



Original Article

Repair of ear cartilage fracture in the horse using Kirschner wire

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ABSTRACT

One of the most common methods used in horses to restrain them is rolling up their ear's pinna, which is involved some fracture for the animal, albeit it is convenient. The important defect of this method is the probability of fracture in the ear cartilage. Traditionally used approaches for restraining horses also possessed disadvantages for the animal such as leaving scar tissues and leading to an unfavorable appearance of the horse ear. The present study aims at employing a novel approach to prevent fracture in the horse ear as well as solving other undesirable effects on the animal's appearance. For this purpose, 5 horses were selected to proceed this investigation, with a weight average of 450 ± 50 kg and an age average of 3-7 years old. After general anesthesia, the area of surgery was prepared and the ear cartilage was immobilized using a Kirschner wire. Afterward, the interrupted suture was utilized to stitch the ear and a radiograph was depicted from the area of Kirschner wire to reassure of proper immobilization of Kirschner wire. The area of surgery was controlled for 21 days in the terms of having infection or inflammatory, and the granulation tissue of the ear. Based on the obtained clinical results in this study, it can be stated that the employment of Kirschner wire exhibited promising results in terms of healing speed, wound quality, final scar and faster return of livestock to daily activity.

ترمیم شکستگی غضروف گوش اسب با استفاده از کریشنر وایر

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چکیده

مقید کردن اسب از طریق بپیچاندن قاعده گوش یکی از روش هایی است که در اسب داری ها به فراوانی مورد استفاده قرار می گیرد. این روش علیرغم آسان بودن و عدم نیاز به وسایل خاص دارای معایب و خطراتی برای حیوان می باشد. یکی از این معایب شکستگی غضروف لاله گوش اسب می باشد. از آنجا که این عارضه تاثیر نامطلوبی بر ظاهر حیوان داشته و روش های معمول درمانی دارای معایبی مانند باقی ماندن بافت اسکار و ایجاد ظاهر ناخوشایند در گوش حیوان می گردد، برآن گردید در روشی نوین که در این پژوهش استفاده شد، علاوه بر رفع کامل شکستگی، در ظاهر گوش اسب تاثیر نامطلوبی نداشته باشد. بدین منظور از ۵ راس اسب با متوسط وزنی 400 ± 50 کیلوگرم و متوسط سنی ۳-۷ ساله استفاده شد. پس از بیهوشی عمومی، موضع عمل آماده سازی و غضروف گوش به وسیله کریشنر وایر تثبیت گردید. سپس به روش بخیه ساده تکی محل جراحی بخیه و اقدام به تهیه رادیوگراف از موضع جهت اطمینان از قرار گیری صحیح کریشنر وایر گردید. سپس لاله گوش حیوان پانسمان و آنتی بیوتیک های لازم تزریق شد. به مدت ۲۱ روز پانسمان تعویض و موضع جهت وجود چرک، التهاب و روند ترمیم و بهبودی زخم و نیز تشکیل بافت جوانه گوشتی بررسی شد. با توجه به یافته های بالینی و نتایج بدست آمده در این مطالعه، استفاده از کریشنر وایر در شکستگی غضروف لاله گوش اسب، نتایج مفیدی از نظر سرعت التیام، کیفیت زخم، اسکار نهایی و بازگشت سریع تر دام به فعالیت داشت. **واژه های کلیدی:** شکستگی، غضروف گوش، کریشنر وایر

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INTRODUCTION

One of the most common disorders in outer ear of the horses is related to their breakage area, which is usually done to restrain these sorts of animals. It should be mentioned that no especial surgical approach has been reported for this problem up to now. Considering the fact that the plenty of ear breakage among Perissodactyl is increasing annually, the importance of having a reliable and effective medical technique seems to be necessary. In order to restrain horses for different medical examinations, numerous methods have been proposed, which most of them are not applicable in farms, since especial instruments such as chain is required. Amongst introduced techniques, used for horses is to roll up their ear or its upper lip. In this method, upper lip is taken with a metallic or wooden tool and rolled up. The other technique to restrain the head of the horse is rolling its ear from the pinna [1]. This technique is involved with strong rolling of pinna and drawing it downward. Although this approach is simple, it may cause problems for the animals' ear. For example, the aforementioned technique may cause breakage in cartilage, which is painful and affects appearance of the animal. Different methods have been proposed in the literature to cure and relieve the breakage of cartilage including stitching. In this study, Kirschner wire is proposed as a new approach to relieve breakage of the ear after

inappropriate restraining of Perissodactyl.

MATERIALS AND METHODS

The present study was carried out using five healthy horses as samples. The study is a descriptive-analytical, and library research conducted in spring, 2019 at the veterinary clinic of Urmia Islamic Azad University. Initially, anti-parasitic drugs were used and clinical examinations were carried out to reach a certainty about the health of the samples. A natural situation is secured for them to avoid stress. Various races of the horses were employed in this study comprising of three stallions and two mares with weight average of 400 ± 50 kg and the average age of 3-7 years old. Once again, it is worth noting that all the horses were healthy in the terms of appearance and clinical symptoms.

The analysis of the obtained descriptive results and variables including average and absolute/relative plenty were calculated and reported. The permitted error for the rejection of a theory was considered to be 15%. In order to evaluate dependence of such variables as relief quality of the injuries and tissues strength, chi-square and Fishes Exact tests were employed.

RESULTS

Descriptive and inferential statistics are presented on several influencing parameters on

Table 1. Absolute and relative frequency of the samples

Gender	Absolute frequency (number)	Relative frequency (%)
Stallions	3	60
Mares	2	40
Total	5	100

Relative and absolute frequency of stallions and mares in this study related to their gender were determined as 0.06% and 0.04% respectively.

relieving fracture of ear cartilage using 0.0045 Kirschner wire (Tables 1- 4).

which horses are employed [2]. In Iran, the development of activities based on horse is

Table 2. Relative an absolute frequency of the age of the samples

Age (year)	Absolute frequency (number)	Relative frequency (%)
4 years old or lower	1	20
4-6 years old	2	40
6-7 years old	2	40
Total	5	100

Table 3. Three investigated parameters and their monitoring for alteration

The state of infection in operated injury	Scoring from 1 to 4; low, medium, high and severe +, ++, +++, +++++
The state of secretion of injury	Scoring from 1 to 4; low, medium, high and severe +, ++, +++, +++++
Dimensions of ears tissue	Scoring from 1 to 4; low, medium, high and severe +, ++, +++, +++++
The state of ears standing	Scoring from 1 to 4; low, medium, high and severe +, ++, +++, +++++
Pain in the operated area	Scoring from 1 to 4; low, medium, high and severe +, ++, +++, +++++

Table 4. The results of clinical symptoms and evaluation of breakage in cartilage

Entry	Characteristics of the operated horse	Infection and secretion			Outer relief of the ear	
		Tissue of ear	Secretion of injury	Infection	Pain	State and standing
1	Healthy 4.5 years old stallion with weight of 400kg	+	+	+	++	++++
2	Healthy 5.5 years old stallion with weight of 400kg	+	+	+	++	++++
3	Healthy 6.5 years old stallion with weight of 450kg	++	+	+	++	++++
4	Healthy 3.5 years old mare with weight of 350kg	+	+	+	+	++++
5	Healthy 5.5 years old mare with weight of 350kg	+	+	+	++	++++

DISCUSSION

Horse is one of the most important members of Perissodactyl playing remarkable role in human civilization. Horse is still employed in different parts of the world due to the impossibility of vehicle transportation. Nowadays, most countries have cultural, sport, hunting, military, and environmental events in

still increasing, although transportation methods have been developed significantly in last decade. Thus, rural economy of Iran is either directly or indirectly depends on this animal.

Different methods are used for physical restraining and examining of horses. For instance, taking rope twitch in ear cartilage is regarded as one of these techniques. In this

method, breakage of ear is highly probable. Given the problems related to the cartilage breakage, in some situations, it is vital to use an appropriate and new surgical approach. Using rope twitch in some cases may cause heart disorders [3]. Various injuries in terms of extent, depth, and anatomic location in the body of the animal can occur in treating and examining horses. One of the most important issues related to the injuries, is the formation of spare tissues in the scar of relieved injuries. This issues have been widely investigated worldwide. High mobility of the horses, lack of soft tissues, weakness in blood system, probability of happening sever impacts and contamination are identified as main parameters responsible for generation of these tissues.

In order to minimize the formation of these tissues and preservation of horse ear natural appearance, physical bondage methods were employed in the present study. Relief of injury is the process in which complex cellular performances are done facilitating adsorption, propagation, biosynthesis, and storage of cells in the injured area. The aforementioned process is initiated naturally in any injured area. Previous literature dominantly confirms the positive role of using this approach from two different point of views (speedy relief and quality). Based on the literature, it can be stated that this method has been considered as an ideal method for relieving breakage in the cartilage of horse ear [4]. One the important advantages of this method is its short time relief for the horse and its rapid recovery to resume the animals' daily activities.

In general, the obtained results in the present study relieving breakage of cartilage using Kirschner wire in a constant speed and duration- are in agreement with those of the

previous studies in the field [1]. In addition, the obtained results demonstrated that the relieving quality of cartilage depended on the method utilized for the sample. The quality of fresh tissue formation plays an important role in the appearance of horse. The new employed method provides less defects in the appearance of the horse, compared with other conventional methods, and this advantage may be due to the prevention of fibroblast formation in the investigated area. The formation of fresh tissue in the third sample with the weight more than 450 kg. and shorter than 140 cm. was hardly observed. Furthermore, the reduction in the formation of fresh tissue as well as infection was observed when Kirschner wire was utilized [5]. The substantial reason for effectiveness of Kirschner wire compared with conventional stitch method could be related to mobility of Kirschner wire along the injury. The mobility of Kirschner wire has the lowest damage to cartilage tissues and stimulation of fibroblasts. Conversely, stitching method can cause destruction in granular tissue as well as stimulation of fibroblasts and generation of more collagen. On the other hand, from physical point of view, Kirschner wire can be moved along the cartilage of the ear and this facilitates formation of fresh coating tissue [6, 7].

Conclusion

Based on the clinical findings and statistical results in this study, it can be claimed that useful results can be obtained by using Kirschner wire to relieve breakage of horse ear cartilage. The obtained results are the speed of relief, the quality of final scar, and economic considerations. Importantly, the recovery time of the samples was significantly decreased when this approach was employed.

ETHICS

All procedures of the current research have been performed based on the ethical standards.

CONFLICT OF INTEREST

None.

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