries (9.4%) | 3. Brain concussion (8.9%) |
| 4. Injuries of the spine and spinal cord (8.3%) | 4. Injuries of soft tissues of upper limbs (10.3%) | 4. Fractures of the upper limbs (8.1%) |
| 5. Injuries of soft tissues of lower limbs (8.3%) | 5. Craniocerebral trauma and fractures of upper limbs | 5. Injuries of the pelvis and injuries of soft tissues of chest and abdomen |

| | | |
|--|--------|--------|
| | (7.0%) | (7.3%) |
|--|--------|--------|

(Source: own elaboration based on: Bilaniuk J.W, Adams J.M, et al.: *Equestrian Trauma: Injury Patterns Vary among Age Groups. Am Surg. 2014; 80 (4): 396-402.*)

Kicking by a horse can cause serious damage to internal organs located inside the abdominal cavity, which is divided into three floors: upper, lower and retroperitoneal space. The upper floor is under the diaphragm and is surrounded by the lower ribs in this space there are liver, gallbladder, spleen, stomach and transom. In the lower floor there are intestines and bladder, in women in the pelvic abdominal cavity there is a uterus, fallopian tubes and ovaries. In the last described floor, i.e. the retroperitoneal space, there are such organs as: kidneys, ureters, pancreas, posterior part of the duodenum, ascending colon and sternum, abdominal aorta and lower main vein [1, 2]. Damage to parenchymatous organs (liver, spleen, kidney) or cavernous organs (digestive tract, urinary bladder, gall bladder) results in a hemorrhage into the free peritoneal cavity or its infection. All victims who have suffered an abdominal injury must be transported to the hospital for diagnosis. The mortality caused by abdominal injuries in total is 10% [13].

First aid at the accident scene should always be carried out according to the rules determining the sequence of activities performed. People who try to do everything at the same time or only what they remember could skip actions that determine the life of the victim, and above all expose themselves to the loss of health or even life. Each event is different, arises in different circumstances, affects different people and causes various types of injuries. Regardless of the diversity of accidents, assistance is provided according to the following steps:

1. Assessment of the situation - what and how did it happen? We see, we hear, we ask witnesses of the event.
2. What are the threats, in the first place for the first aid provider, then for the injured and third witnesses of the event - it depends on whether we will provide help at the scene or we need to evacuate the victim to a safe place.
3. Securing the place of the accident depending on the circumstances.
4. If it is safe already do an assessment of basic vital activities of the injured - consciousness, patency of airways and respiration, and signs of circulation - normal color and temperature of the facial skin, or movements performed.
5. We notify the relevant emergency services of the accident.
6. We provide a detailed first aid depending on the victim's condition.

The first action which should be taken at the accident involving a horse scene is to secure the event. The purpose of this action is to avoid an unintentional increase in the number of injured people. The most important is to protect the horse so that it does not pose an additional threat. The approach to the injured person should take place in a special way. It is important to approach to the patient from the side of his legs so that the injured person would not move his head unnecessarily when he hears us and will want to turn his head to see us. After assessing the basic vital parameters, help from the emergency services should be called. The medical dispatcher should be provided with information such as: what and where it happened, basic data about the victim: age, gender, personal data, whether he is conscious or unconscious, whether he has preserved breath and circulatory symptoms. It is worth mentioning the characteristic points on the scene of the incident. The more detailed description we give, the easier it will be for emergency services to reach the place of the accident, which will significantly reduce the time of travel to the victim. By means of eyesight we assess the possible effects of injuries: hemorrhage, deformation and incorrect positioning

of the limbs, wounds and others. After correctly reported check-in we proceed to provide detailed first aid depending on the condition of the victim. We should start with the correct arrangement of the victim, put it on the back with the lower limbs bent in the hip and knee joints - this position eliminates the tension of the abdominal muscles and reduces the pain caused by the injury. If he is unconscious, head should be kept in position which will secure airway. What is more breathing and circulatory signs should be control every minute. Using the first aid kit and objects from the environment, we provide the injuries suffered during the animal kick and fall. During the rescue operations, we try to collect an interview from the victim or witnesses of the incident if the victim is unconscious. This is to gain as much valuable information as possible to help the emergency medical team and physicians at the later stage of the rescue procedure and in the diagnostic and therapeutic process. The easy-to-remember SAMPLE acronym will allow you to ask all important questions:

- S - Signs/Symptoms (which hurts, where does it hurt, how do you feel?)
- A - Allergies (is it allergic to: medicaments, food, anything else?)
- M - Medicaments (does it take any?)
- P - Past medical history (operations, hospital stays, etc.)
- L - Last oral intake (When was the last time he was drinking or eating something?)
- E - Events leading to injury or illness

Further treatment after the supply is the covering of the injured person (thermal foil, blanket, jacket) to ensure thermal comfort and to avoid over-cooling or overheating of the body depending on the prevailing weather conditions. Lying on the ground, the victim quickly loses heat. We try not to leave the victim after the accident itself. While waiting for the arrival of qualified services to the place of the event, we must be psychological support for him talking to him and constantly watching if his condition does not change. While performing all rescue operations, we try not to cause additional pain. The rescuer should also observe the injured person if they are not developing symptoms of shock, which is one of the most dangerous consequences of injuries. Shock is one of the life-threatening states associated with impaired blood flow. This leads to inadequate oxygen supply to tissues and nutrients, as well as impairs the proper removal of metabolic products. The reaction of the human body to protect itself is the so-called centralization of circulation. This phenomenon consists in limiting the blood supply to organs less vital for human life (skin, limb muscles, intestines) and provides it with the most important organs (brain, heart, lungs). Symptoms that may indicate that the victim develops a shock is:

- the skin will be pale, cool and wet,
- sweating,
- the patient will be weakened, have nausea and dizziness,
- quick breath and plates,
- feelings of anxiety, fear,
- drowsiness or apathy,

- loss of consciousness,
- cardiac arrest.

The victim in shock should be placed in a shock position. Victim's head must be placed lower than his torso, with the lower limbs raised above the level of the heart about 35 centimeters.

Rescue procedures will be different if the victim loses consciousness after being kicked by a horse. The rescuer kneels next to the victim, and then tries to take contact through the loud cry "Do you hear me" and at the same time patting him lightly on the shoulder. If the aggrieved does not respond to the touch and the voice should be called out loud for help or if there is someone else who can help, please call him to call the emergency services. After verifying the consciousness, follow the procedure "ABC" - A (airway) - clear the airways, B (breathing) - check the breath and C (circulation) - check the signs of circulation. If, after performing the "ABC" action by the person providing help and finding that the victim is unconscious, not breathing and has no signs of circulation (pale face skin, cold covered with cold sweat, total immobility), cardiopulmonary resuscitation should be started. In adults, it starts with 30 compressions in the middle of the chest and then performs 2 rescue breaths. We continue the resuscitation until:

- return of vital activities of the victim,
- the arrival of a medical rescue team at the scene of the accident and the taking over of the victim,
- loss of strength by the person performing CPR

Summary

Injuries caused as a result of horse kick are paradoxically quite frequent. What's more, they can cause serious internal injuries such as: abdominal organ injuries, head injuries, as well as damage to the heart and large blood vessels with traumatic aortic rupture [4, 8]. There are also published many papers on the diagnosis of cardiac tamponade or severe arrhythmia in such patients [9, 10]. Therefore, proper first aid delivery to an injured person at the accident scene should be a priority. Early call for help, precise gathering of the interview according to the SAMPLE algorithm and observation of the patient in the direction of shock symptoms may later help the ambulance crew and emergency medicine physician in treatment and in faster, targeted diagnostics in the emergency department.

List of references

- [1] - Campbell J. E. (red.): International Trauma Life Support. Ratownictwo przedszpitalne w urazach. Wydawnictwo Medycyna Praktyczna Kraków 2009.
- [2] - Brongel L, Lasek J, Słowiński K.: Podstawy współczesnej chirurgii urazowej. Wydawnictwo Medyczne. Kraków 2008.
- [3] - Cripps R.A.: Horse - Related injury in Australia National Injury Surveillance Unit. Australian Injury Prevention Bulletin. Issue 24, 2000.
- [4] - Gorman R, Nuttall S.M.: Traumatic right ventricular rupture following a horse kick. BMJ Case Rep. 2012; 21; 2012.
DOI: 10.1136/bcr-2012-006657, indexed in Pubmed: 23175003.
- [5] - Bury D, Langlois N, Byard R.W.: Animal-related fatalities-part I: characteristic autopsy findings and variable causes of death associated with blunt and sharp trauma. J Forensic Sci. 2012; 57 (2): 370-4.
DOI: 10.1111/j.1556-4029.2011.01921.x, indexed in Pubmed: 21981339.
- [6] - Eckert V, Lockemann U, Püschel K, et al.: Equestrian injuries caused by horse kicks: first results of a prospective multicenter study. Clin J Sport Med. 2011; 21 (4): 353-5.

- DOI: 10.1097/JSM.0b013e318221840f, indexed in Pubmed: 21694587.
- [7] - Jagodzinski T, DeMuri G.P.: Horse-related injuries in children: a review. *WMJ*. 2005; 104 (2): 50-4.
Indexed in Pubmed: 15856743.
- [8] - Sarin E.L, Moore J.B, Moore E.E, Sheppard F.R.: An unlucky horseshoe: blunt aortic rupture after horse kick. *J Trauma*. 2005; 59 (3): 616-8.
Indexed in Pubmed: 16361903.
- [9] - Skene C, Timmis A.D.: Non-haemorrhagic cardiac tamponade caused by a horse kick. *Heart*. 2003; 89 (3): 330.
Indexed in Pubmed: 12591847.
- [10] - Benitez R.M, Gold M.R.: Immediate and persistent complete heart block following a horse kick. *Pacing Clin Electrophysiol*. 1999; 22 (5): 816-8.
DOI:10.1111/j.1540-8159.1999.tb00549.x , indexed in Pubmed: 10353144.
- [11] - Ok E, Küçük C, Deneme M.A, et al.: Large animal-related abdominal injuries. *J Trauma*. 2004; 57 (4): 877-80.
DOI: 10.1097/01.TA.0000100370.59653.41 , indexed in Pubmed: 15514546.
- [12] - Ball C.G, Ball J.E, Kirkpatrick A.W, Mulloy R.H.: Equestrian injuries: incidence, injury patterns, and risk factors for 10 years of major traumatic injuries. *Am J Surg* 2007; 193 (5): 636-40.
DOI: 10.1016/j.amjsurg.2008.02.004 , indexed in Pubmed: 18417089.
- [13] - Yim V.W, Yeung J.H, Mak P.S, et al.: Five year analysis of Jockey Club horse-related injuries presenting to a trauma centre in Hong Kong. *Injury*. 2007; 38 (1): 98-103.
DOI: 10.1016/j.injury.2006.08.026, indexed in Pubmed: 17049524.
- [14] - Griffen M, Boulanger B. R, KearneyP, et al.: Injury During Contact With Horses: Recent Experience With 75 Patients at a Level I Trauma Center. *South Med J*. 2002; 95 (4): 441-5.
Indexed in Pubmed: 11958244.
- [15] - Bilaniuk J.W, Adams J.M, et al.: Equestrian Trauma: Injury Patterns Vary among Age Groups. *Am Surg*. 2014; 80 (4): 396-402.
Indexed in Pubmed: 24887673.