

SARCOIDS: CLINICAL EPIDEMIOLOGY, PRINCIPAL EFFECTS AND TREATMENT RESPONSES

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Abstract

During the period between October 2003 and August 2005, 172 cases of sarcoids were diagnosed at the Donkey Health and Welfare Clinic, Ethiopia and 149 of the cases were subjected to three types of treatment: surgical excision, debulking or ligation at base, based on size, location and clinical appearances of the tumours. A follow-up study was undertaken to determine the outcome of the treatments.

The sarcoid types were fibroblastic (89%), mixed (5%), nodular (2%), verrucous (2%) and occult (1%). Donkeys in the age range of 3–6 years were more affected (54%) while those beyond 10 years were less affected (7%). Sarcoids were also detected in two 8 month old foals. The anatomical sites affected were legs and shoulder (59.8%), head, neck and ears (33.1%), trunk and genital regions (7.1%). No seasonal or sex predilection was observed. Effects of sarcoids observed on the animals were weight loss, secondary bacterial and larval complications of the mass, bleeding, epiphora, fly worry, fate of donkey being isolated by owners from companions for fear of transmission. Apparent blindness, defecation, difficulties in locomotion, urination, grazing, and mastication were the main effects of sarcoids observed depending on the site of development of the mass. Most and quite often the severe sarcoids encountered were improperly treated by traditional healers and owners.

Surgical excisions with “non-touch” technique were applied for most confined and defined sarcoids (n = 67 donkeys). Debulking to the level of the skin or slightly below and cauterization of the remaining neoplastic tissue was applied for areas which did not allow wide margin of surgical excisions (n = 29 donkeys). Pedunculated sarcoids (n = 53 donkeys) with smaller sizes were ligated at the very base of the mass with non-absorbable suture or rubber ring. Periocular sarcoids and those with underlying sensitive tissues were not interfered with. These sites were the limitations of the procedures. A follow up period of 5–24 months was made and 89.5%, 75.9% and 81% success rates were obtained from the surgical excision, debulking and ligation techniques, respectively. Five types of sarcoids were diagnosed affecting the health and welfare of working donkeys in the study area. A long-term epidemiological study of the true representative population should be carried out. Awareness enhancement should be undertaken to make donkey owners realise the consequences of faulty interference in the treatment of sarcoids.

Introduction

Equine sarcoids are the most common skin tumour found in horses worldwide. It is a locally aggressive fibroblastic tumour occurring in six clinically recognizable

forms (Pascoe and Knottenbelt, 1999). Although there have been no reports of the isolation of the bovine papilloma virus (BPV) virions from the equine sarcoid, PCR-based detection methods offering greater sensitivity have demonstrated the presence of BPV DNA in sarcoids (Martens *et al.*, 2001a; Carr *et al.*, 2001 and Otten *et al.*, 1993). Epidemiological studies of equine sarcoids have indicated that the sarcoids occurred most frequently in younger male animals (Mohammed *et al.*, 1992; Reid *et al.*, 1994; Torrontegui and Reid, 1994 and Reid and Mohammed, 1997). Reid and Mohammed (1997) have attempted to address the possible association of sarcoid occurrence with castration. They concluded that castration was not statistically significant for disease occurrence in a population of donkeys when controlling for age. The prognosis for all sarcoid treatment is very guarded and owners must be made aware of the possible serious complications which can arise from the disease (Pascoe and Knottenbelt, 1999). Martens *et al.* (2001b) have applied three types of treatments (surgical excision, debulking and ligation) based on the characteristics of the tumours and obtained a relatively successful outcome.

In Ethiopia, although few local reports indicated that the sarcoid is one of the health problems of donkeys, there has been no formal study done on equine sarcoids, making information available on the disease limited. Therefore the objectives of this work was: to assess the clinical epidemiology of sarcoids, its principal health effects and efficacy of the available sarcoid treatment options in donkeys presented to the Donkey Health and Welfare Project (DHWP) stationary clinic in Ethiopia.

Materials and methods

Study area

The study was conducted during the years October 2003 to August 2005 in the DHWP clinic at the Faculty of Veterinary Medicine, Debre Zeit, Ethiopia (45 kms to the east of Addis Ababa). The area has elevation of 1780 m, latitude of 09° 01'.232" and longitude of 038° 48'.177". The mean minimum and maximum temperatures in the area ranged from 14 °C to 27 °C with an average annual rain fall of 1151.6 mm. The total human population in the district is 282,026 (98,921 urban and 183,105 rural). There are 48,366 donkeys, 2,025 mules and 2,115 horses in the district. The total area and total land cultivated in the district are 161,056.33 and 119,449.50 hectares, respectively. The total land covered by pasture is 6,462 hectares.

Study protocol

Between October 2003 to August 2005, 172 donkeys (87 males and 85 females) were presented for the treatment of sarcoids. The diagnosis was based on the clinical appearance of the tumours, according to Pascoe and Knottenbelt (1999). The age of the donkeys was determined by dentition (Crane, 1997) and grouped into three age groups; less than three, between 3 and 10 and greater than 10. The anatomical distribution of sarcoids were also grouped into three; (1) limbs and shoulder, (2) head, ears and neck and (3) trunk and genitalia. In all cases a detailed history of the progressive nature of the tumour and previous traditional treatment attempts were noted.

The following three treatment options were applied based on the size, location and clinical appearance of the sarcoids.

Surgical excision (67 donkeys)

This technique was applied for sarcoids which allowed a wide margin of excision. The donkeys under this treatment group were put under general anesthesia (Xylazine/Ketamine) before the operations. The tumours were excised with a scalpel blade. Pallid hair zones were included in the evaluation of the border. Rigorous measures were taken to avoid autoinoculation, so that contact with the tumour was avoided as much as possible (Martins *et al.*, 2001b). Flunixin meglumine at 1.1 mg/kg IV was administered for the first two days and systemic penicillin G, 20×10^3 iu/kg intramuscularly, for the first three to five days after surgery.

Debulking and cauterization of the remaining neoplastic tissue (29 donkeys)

Sarcoids with no important underlying structures and which did not allow a wide margin of excision were debulked to the level of the skin or slightly below and the remaining neoplastic tissues were cauterized. The donkeys under this treatment group were put under general anesthesia (Xylazine/Ketamine) before the operations. Flunixin meglumine at 1.1 mg/kg IV was administered for the first two days and systemic penicillin G, 20×10^3 iu/kg intramuscularly, for the first three to five days after surgery.

Ligation (53 donkeys)

Small and pedunculated sarcoids were ligated by rubber ring or non-absorbable suture material. While the ligated mass dropped off the area was managed as an open wound.

No therapeutic interference (23 donkeys)

No therapeutic interferences were done for sarcoids that did not interfere with normal function of the animal ($n = 5$), with underlying sensitive tissues ($n = 7$) and periocular sarcoids ($n = 11$).

Data on the outcomes of the treatments were collected for an average of six months. The outcome was considered successful when the treated sarcoids had regressed completely when the donkeys were re-evaluated.

Results

Clinical epidemiology

There were 172 cases of sarcoids, 87 male and 85 female, presented to the stationary clinic of DHWP, Debre Zeit from October 2003 to August 2005. Five clinical types of sarcoids were diagnosed such as fibroblastic (88.9%), mixed (5.2%), nodular (2.4%), verrucous (2.3%) and occult (1.2%) sarcoid.

54% of sarcoids occurred in animals between 3–6 years of age and 93% in animals 10 years of age or less (Figure 1). It was also detected in two 8 month old foals. Limbs and shoulder were the most frequently affected body part of the donkeys (Figure 2). Two sarcoid cases were detected in sites with a history of previous hyena and donkey bites. History from the owners on the nature of the tumours suggested that the

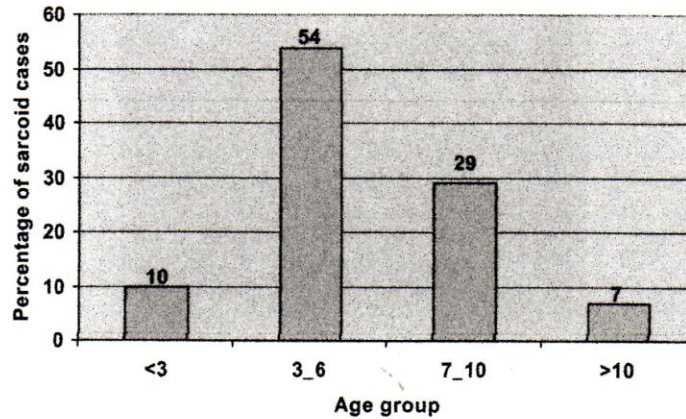


Figure 1: Age distribution of sarcoid in donkeys.

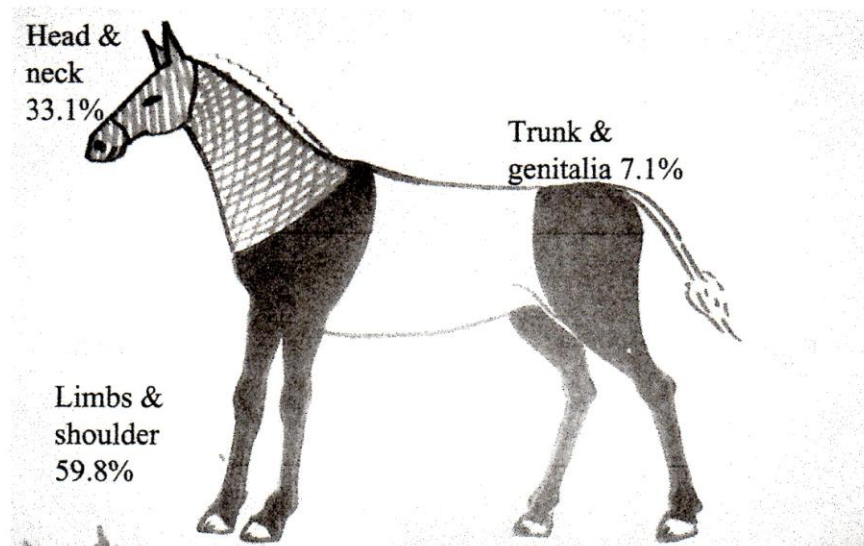


Figure 2: The anatomical distribution of sarcoid in donkeys.

transition of the occult, verrucous and nodular sarcoids into fibroblastic sarcoid type occurred. The rate of transition was faster for sarcoids grown on parts of the body exposed to harness and other work related injuries. The owners detected the sarcoids on their donkeys between 2 weeks and 2 years prior to presentation to the clinic. There were no seasonal and gender predilection for the occurrence of the sarcoids.

Principal effects of sarcoids

The principal effects of sarcoids observed on the animals were debilitation, secondary bacterial and larval complications of the mass (Figure 3), bleeding, epiphora and fly worry. Blindness, defaecation, difficulties in locomotion, urination, grazing, and mastication were the main effects of sarcoids observed, depending on the site of development of the mass (Figures 4, 5, 6 and 7). The owners isolated the affected donkey from its companions in fear of transmission of the disease and the bad smell developing after the tumours were complicated. Most often the severe and complicated



Figure 3: Complicated (abscessed) fibroblastic sarcoid.



Figure 4: Effect of fibroblastic sarcoid: apparent blindness.



Figure 5: Effect of mixed (verrucous and fibroblastic) sarcoid: impaired defaecation.

sarcoids encountered were those improperly treated by traditional healers and owners (Figure 8). The owners or traditional practitioners inhumanly restrained the donkeys and cut the tumour with the objective of only removing or reducing a visible mass without considering its consequences. In addition to the traditional excisions, some owners had practiced severing the dorsal aspect of the tongue with sharp objects for the treatment of a sarcoid grown on any part of the donkey. This practice resulted in difficulties in eating and local infections of the tongue.

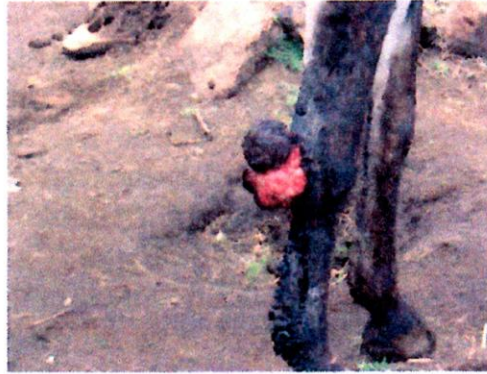


Figure 6: Effect of fibroblastic sarcoid: impaired locomotion.



Figure 7: Fibroblastic sarcoid: impaired urination.



Figure 8: Large sessile fibroblastic sarcoid: after owner intervention.

Treatment responses

90%, 76% and 81% success rates were obtained from surgical excision, debulking and ligation techniques, respectively. An overall success rate of 84% was obtained for the three treatment groups.

Discussion

Five types of sarcoids, fibroblastic (89%), mixed (5%), nodular (2%), occult (1%) and verrucous (1%) types were diagnosed based on gross appearance. Epidemiological observations on sarcoids in a population of donkeys in the Donkey Sanctuary, UK had indicated that the disease most frequently occurred in younger, male donkeys in their first five years of age (Mohammed *et al.*, 1992, Reid *et al.*, 1994, Torrontegui and Reid, 1994, Reid and Mohammed, 1997). The present results further confirmed the higher risk of the disease in young donkeys but contrary to the sex predilection. Reid *et al.* (1994) and Reid and Mohammed (1997) have indicated castration as the possible risk factor for the increased incidence of sarcoids in male donkeys. In the present study there was no association between castration and sarcoid occurrence. These different findings might be attributed to the differences in the predisposing factors

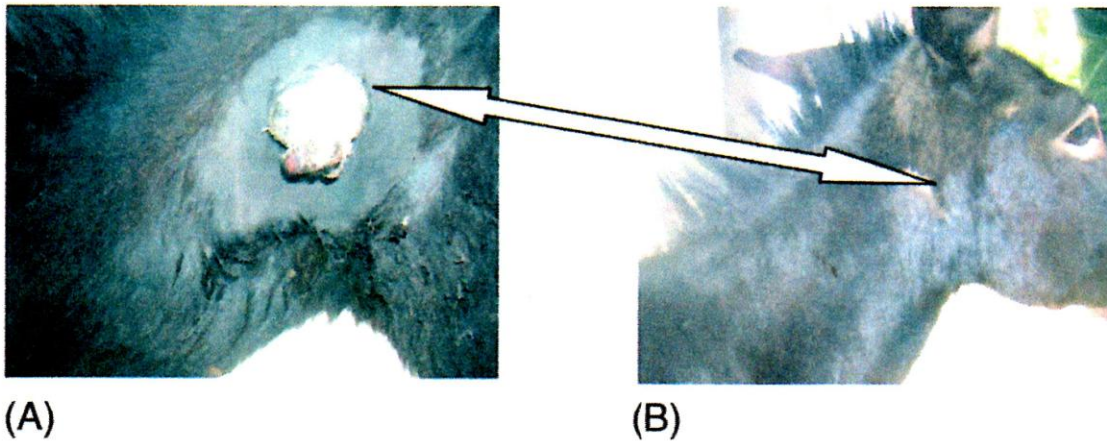


Figure 9: (A) Fibroblastic sarcoid before surgical excision. (B) The excised sarcoid after four months of surgical excision: regressed completely.

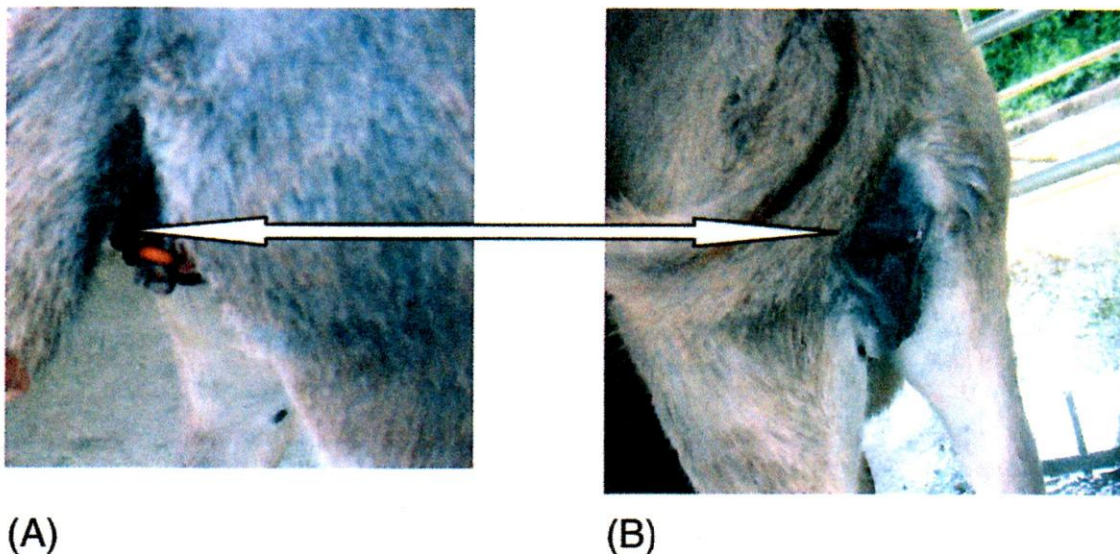


Figure 10: (A) Ligated sarcoid: after a week of treatment. (B) After two months of treatment: regressed completely.

of sarcoids, where in Ethiopia most wounds are work related rather than surgical wounds. The sarcoids were most often on the limbs and shoulder (60%), followed by head and the neck (33%) and trunk including the male and female genitalia (7%). These differences in anatomical distribution of the lesion might be related to the differences in exposure frequency of different anatomical parts to different traumatic agents in the working environment of the donkeys.

The owners or traditional healers who treat sarcoids use sharp sickles designed for mowing grass to cut the mass with improper manual restraining which favours autoinoculation of the disease. In addition they do not take into account the margin and depth of the mass which also facilitates the recurrence of the mass in a more aggressive form. Pascoe and Knottenbelt (1999) have recommended that incomplete excision can precipitate rapid fibroblastic proliferation which can be difficult if not impossible to treat successfully. Sarcoids are also an economic problem for the owners who are dependent on their single donkey for their various daily income activities as the mass can cause loss of use of the donkeys.

Regland *et al.* (1970) and Brostrom (1995) have reported recurrence rates after surgical excision as 50% and 35%, respectively. This is contrary to the 89% success rate in the present study. The high success rate in this study was probably because of the careful selection of donkeys for the treatment and vigorous measures taken to avoid autoinoculation and include a wide margin of normal skin. In addition, the operations were done under general anaesthesia. A wide margin of excision is probably the major key in the success rate found. PCR test of apparently healthy skin surrounding the sarcoids detected BPV-DNA in all the sarcoids and normal skin. The detection of this BPV-DNA was inversely proportional to the distance of margin of excision i.e. as the margin of resection increased the frequency of detection of BPV in the normal skin decreased (Martens *et al.*, 2001a). Brostrom (1995) has concluded that treatment performed under general anaesthesia in recumbency permitted wide excision and significantly reduced recurrence rate from 80% to 24%.

The surgical debulking resulted in a success rate of 76% (n = 23). This result was comparable with Martens *et al.* (2001b) of cryosurgery where large sarcoid masses of 15 horses were debulked to the level of the surrounding skin or slightly below before the remaining tissue was frozen. A success rate of 81% (n = 59) was recorded after surgical ligation of small pedunculated sarcoids. Although the rubber ring or the non-absorbable suture was tied between the visible border of the sarcoid and the normal skin, it cannot always be concluded that the pathological lesion is exactly demarcated because of the invasive nature of the tumour (Ragland *et al.*, 1970).

An overall 84% success rates was obtained. This high success rate might be attributed to selection of the treatment methods based on the size, location and clinical appearance of the tumours. Martins *et al.* (2001b) selected the type of treatments on the basis of the size, location and clinical appearance of the tumours and obtained an over all success rates of 74% in horses. The higher success rate in this study might also be associated with the relatively shorter follow-up period and the limitation of the treatment options to the periocular sarcoids and sarcoids with underlying sensitive tissue which might increase the probability of recurrence rates.

Conclusion and recommendations

Five types of sarcoids were diagnosed affecting the health and welfare of working donkeys in Ethiopia. Sarcoid were not a minor cosmetic disease of no material value rather it was a life threatening disease to working donkeys. The three types of treatments applied were 84% effective in improving the health and welfare and prolonging the working life of working donkeys owned by the resource poor farmers. Sarcoids with underlying sensitive tissues and periocular sarcoids were the limitations to the treatment options used.

An epidemiological study of a true representative population should be carried out to determine the factors associated with sarcoids. Treatment options for sarcoids with underlying sensitive tissues and periocular sarcoids should be considered. Awareness enhancement should be undertaken to make donkey owners realise the consequences of faulty interference of sarcoids.

Acknowledgement

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Table 18.5 Relative value of treatment methods in the author's experience for the various forms of equine sarcoid

Treatment	Type of sarcoid				
	Occult	Verrucose	Nodular	Fibroblastic	Mixed
Surgical					
Ligation	N/A	N/A	***	#	#
Excision	***	*	***	*	*
Cryosurgery	**	**	N/A	*	*
Hyperthermia	**	*	N/A	*	N/A
Electrocautery	**	**	***	*	*
CO ₂ -YAG laser	***	**	***	*	*
Photodynamic	**	**	NA	*	*
Topical					
(AW4-LUDES)	****	***	**	***	**
Podophyllin	*	#	N/A	#	#
5-Fluorouracil	***	***	*	*	NA
Tazarotene	***	**	N/A	NA	NA
Imiquimod	**	**	N/A	*	*
<i>Sanguinaria</i> /ZnCl ^a	**	**	N/A	*	*
Intralesional injection/cytotoxic/antimitotic					
5-Fluorouracil	NA	NA	**	**	*
Cisplatin	N/A	N/A	***	***	N/A
Immune methods					
Autogenous vaccines	#	#	#	#	#
BCG	N/A	N/A	**** ^b	*** #	#
Radiation					
Brachytherapy	N/A	N/A	*****	*****	***
Teletherapy	*****	*****	*****	*****	*****

*****, Expected results over 80–90% success; ****, expected 60–80% success; ***, 40–60% success; **, 20–40% success; *, <20% success.

N/A, not appropriate modality.

#, liable to be worse.

^a*Sanguinaria canadensis* and zinc chloride marketed as XXTERRA and SARC-OFF.

^bBCG therapy has a good reputation in the treatment of nodular lesions around the eye but a poor one elsewhere. The results are particularly poor on limb or body lesions.