

Leech therapy in the treatment of a penile haematoma in a stallion

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Abstract: Treatment of penile haematomas includes conventional therapy and/or surgical intervention which may not always result in the recovery of all penile functions. For valuable breeding stallions, a safe and effective treatment is necessary and medical leech therapy meets these criteria. Additionally, the proven efficiency and safety of the use of leeches in the resolution of haematomas makes this method applicable to other fields of veterinary medicine. A 14-year-old stallion was presented and assigned to the university hospital with a swollen and prolapsed penis. The owner reported that the stallion was likely kicked in the penis while mating. There were no deviations in the physiological indicators during the general examination. A drainage was inserted and a compression bandage was applied. After an initial slight subsidence of the oedema, the healing process slowed down. Hence, the experimental leech treatment was applied. The hirudotherapy was performed twice, five days apart. The hirudotherapy proved to be safe and effective, and with the addition of hydrotherapy, anti-inflammatory drugs and antibiotics, resulted in the full recovery of the horse within 45 days. The erectile functions of the penis were restored and the stallion successfully continued its breeding career.

Keywords: *Hirudo officinalis*; hirudin; prepuce; penis; reproductive disorder; paraphimosis

Generally, traumatic injuries to the equine penis are rare (Gaughan and van Harreveld 2007). In the majority of cases, they happen during natural mating. Mares, even though they are covered during oestrus, are not always fully receptive to the stallion, which may result in a direct kick to an erect penis (Memon et al. 1987; Schumacher and Vaughan 1988; van Harreveld et al. 1998; Steiner et al. 2008). Masturbation or mounting over hard surfaces are described as other factors which could cause a penile trauma (Edwards 2008). Clinical signs of penile trauma can include extensive swell-

ing, haematoma and paraphimosis (Gaughan and van Harreveld 2007; Ferris et al. 2008). Treatment is usually based on the systemic use of analgesics, anti-inflammatories and antibiotics as well as local hydrotherapy with cold water and compression bandages (Gaughan and van Harreveld 2007). The therapy must ensure the full recovery and function of the injured penis, especially in the case of valuable stallions. However, a very enlarged penis and its permanent prolapse is a potential complication despite treatment. Next to a conservative treatment, surgical interventions are treatment options;

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however, they do not always result in satisfactory progress.

In human medicine, leeches are considered a therapeutic option, particularly in cases of wounds with compromised blood circulation (Reddy 2014; Sig et al. 2017). The saliva of leeches contains, among others, hirudin, an anticoagulant which prevents blood clotting. It has been suggested that the use of leeches improves the local blood circulation and clears the blockage caused by blood excess, such as in the case of some wounds or haematomas. In addition, leeches inject anaesthetic and anti-inflammatory enzymes while feeding (Sig et al. 2017).

To the best of the authors' knowledge, this is the first case of the use of hirudotherapy in the treatment of a penile haematoma in a stallion.

Case description

A 14-year-old Hucul stallion was presented to the university clinic due to a penile trauma. The owner reported that the horses were left unattended for the weekend and was, therefore, not able to determine the date of the accident. The stallion, according to the owner, was probably kicked by a mare



Figure 1. Prolapsed penis with haematoma upon presentation

during a mounting attempt. Upon the initial examination, the horse was bright and alert with a temperature of 37.8 °C and heart (38/min) and respiratory (17/min) rates within the physiological ranges. The penis was prolapsed and enlarged and, due to its size, unable to retract (Figure 1). The penis was firm on palpation and no fluctuation was detected. Upon the ultrasound examination, there were visible hyperechogenic areas with fibrin (Figure 2). However, the stallion urinated physiologically without any signs of pain. There were no visible changes in the scrotum and no pain reaction during palpation of the testes. A routine complete blood count was performed and the result was within the physiological range. Based on the clinical signs and anamnesis, the case was diagnosed as penile haematoma.

TREATMENT

A conventional treatment was initiated. An attempt was made to drain the hypoechoic fluid using a 16-gauge needle; however, no fluid was drained. Similarly, the application of a compression bandage did not result in a decrease in the swelling and due to the lack of improvement, this procedure was performed once. Hydrotherapy with cold water was performed three times per day for 30 min each time. To prevent excessive scaling and dryness of the penis an emollient (Unguentum Olei Jecoris Aselli; Biowet Drwalew, Drwalew, Poland) was applied 5 times per day. Between treatments, the penis remained suspended with the use of cotton sling for protective purposes (Figure 3). The pharmacological treatment included antibiotics with pro-



Figure 2. Ultrasound of the oedema. The white ovals indicate hypoechogenic blood and the black ovals indicate hyperechogenic fibrin

caine benzylpenicillin (8 mg/kg i.m., every 24 h for 6 days) and dihydrostreptomycin sulfate (10 mg/kg i.m., every 24 h for 6 days, Pen-Strep; ScanVet, Gniezno, Poland), which were given to avoid a secondary infection, dexamethasone (0.06 mg/kg i.v., Rapidexon; Eurovet Animal Health BV, Bladel, The Netherlands; given only on the day of admission to hospital), flunixin meglumine (1.1 mg/kg i.v., ev-



Figure 3. Cotton material suspending the penis. In addition to its protective role, suspension of the swollen penis facilitates the blood circulation



Figure 4. Leeches attached to the haematoma. To ensure that the leeches did not come into any contact with any ointment, the dorsal part of the haematoma was carefully washed 12 h before each leech session

ery 24 h for 3 days, Vetaflunix; VET-AGRO, Lublin, Poland) and furosemide (0.5 mg/kg i.v., every 24 h, Furosemid 5%; Biowet, Drwalew, Poland). During the first two days of hospitalisation, the haematoma decreased in size; however, within the next three days, there was no further change and the swelling still impeded the retraction of the penis. To support the conventional treatment and hasten the recovery process, a leech therapy was applied on the seventh day of hospitalisation.

Medicinal leeches were applied twice, five days apart. The hirudotherapy was performed by qualified personnel from the BioMedic Olsztyn (Zjawieński) company which purchased the leeches from BIO-GEN Namysłów, a company which specialises in breeding standardised leeches. For each treatment, the stallion was sedated with detomidine hydrochloride (0.01–0.02 mg/kg i.v., Domosedan; Orion Corporation, Orionintie, Finland). The site of the haematoma was prepared aseptically before attachment of the leeches (Figure 4). Each time, six leeches were applied to the site of the haematoma, but not directly above the blood vessels. The leeches were left to feed until the moment of spontaneous detachment, usually after 15–20 minutes. The hydrotherapy was not performed 12 h before and 12 h after the leech session; apart from that,



Figure 5. Penis three days after the first leech treatment

the hydrotherapy was continued normally, twice a day. The pharmacological therapy was discontinued except for flunixin meglumine given once a day for the next five days.

Within two days after the first application of the leeches, a significant improvement in the penis size was observed (Figure 5). It was possible to retract the penis manually; however, the stallion was not able to retract it by himself. The penis was prolapsed during the stallion's movement. To keep the penis in the preputial cavity, a homemade device (Figure 6) was created and tied around the stallion (Figure 7). The bottom of the device had an opening to allow urination without its removal. It was removed during the hydrotherapy and only cleaned. This device was used for the next eight days until the stallion was discharged from the clinic. The owner was advised to continue the hydrotherapy and emollient application for the next 10 days. Because the penis was not able to fully retract, the owner was also trained to perform a massage 3 times per day.

A follow-up examination revealed the complete resolution of the haematoma and restoration of the penile function within 45 days of the initial trauma (Figure 8). Additionally, the owner reported that the stallion was able to successfully mate.



Figure 6. Device for suspending the penis. The flange was made from gauze around the sharp edge of a cut bottle; the gauze was fixed to the bottle



Figure 7. Homemade device constructed from a half-cut bottle and a flange, used to retract the penis into the foreskin



Figure 8. The penis after treatment. There were no visible scars; only the colour was changed. Prolapse after the detomidine injection

DISCUSSION AND CONCLUSIONS

This paper reports on the successful treatment of a penile haematoma in a stallion using hirudotherapy as an additional local therapy.

By definition, a haematoma is a localised swelling filled with blood that escaped due to a break in the wall of a blood vessel. The blood might be clotted or partially clotted when it remains within an organ or soft tissue, causing the recruitment of immune cells. The time needed for the resolution of a haematoma depends on its size and location, and its persistence may have a deleterious impact on the function of the injured organ (Wang and Dore 2007; Schnoor et al. 2015).

Both oedema and haemorrhage impede the venous and lymphatic drainage, which leads to further swelling. In cases of a penile haematoma, this swelling also prevents the retraction of the penis (Brinsko et al. 2010). The longer the penis remains prolapsed, the greater the risk of possible further injuries. In addition, a compromised blood circulation may lead to ischaemia and eventually to necrosis. A long-term penile prolapse, in combination with its increased weight (due to swelling), may cause the degeneration of the internal pudendal nerves and fatigue of the penis retractor muscle, which may lead to permanent penile paralysis (Hayden 2012; Schumacher 2012). Thus, in order to preserve the physiological functions of this organ, and the stallion's fertility, a local treatment should be introduced which is fast and effective. To improve this type of treatment, a leech therapy was applied in the described case.

Although the use of leeches in human medicine dates back to ancient times (Munshi et al. 2008), in veterinary medicine, their use is rare. Over 20 compounds with analgesic, anti-inflammatory, anticoagulant, antimicrobial and extracellular matrix degradative functions have been identified in leech saliva (Sig et al. 2017). The anticoagulant factors produced by leeches include hirudin and gelin, which inhibit the conversion of fibrinogen to fibrin, and destabilase, an enzyme able to degrade fibrin. Other enzymes, namely collagenase and hyaluronidase, are able to degrade the extracellular matrix. In addition, factors such as acetylcholine and histamine-like compounds dilate the blood vessels which further helps the resolution of the haematoma and co-existing swelling (Riede et al. 2010; Sig et al. 2017; Abdisa 2018).

In the presented case of a penile haematoma, a leech therapy was complementary to conventional treatment since the hydrotherapy and the use of anti-inflammatory drugs improved the condition of the stallion only within the first two days of treatment. In this case, the prolonged swelling and prolapse of the penis could have resulted in persistent paraphimosis and the inability to achieve an erection, which might have had a detrimental effect on the horse's fertility. After the application of leeches, there was a significant improvement in the healing process.

Another complementary therapeutic option is a surgical intervention. Drainage of the haematoma may be performed either on a standing or tranquillised horse or under general anaesthesia (Brinsko et al. 2007; Jitender and Sarvjot 2011). Such procedures are performed in human patients in the cases of haematomas caused by penile fractures (Ruckle et al. 1992). Nonetheless, some researchers claim there is an increased risk of infection associated with this procedure (Gaughan and van Harreveld 2007).

On the other hand, a case report describing the surgical drainage of a penile haematoma in a stallion under general anaesthesia reported a full and uneventful recovery of the patient (Jitender and Sarvjot 2011). The disadvantage of such a procedure is the risk and cost of anaesthesia.

Some authors suggest the use of a compression bandage over the penis and prepuce to reduce the oedema. A purse-string suture is then applied to retain the penis within the prepuce (Knottenbelt et al. 2003; Schumacher 2012). This method results in a potential resolution of the haematoma over an extended period, which could lead to fibrosis of the prepuce and impair the erectile function of the stallion in the future.

Because of their properties (anticoagulant and anti-inflammatory effect as well as stimulation in the blood circulation), medicinal leeches may be used as an additional treatment in cases such as wound care. Some authors suggest their possible use in laminitis, tendinitis, tenosynovitis, myositis or arteritis (Sobczak and Kantyka 2014; Abdisa 2018).

In conclusion, the effects of both a conventional and leech therapy suggest that leeches might be helpful for similar cases of penile haematomas. We suggest that when leeches are applied shortly after the injury, they may have a better anticoagu-

latory effect than if they are applied later, which may result in a shorter recovery time. In our case study, the use of leeches was proven to be a safe and cost-effective treatment (the total cost of the leech treatment was EUR 140).

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Conflict of interest

The authors declare no conflict of interest.

REFERENCES

- Abdisa T. Therapeutic importance of leech and impact of leech in domestic animals. *MOJ Drug Des Develop Ther.* 2018;2(6):235-42.
- Brinsko SP, Blanchard TL, Varner DD. How to treat paraphimosis. *Proceedings of the 53rd Annual Convention of the American Association of Equine Practitioners*, Orlando, Florida, USA; 2007 Dec 1-5. Lexington: American Association of Equine Practitioners (AAEP); 2007. p. 580-2.
- Brinsko SP, Blanchard TL, Varner DD, Schumacher J, Love C. Surgery of the stallion reproductive tract. In: Brinsko SP, Blanchard TL, Varner DD, Schumacher J, Love CC, Hinrichs K, Hartman DL, editors. *Manual of equine reproduction*. 3rd ed. St. Louis: Mosby; 2010. p. 263-8.
- Edwards JF. Pathologic conditions of the stallion reproductive tract. *Anim Reprod Sci.* 2008 Sep;107(3-4):197-207.
- Ferris R, Franklin R, Adams A, Miller C. Rupture of a penile artery and erectile body: An uncommon cause of dysuria in a horse. *Equine Vet Educ.* 2008 Nov;20(11):564-6.
- Gaughan EM, van Harreveld PD. Trauma to the penis. In: Samper JC, Pycock JF, McKinnon O, editors. *Current therapy in equine reproduction*. St. Louis, MO: Saunders Elsevier; 2007. p. 227-30.
- Hayden S. Treating equine paraphimosis. *Compend Contin Educ Vet.* 2012 Sep;34(9):1-5.
- Jitender M, Sarvjot S. Successful treatment of penile hematoma in a colt. *J Equine Vet Sci.* 2011 Nov;31(11):615-7.
- Knottenbelt DC, LeBlanc M, Lopate C, Pascoe RR. *Equine stud farm medicine and surgery*. Edinburgh, Scotland: Elsevier Science Ltd; 2003. p. 84-7.
- Memon MA, McClure JJ, Usenik EA. Preputial hematoma in a stallion. *J Am Vet Med Assoc.* 1987 Sep;191(5):563-4.
- Munshi Y, Ara I, Rafique H, Ahmad Z. Leeching in the history – A review. *Pak J Biol Sci.* 2008 Jul 1;11(13):1650-3.
- Reddy KR. Clinical study of leech application in various medico-surgical conditions. *Curr Med Prac.* 2014 May; 4(3):101-5.
- Riede F, Koenen W, Goerdts S, Ehmke H, Faulhaber J. Medicinal leeches for the treatment of venous congestion and hematoma after plastic reconstructive surgery. *J Dtsch Dermatol Ges.* 2010 Nov;8(11):881-8.
- Ruckle HC, Hadley HR, Lui PD. Fracture of penis: Diagnosis and management. *Urology.* 1992 Jul;40(1):33-5.
- Schnoor M, Alcaide P, Voisin MB, van Buul JD. Crossing the vascular wall: Common and unique mechanisms exploited by different leukocyte subsets during extravasation. *Mediat Inflamm.* 2015 Nov;2015(10):1-23.
- Schumacher J, Vaughan JT. Surgery of the penis and prepuce. *Vet Clin North Am Equine Pract.* 1988 Dec;4(3):473-91.
- Schumacher J. Penis and prepuce. In: Auer AJ, Stick JA, Clarence J, Marshall Memorial Library Fund, editors. *Equine surgery*. 4th ed. St. Louis, Mo.: Saunders Elsevier; 2012. p. 840-65.
- Sig AK, Guney M, Guclu AU, Ozmen E. Medicinal leech therapy – An overall perspective. *Integr Med Res.* 2017 Dec;6(4):337-43.
- Sobczak N, Kantyka M. Hirudotherapy in veterinary medicine. *Ann Parasitol.* 2014;60(2):89-92.
- Steiner JV, Hillman RB, Orsini JA, Divers TJ, Schlafer DH. Reproductive system. In: Orsini JA, Divers TJ, editors. *Equine emergencies: Treatment and procedures*. 3rd ed. St. Louis, MO: Saunders Elsevier; 2008. p. 413-4.
- van Harreveld PD, Gaughan EM, Lillich JD. Penile surgery in horses. *Compend Contin Educ Pract Vet.* 1998 Aug; 20(8):947-54.
- Wang J, Dore S. Inflammation after intracerebral hemorrhage. *J Cereb Blood Flow Metab.* 2007 May;27(5):894-908.

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