# Treatment of equine proud flesh

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## Introduction

In equine wound healing processes, proud flesh is considered a major issue by the owner and the veterinarians (Barrelet, 2010). In my view this is not necessary. Proud flesh is the result of exuberant granulation of wounds (Knottenbelt, 2003) and it is most commonly found in the legs of the horse. This is (mainly) because the skin on the lower extremities is less well fed by blood compared to body tissue.

Stashak learns that ponies heal faster and with fewer complications than horses do (Stashak, 2008). There might be a genetic predisposition in play with horses when proud flesh is formed (Wilmink, 1999; Wilmink, 2005). Stashak furthermore points out that these differences can, to a large extent, be explained by disparity in the local inflammatory response, which in turn relates to differences in functional capacity of the leukocytes. A robust inflammatory response hinges on the ability of leukocytes to clear foreign material and resist infection (Celeste, 2010); compared with ponies, horses mount a weak, persistent inflammatory response to dermal wounding, especially at the limb level.

A prolonged, ongoing low-grade inflammation in horse wounds is accompanied by up-regulation of various inflammatory and profibrotic mediators, which might ultimately promote the development of fibroproliferative disorders such as exuberant granulation tissue (Celeste, 2010).

In short: a long inflammation phase can lead to proud flesh.

## Reduction of inflammation

In our equine wound management practice we use honey based ointments to treat wounds. With these products (L-Mesitran, Triticum, NL) we have had little to no cases of proud flesh, which can be attributed to a shortening of the inflammation phase.

In a study with Yorkshire pigs histological examination revealed less inflammation in wounds treated with honey than in those treated with sugar and with silver sulfadiazine, and honey showed a more advanced stage of healing (Postmes, 1997). In a study with rabbits less oedema was observed with the honey treatment, and histological examination revealed that honey gave less inflammation (Oryan, 1998). In a study with 60 rats healing was seen histologically to be more active and advanced with honey, and honey was also clearly seen to give attenuation of inflammation and exudation, and less serious necrosis (Burlando, 1978). According to Molan (Molan, 2006) this indicates that the anti-inflammatory activity of honey is a direct action and not a secondary consequence of removal of infection through its antibacterial activity. This is confirmed also by honey giving a positive result in the standard guinea pig wrist stiffness test for anti-inflammatory activity (Church, 1954).

## How to diagnose proud flesh

It takes skill and experience to correctly diagnose the formation of proud flesh. Exuberant granulation tissue can be easily confused with tumors, in particular sarcoids (Stashak, 2008). The only definitive way of establishing the formation of proud flesh is to take a biopsy and histological examination for the correct diagnosis. In our practice we more often see new tissue development in a wound bed that might show some elevation over the wound edges, but rarely proud flesh.

*Proud flesh according to the attending veterinarian*

*Same wound 1 week later, continuing treatment Mesitran ointment*

In the contraction phase of wounds, wound edges can become bigger/higher and thus slightly elevated over the wound bed. This usually subsides over time and the wound will close nicely most of the times.

## Movement or rest?

Some argue that in addition to therapy, restriction of movement by confining the horse to a loosebox is useful (Knottenbelt, 2003). In our experience it is better to allow the horse some controlled movement, e.g. lunging or steps on a lead rope. Providing the horse movement and (controlled) exercise will stimulate the blood flow to the lower extremi-

ties and prevent oedema in the legs.

Bandaging plays a critical part in enhancing tissue growth and reducing granulation tissue overgrowth (Jolly, 2011)

When the wounds are properly bandaged to prevent maceration and new injuries, some movement is helpful and not damaging. Exercise during the healing and recovery period is a critical part of returning the horse to performance level. (Jolly,2011)

We also see that not all owners are capable of applying bandages and dressings properly. In those cases we see that when the owners as a minimum clean the wounds daily and treat them with the honey based ointment, proud flesh does not form. This therefore means that wounds are only dressed with the honey based ointment.

**How to treat proud flesh?**

When proud flesh is established, there are several remedies:
- surgical removal, followed mostly by ten days of stable rest and pressure dressings (Knottenbelt, 2003);
- skin grafting (Stashak, 2008);
- corticosteroid treatment (ointment), this sometimes will help (Stashak, 2008);
- application of silicone bandages, this can reduce proud flesh, although treatment is needed for a prolonged period of time (Theoret, 2006).

**Silver nitrate**

We mostly use a silver nitrate stick in our practice in addition to honey based therapy. With this stick one etches the proud flesh and it will reduce the proud flesh bit by bit. It works like other caustic substances (including copper sulphate, nitric acid, potassium permangate, lye etc.). These caustic substances induce necrosis not only of the granulation tissue, but also of the migrating and proliferating epithelium and thus also delay repair (Stashak, 2008). This method should therefore be applied cautiously and one needs to be patient. It will take some time, but it provides good aesthetic results and is very cost effective and can be done by the owners themselves.

Before one starts with a silver nitrate stick, the instructions for use should be read carefully. Make sure you protect the surrounding healthy tissue by applying some Vaseline on it, this is sufficient.

We saw one case in which proud flesh was formed after a malignant tumor was removed. The use of L-Mesitran was temporarily stopped and silver nitrate was used (G. Benedetti). For a period of 2-3 weeks a ± 4.5cmx10.5cm abdominal wound was treated primarily with the nitrate stick, and the proud flesh was removed (Brander, 2009).

In one other case a horse had an autoimmune disease which led to vasculitis. The horse showed a lot of proud flesh upon presentation to our practice. A treatment of L-Mesitran, to close the wound lasted 3 months. In that period the proud flesh was concentrated into one specific area, it looked as if all the proud flesh collected itself in a huge ball next to the hoof. This could then be easily removed surgically by the veterinarian. After removing, the wounds were almost closed.

*Proud flesh before treatment*

*Same wound after treatment with Silver nitrate*

**Summary**

Wound healing consists of several phases; one of the first is the inflammation phase. If this phase cannot run its natural cause and is delayed, new tissue growth can get out of control, resulting in exuberant granulation tissue, also known as proud flesh.

The easiest remedy for every wound is to keep this inflammation phase as short as possible. Honey is known to shorten the inflammatory phase, hence the good results in our clinical practice with the application of honey based ointments (L-Mesitran, Triticum, NL) to treat wounds and reduce the risk of the formation of proud flesh. However, when proud flesh already started to form, a careful silver nitrate application provides good results, providing the diagnosis of proud flesh has been done through histological examination.

**References**


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