Maggot debridement therapy in an infected wounded dog: A case report

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ABSTRACT

Losing its importance over time with the discovery of antibiotics, maggot debridement therapy (MDT) to treat non-healing wounds tends to increase in recent years. However, its use in veterinary medicine is rather limited than human medicine. The material of this case report consisted of a 5-month-old Doberman dog bandaged for a fracture of the left hind toe. An anamnesis was taken that the bandage on the leg area was wet and remained on the wound for five days, and due to these, the foot turned into a macerated and gangrenous structure. Then, the gangrenous foot was amputated, and an infected wound that did not respond to antibiotic therapy occurred in the amputation area. The study was planned to investigate the efficacy of MDT on a post-operative infected wound. For this purpose, the sterile first and second instar larvae of *Lucilia sericata* were used. The first MDT administration was performed six days after the amputation. The second application was repeated after 24 hours, and the other two applications were repeated 48 hours intervals. After the first application, the amount of discharge gradually decreased in the wound, and rapid healing was determined. The wound was successfully treated by the wound healing-promoting characteristics of sterile *L. sericata* larvae. It is thought that this study will contribute to the spread of MDT applications, which are applied at a limited level for the treatment of non-healing chronic infected wounds in the field of veterinary medicine.

The calliphorid fly *Lucilia sericata* is one of the primary etiological agents of traumatic myiasis cases in animals and humans (4, 6). However, it is also known that the larvae of this fly make a significant contribution to wound healing by removing the necrotic tissues from the non-healing wounds. The use of *L. sericata* larvae for this purpose is known as biotherapy, biosurgery, maggot debridement therapy, or larval treatment (10, 12). Although widely used in human medicine in the treatment of chronic wounds, the use of MDT in veterinary medicine is limited. However, veterinary practices have reported that different types of wounds have been treated with MDT in animals in recent years (3, 8, 9, 13).

The literature review determined that MDT was applied in a post-operative infected wound covering the inguinal and abdominal regions of a cat in Türkiye (13). Apart from that study, no study regarding the application of MDT in animals has been found in Türkiye. This case report was prepared to give information regarding the efficacy of MDT in the treatment of a post-operative infected wound of a dog, which did not respond to the antibiotic regimen.

This case study aimed to evaluate the effectiveness of MDT in a post-operative infected wound of a dog. A 5-month-old Doberman breed dog constituted the material of this case study. The dog left hind leg was bandaged due to a finger fracture. An anamnesis was taken that the bandaged area got undesirably wet and remained this way for a long time. As a result, the wet leg turned into macerated tissue, and gas gangrene occurred (Figure 1). The left hind leg was amputated from the upper 1/3 of the femur due to gangrene. Due to the ongoing post-operative infection after the amputation, the wound did not respond to standard wound treatment and antibiotic regimens.

After the operation, wound treatment was performed for five days, but no successful results were obtained. Therefore, the case became a situation where euthanasia was considered.

In order to prevent euthanasia, MDT was considered as a treatment option. Six days after the amputation, sterile I. and II. instar larvae of *L. sericata* were obtained from the Maggot Production Laboratory of Selçuk University Faculty of Veterinary Medicine. After determining the size of the wound, 8-10 larvae were administered to 1 cm^2 of the wound (Figure 2). Systemic antibiotic ceftriaxone (Unacefin® 1 g IM Flankon, Yavuz İlaç San. Tic. A.Ş, Istanbul, Türkiye) and enrofloxacin (Baytril-K® 5 50 mL, injectable solution Bayer) applications were continued during MDT applications. After a bidirectional sticking plaster surrounded the wound edges, the wound was covered with sterile gauze to prevent the larvae from escaping the wound area. The gauze was left on the wound for 24 hours.

Figure 1. Status of the leg before amputation.

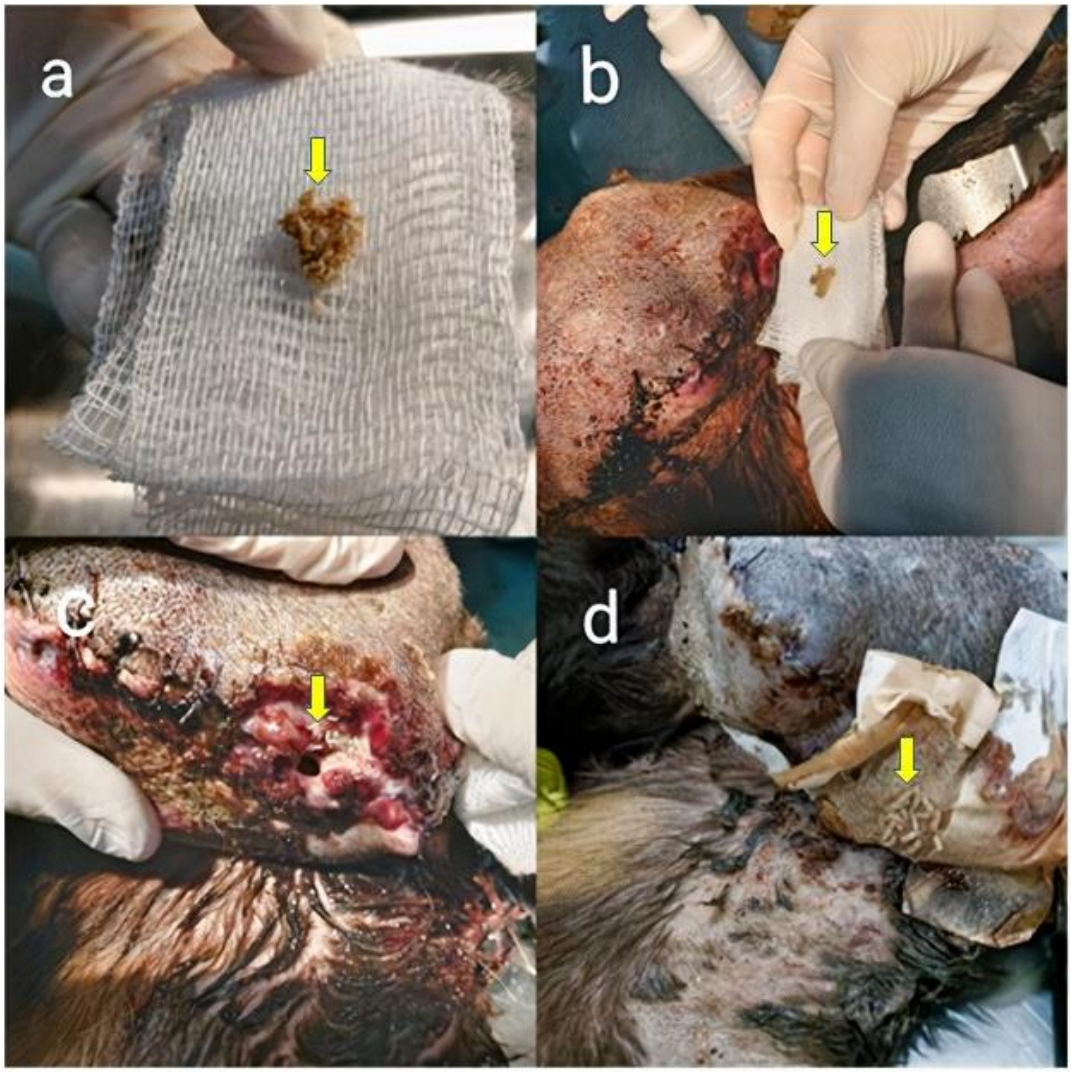

Figure 2. Application of sterile *Lucilia sericata* larvae to the infected wound (**a.** Sterile larvae, **b.** Application of the larvae to the wound site, **c.** The appearance of the larvae on the wound, **d.** Appearance of larva after 24 hours application).

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After 24 hours, the gauze opened, and the larvae that had passed into the III. larval stages were removed from the wound. The wound was carefully checked for larvae likely to remain in the wound. A decrease in the smell of the wound and discoloration in the discharge were detected. Before each larva application, the wound area was irrigated with isotonic solution (0.9% serum physiological). Two days later, the practice was repeated, and the maggots were left on the wound for 48 hours. Visible improvement was detected in the wound, which was rechecked. The application was repeated two more times at 2-days intervals, and the MDT was discontinued after a total of four applications (Figure 3). At the end of the applications, the larvae significantly promoted wound healing, and then treatment was continued with topical antibiotics.

Figure 3. Wound status before (**a**) and after (**b**) MDT application.

Maggot debridement therapy is the use of sterile *L. sericata* larvae in chronic, infected, and non-healing wounds. The larvae contribute to wound healing by four main mechanisms: debridement, disinfection, initiation of granulation, and improvement of blood flow in the wound area (5). The application of this treatment method, which is successfully applied in human medicine, is not at the desired level in veterinary medicine. In this study, an infected wound formed after amputation that did not respond to antibiotic treatment was successfully treated with maggot therapy in a 5-month-old Doberman.

The field of veterinary medicine has a limited number of studies on the use of MDT. Maggot treatment has been more widely used on horses than pet animals. It has been reported that MDT is successfully used to treat contaminated and septic navicular bursitis in horses than other methods, and most of the horses have reached their previous health thanks to MDT (2). In addition, MDT can be effectively used to treat many types of wounds, including foot/leg wounds and horses' wounds such as deep cuts, abscesses, and abdominal wounds (2). Lepage et al. (8) reported that 41 equines with wounds in different parts of their body were treated with MDT, and considerable results concerning wound healing were obtained in less than one week in 38 horses. Apart from these, various wounds such as panniculitis, soft tissue abscess, laceration of the limbs, dehiscence of the *linea alba*, fistulous withers, some musculoskeletal wounds, and laminitis in equines were treated by MDT (1, 8, 9, 11). Kocisova et al. (7) reported that MDT could be used to treat foot root and foot scald in sheep. Maggot debridement therapy is also reported as an effective treatment option for small animals (12). Gunshot wounds, pressure ulcers, necrotic tumors, and multiple bite wounds were successfully treated in dogs and cats (12). The literature search revealed the scarcity of MDT applications in the veterinary field in Türkiye. The first MDT application in Türkiye was performed by Uslu et al. (13) in 2021. A cat with a non-healing post-operative infected abdominal and inguinal wound was successfully treated in that study (13). Apart from that, no study has been encountered regarding the application of MDT, and the current study is the second study on the use of MDT in the veterinary field in Türkiye.

In this study, wound healing was promoted using sterile *L. sericata* larvae in a dog with an infected wound, which did not respond to antibiotic treatment. Sherman et al. (12) stated that MDT provides debridement of wounds of companion animals, which is expected to prevent euthanasia and amputation, and these animals regain their health. Thus, the treatment procedure for non-healing chronically infected or gangrenous wounds should be determined as soon as possible. In conclusion, MDT can be used before amputation and may prevent amputation in some animals, depending on the character of the wound. At this point, animal owners and veterinarians should be informed more regarding MDT. The current study and similar studies concerning the use of MDT have indicated that MDT will also be one of the alternative treatment options used for non-healing wounds in the future.

This case study showed that the dog with the non-healing infected wound could be successfully treated with MDT. It should be noted that MDT is an important

alternative treatment option used in veterinary medicine to treat such wounds. It should not be forgotten that MDT is an effective and safe method to promote wound healing. Although MDT is an effective and cost-efficient option used in the treatment of non-healing wounds, it has some undesirable conditions such as the difficulties in obtaining sterile larvae and the tickling sensation caused by the larvae at the application site. However, the development of resistance to antibiotics and expensive surgical applications indicate that the need for MDT will increase in the debridement of chronically infected non-healing wounds in the future.

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Conflict of Interest

The authors declare that there is no conflict of interest.

Author Contributions

UU and OC conceived and planned the study. AE and HKA carried out the experiments. UU and OC took the lead in writing the manuscript. All authors have read and agreed to the submitted version of the manuscript.

Data Availability Statement

The data supporting this study's findings are available from the corresponding author upon reasonable request.

Ethical Statement

This study does not present any ethical concerns.

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