

# Surgical removal and autologous skin grafting as a successful treatment of primary cutaneous hemangiosarcoma in a horse.

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## Abstract

This report describes the successful treatment of a cutaneous hemangiosarcoma of a 12 years old horse presented for evaluation of a cutaneous mass on the left gluteal region. Hemangiosarcoma is a rare life-threatening neoplasia that can be successfully managed when diagnosed and treated at early stages. Unfortunately, they are often diagnosed at later stages, leading to a poor outcome and low survival rates. In this report, the horse has been treated with a complete large surgical excision of the neoplastic tissue. A good cosmetic outcome as well as a short recovery time has been achieved with an autologous skin grafting split thickness modified meek technique. A long-term follow-up of the patient showed no reoccurrence of the hemangiosarcoma, and successful return to athletic performance. In the authors knowledge, this is the first equine primary cutaneous hemangiosarcoma treated with complete excision and subsequently autologous skin grafting with a long-term follow-up and good outcome despite the poor prognosis.

## Case report

### Title:

Surgical removal and autologous skin grafting as a successful treatment of primary cutaneous hemangiosarcoma in a horse.

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### Abstract:

This report describes the successful treatment of a cutaneous hemangiosarcoma of a 12 years old horse presented for evaluation of a cutaneous mass on the left gluteal region.

Hemangiosarcoma is a rare life-threatening neoplasia that can be successfully managed when diagnosed and treated at early stages. Unfortunately, they are often diagnosed at later stages, leading to a poor outcome and low survival rates. In this report, the horse has been treated with a complete large surgical excision of the neoplastic tissue. A good cosmetic outcome as well as a short recovery time has been achieved

with an autologous skin grafting split thickness modified meek technique. A long-term follow-up of the patient showed no reoccurrence of the hemangiosarcoma, and successful return to athletic performance. In the authors knowledge, this is the first equine primary cutaneous hemangiosarcoma treated with complete excision and subsequently autologous skin grafting with a long-term follow-up and good outcome despite the poor prognosis.

## Key words:

Neoplasia, modified Meek technique, split thickness skin graft, equine.

## Introduction:

Hemangiosarcoma is a malignant neoplasm originated from the vascular endothelium. It has been rarely described in horses, and often the diagnosis occurs at later stages of the disease when no treatment options are available anymore (Beaumier et al., 2020; Ferrucci et al., 2012). Hemangiosarcoma affects middle aged horses (Johns et al., 2005) with no breed or sex predilection (Beaumier et al., 2020). Horses can present systemic clinical symptoms, such as hyperthermia, anorexia and weight loss (Ferrucci et al., 2012). The clinical presentation of hemangiosarcomas in the musculoskeletal system includes: growing cutaneous masses, swollen legs and bleeding wounds as well as hairless masses and eroded skin (Southwood et al., 2000; Taintor et al., 2014). The highly aggressive biologic behaviour and high metastatic potential of this neoplasm leads to a multicentric hemangiosarcoma spreading to the respiratory system and other internal organs, associated with a rapid deterioration of the clinical symptoms, including respiratory complaints, anaemia, haemorrhage and the median survival time after the onset of clinical signs to euthanasia is 17 days (Reed et al., 2017; Beaumier et al., 2020; Taintor et al., 2014), therefore a final diagnosis of hemangiosarcoma is most often obtained post-mortem. The prognosis is generally considered poor, and surgical resection is often not attempted due to the rapid growth, high metastatic potential and risk of recurrence of the tumour.

Herein, the goal of this case report is to describe a case of successful surgical treatment of a cutaneous hemangiosarcoma using split thickness skin micrografting in conjunction with complete surgical excision.

## Case history:

A 12-year-old Nederland Warmblood gelding was presented at De Bosdreef equine hospital for fluctuating fever and deformation of the left gluteus region for a duration of 2-3 weeks. The mass had previously been injected with corticosteroids by the referring veterinarian without improvement.

The horse presented very mild hyperthermia (38,4°C), haematology results showed a decreased white blood cell count (3 600 c/μL) with a normal neutrophilic count (2300 c/μL), serum amyloid A was elevated (569μg/mL), serum proteins and electrolytes were within normal limits.

## Clinical findings and diagnosis:

The mass located on the left gluteus region was 6 cm long, 4 cm wide and 2 cm thick, slightly elevated of 3 mm from the skin level and with a solid consistency (Figure 1a). The mass was not painful at palpation and no other discomfort or lameness was noted. On ultrasonography, the deformation was heterogeneously hypoechoic with multifocal fluid accumulations (hematoma-like appearance) and thickening of the overlying subcutaneous tissues was observed. A biopsy was obtained and histopathology revealed a moderately defined infiltrative tumour consisting of highly variable vascular structures filled with blood and delineated by a multi-layered highly pleiomorphic endothelium, with oval nucleus, finely dotted chromatin, small nucleoli and moderate amount of basophilic cytoplasm. The vascular structures were surrounded by a small amount of collagenous stroma with multifocal pronounced infiltrate of hemosiderophages. Immunohistochemistry results

showed that tumoral cells were positive for Von Willebrand factor, a biomarker used to confirm hemangiosarcoma in soft tissues (vWF >50%), leading to the cutaneous hemangiosarcoma diagnosis with a high degree of malignancy (Figure 2).

Cancer staging was performed and no significant abnormalities were seen on the thoracic or abdominal region by ultrasound. The horse tested positive for EHV-2 during hospitalization. Given the localized neoplastic lesion, the good clinical presentation and the lack of metastasis at the time of presentation, it was decided to perform a complete surgical excision of the mass and subsequent skin grafting.

## Treatment and outcome:

The hemangiosarcoma was surgically excised under general anaesthesia. A circular incision of 25 cm in diameter and 6 cm depth was made, and the *gluteus medius* muscle and fascia were partially removed. The wound was left open and covered by a wet stent bandage for recovery.

The tumour extended very densely into the deep surgical margins centred on the lesion. The skin edges were free of neoplasia (>4 cm). The horse received phenylbutazone (2,2mg/kg IV q24h) for 5 days.

Daily wound care was provided post operatively. After 4 weeks, the granulation tissue covered the entire wound, but due to large extent of the wound created (25cm) a skin grafting was performed.

Multiple punch biopsies of the granulation tissue were taken to ensure that the wound bed was free of neoplastic cells, and to subsequently perform the grafting on healthy tissue. Five biopsy sample were additionally sent for histopathology, and showed only granulation tissue with minor to marked superficial pus-like inflammation, without evidence of neoplasia.

The granulated wound was treated and prepared for grafting with local antimicrobials, silver sulphadiazine ointment and fusidinic acid cream alternately for 8 days. Forty-eight hours before grafting, triamcinolone acetonide cream was used to prevent any further inflammation of the wound bed after grafting.

Skin grafting was preformed using a modified micro grafting Meek technique with split thickness skin (1mm) harvested from the ventral abdomen with a power-driven dermatome, under general anaesthesia. The wound was trimmed during the procedure and grafted over its entire length. A pressure stent bandage was placed for 7 days after surgery to ensure full coverage and pressured contact between the graft and the granulation tissue. Wound care was given every 5 to 7 days including bandage change and wound cleaning with sterile swabs and sterile saline (0,9% NaCl). The wound epithelized and was completely healed 4 weeks after grafting (Figure 1F). The overall acceptance of the micro grafts was about 90%, and no signs of infection were noticed at any stage. The horse was hospitalized for 49 days in total.

Fourteen months after discharge from the hospital, the horse is performing at his previous level of competition, and is clinically healthy. From a cosmetic point of view, the surgical wound is almost completely covered with brown and white hair, the donor site healed without any complications.

## Discussion:

Hemangiosarcoma in horses has been reported to be uncommon and challenging to diagnose and treat (Beau-mier et al., 2020; Taintor et al., 2014; Fontenot et al., 2018). In horses, the prevalence of hemangiosarcoma has been reported to be 0 to 0,7% (Ferrucci et al., 2012) and considering the multicentric form, the diagnosis often occurs at post mortem (Ferrucci et al., 2012; Fontenot et al., 2018).

In this current case, the location of the neoplastic mass allowed complete surgical excision before any confirmed metastatic spread, but cutaneous hemangiosarcomas are rarely encountered as a retrospective study on 35 cases of equine hemangiosarcoma showed a cutaneous prevalence of 24% (Southwood et al., 2000).

Surprisingly the precious time that has been lost in between diagnosis and treatment did not change the outcome of that case, this observation supports the belief that 2 different forms of hemangiosarcomas are

described: the slowly progressive or the aggressive form rapidly growing (Johns et al., 2005). In this case the horse was diagnosed with the slowly progressive form.

The genetic implication of hemangiosarcoma has been suspected in several cases (Fontenot et al., 2018), but the genetic predisposition or implication in that case could not be proven since no genetic test was performed.

Although the high malignancy and risk of metastasis of this type of neoplasia generally results in a poor prognosis with a very short survival time (Reed et al., 2017), this was not the case in this report. Metastasis usually occur in the lungs and kidneys regions leading to a higher risk of recurrence (Beaumier et al., 2020). In this particular case, no abnormality was detected by ultrasound.

The typical ultrasonographic appearance in cutaneous hemangiosarcomas is a hematoma like image (Taintor et al., 2014, Ferrucci et al., 2012), with alternating hyperechoic and hypoechoic images as it was observed in this case. The hyperthermia at the time of arrival could be explained by the positive EHV 2 test performed during hospitalization, even though it has also been described in horses diagnosed with hemangiosarcoma (Ferrucci et al., 2012).

A definitive diagnosis of hemangiosarcoma can only be made on histology either pre- or post- mortem, with biopsies or complete mass excision being the most reliable. In this case, the definitive diagnosis was confirmed twice, on the biopsy taken at presentation and on the complete mass excision at the time of surgery. Hemangiosarcomas can be classified histologically either as a well or poorly differentiated neoplastic mass with variable numbers of mitotic figures seen in the histological samples (Taintor et al., 2014). It also has been described to show expansive compressive infiltrative neoplasm, irregular lining, blood filled spaces and channels resembling vascular structures which were seen in this particular case.

One complication of surgical excision in neoplastic masses with wide margins is the lack of skin coverage after their resection. Among the different grafting techniques available for horses, the modified Meek technique is considered the most appropriate treatment if the material and technical skills are available. It is usually advised to prepare any wound wider than 4 x 4 cm for skin grafting in a timely manner. The required amount of time needed for a wound of this size to heal by second intention was estimated for at least 6 months, even with the appropriate wound care. Such an extended period of hospitalization results in high costs and a prolonged resting period, particularly inconvenient for competing sport horses. Furthermore, the cosmetic result was also an important factor for the owners, and the modified Meek split thickness micro grafting was the technique of choice for this case as it provided smaller and more flexible scars covered with the hair of the donor site colour (Wilmink et al., 2010). The optimal result observed in this study, were due to the high rate of epithelialization and the excellent wound contraction, that reduced the remaining scar tissue at the end of the healing process.

Most of the cases diagnosed are multicentric hemangiosarcomas. Even though this particular case has shown very good evolution and no recurrence of clinical symptoms after 12 months, it is more likely that this cutaneous hemangiosarcoma was the site of primary neoplasia (Ferrucci et al., 2012) and has been treated before dissemination.

## Conclusion:

Primary hemangiosarcoma in middle aged horses is a rare, highly malignant condition with a high risk of metastasis and poor prognosis. However, a favourable outcome after treatment by complete surgical excision in this case was possible due early detection and treatment before metastatic spread. The resulting large excision could be treated successfully post-surgery using skin grafting to achieve the most favourable cosmetic outcome, and to reduce the closure time significantly. Despite the poor prognosis given to horses diagnosed with hemangiosarcoma, this patient is free of symptoms, 14 months after being diagnosed.

## Figure legends:

Figure 1: A: The mass before excision, located in the centre of the clipped area, cranial is to the left. The second mass cranioventral to the clipped area (white arrow) was identified as a benign melanoma. B: Surgical site 5 days after excision. C: Surgical site 45 days after excision: the granulation tissue is prepared and ready for grafting. D: 8 days after grafting. E: 11 days after grafting. F: 27 days after grafting. G: 8 months after grafting; scale bar 10 cm.

Figure 2: A: Histologic appearance of the hemangiosarcoma stained with hematoxylin-eosin showing highly variable vascular structures filled with blood and delineated by a single- or multilayered strongly pleiomorphic endothelium, with oval nucleus (black arrows), B: Von Willebrand factor immunohistochemical stain exhibiting positive neoplastic cells (black arrows).

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