

Arnica Montana and triple antibiotic ointment
for infection prophylaxis after dog bite exposure

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Introductory Abstract

Dog bites can be a cause of mortality, as are most animal bites, in fact, as we know, from the World Health Organization reports¹, up to five million people are bitten by venomous snakes every year, whereas dog bites account for tens of millions of serious complications annually, with the most likely victims being children, although other dogs, can also be affected, i.e. chihuahuas. Domesticated animals, particularly dogs, but also wild animals such as monkeys can be vectors of rabies, especially in areas where the virus has not been eradicated to date. Nevertheless, rabies isn't the only concern for dog bites, sometimes, just wound management can be difficult, whereby access to certain healthcare services isn't immediate, and certain gram positive bacteria can get worse and lead to septic shock. Likewise, tetanus is another important concern from dog bites, but this short perspective article is going to focus on wound management, after a dog bite, and how latency periods are also important.

Dog bite wounds

Dog bite wounds usually present as asymmetrical punctures whereby incision through the dermis is usually evidenced by bleeding, whether surface bleeding through indirect exposure, or more "prominent" bleeding whereby the exposure is not immediate. Bruises are often surrounding the areas, however, in dog bite incidents, due to the loss of the dog's cognitive control for whatever reasons, from rabid aggression, or as a consequence of animal abuse, i.e. due to another form of sickness (such as the presence of undetected tumors), the bite will be accompanied by bruises in other areas. These other bruises are impact bruises from the pressure of the dog's weight against the "receiving" party, scratches can also be present, again if the contact between the skin and the dog's attack was direct.

Saliva, which is the most important vector of bacteria and other infectious agents, can be present, minimal or elevated. Generally, where the skin is exposed to the saliva, directly, for instance, because clothing is not blocking the saliva, then the amount will be elevated, and

mostly likely access the bloodstream much more rapidly than if the amount was minimal, which may or may not access the skin. Tetanus exposure will likely be higher in indirect attacks, whereby clothing promotes an anaerobic environment than if the clothing was removed and allowed to breathe. Nonetheless, an anti-tetanic shot can be administered immediately after post-exposure, within the 72 hours of its incubation period to prevent any complications. If exposure to the toxin occurred, then some reaction and side effects to the booster vaccine may be noticeable, as they would be to any vaccine whereby exposure has occurred, ranging from fever, to neck rigidity, tiredness for more than just a few days, but for a week, pain at the injection site and eventually resolution. It is advisable to get a tetanus shot as soon as possible, and closer to the 24 hours from the incident.

Other characteristic features are pain at the site, which may or may not be accompanied by swelling, as well as a slight itchiness. This pain may appear after a few hours, and not right after the incident at the dog bite site.

Disinfection and Wound management

Disinfection should be carried out as soon as possible after the dog bite incident, and should involve the wiping of the area, with bethadine or concentrated ethanol 95%, however, some sources advise a shower, to prevent infection. In truth exposure to water isn't always advisable, particularly where the water jet "stream" may push the microbes deeper into the organism, and it is not urgent to wash the area as soon as possible, but disinfection should be performed as soon as possible. The wound is best not to get covered, particularly in the event that the bleeding stops, however, a film of triple antibiotic ointment can be applied on the area three to four times daily to protect the skin and access of "foreign microbial agents". Likewise, *arnica montana* gel can be applied above that area to create another layer and massaged into the skin. It must be made present that all bites are infectious, regardless of the animal size, because of

the morphology of the teeth, that are made to chew herbs, or meat, or other substances, and thus the crushing of the skin can never been superficial if a bite where jaw-locking occurred.

Triple antibiotic creams or ointments.

Triple antibiotic creams or ointments are over the counter medications that have also been introduced into several first-aid kits in recent years. In some areas, ointments have all been recalled, but creams are still in the market, whether over the counter or prescribed. Again, in some areas the generic is a prescription only medication (POM), whereas some low-concentration brands are over the counter.

These semi-solid preparations normally work through local absorption of the same in the wounded area, however, if the skin is too broken, and there are deep lacerations, clinical management will involve plastic reconstruction surgery to some extent, in most dog bite incidents, punctures are the most common result of the bites, and thus these ointments can be used. Nevertheless, semi-solid preparations also exist in the cosmetic world their employment can be imagined as that of protective foundations, for the skin. Most semi-solid or solid preparations, applicable on the skin are a barrier from exogenous attacks, depending, from the quality of the material involved too. As an example, solid formulations with a high content in metals, are harmful for the skin, and are often a trigger for contact-dermatitis or other more serious allergies, this is relevant in terms of toxicology when we consider the amounts of metals that the skin may get exposed to. Antibiotic semi-solid formulations don't normally contain any such ingredients, but mostly contain the active principle ingredients, in the following concentrations (each gram contains):

- Bacitracin zinc 400 units
- Neomycin sulfate 3.5 mg
- Polymyxin B sulfate 5,000 units

The triple ointment is thus a combination of a gram positive inhibitor, such as bacitracin, a gram negative inhibitor, Polymyxin B, and a wide-spectrum aminoglycoside, Neomycin. The application of this antibiotic on the wound area, every 3-4 hours for 7 days, should lead to the healing of the wound.

Arnica Montana gel

Arnica Montana gel, is a well-known homeopathic remedy which is employed in the management of certain wounds, to prevent inflammation, as an analgesic, but also has a wide range of other uses, it is, like bacitracin quite toxic systemically, thus it is also used as a topical agent. In the veterinary context it can also be used for the treatment of certain fur-skin disorders in dogs, although the dog is not allowed to lick it.

Arnica Montana, is not a semi-synthetic preparation, but is extracted from a yellow flowering plant, which grows in certain regions and is an endangered species in Europe, however, it can also be found in the Western area of North America. There exists a wide range of its sylvatic species, which again can be found worldwide. Recently there have been studies that show how this compound may have extraordinary prophylactic properties, and particularly this article wants to demonstrate how it is a prophylactic for rabies-complications as well. Not only it helps solve the bruising from the dog attack, and healing of wounds through anti-inflammatory action, but it can also could prevent rabies complications, such as gangrene, that normally lead to amputation due to the same properties.

It can be applied on the area of the wound, after or with the triple antibiotic ointment, as it does not inactivate the action of antibiotics. An alternative could be including Arnica Montana with the triple antibiotic cream for dog bite management. Again, Arnica should be used just after the incident, as a prophylactic, and not too late, until bruising is fully solved.

Conclusions

Triple antibiotic creams in association with arnica gel can be used as prophylactic agents in the management of dog bite wounds and could prevent gram positive and gram negative sepsis, even as local agents. Clinicians should consider this alternative within the 24 hours post-exposure to the systemic antibiotic therapy if symptoms are not present, for septic treatment, as dog bites normally carry a wide range of bacteria. For viral or anaerobic exposure, vaccines obviously remain the primary prophylactic choice, but sepsis can be caused by the bacteria as well, and many cases have been reported by the World Health Organization.

No conflicts of interest to disclose

References

1. World Health Organization, (2018), Animal Bites, *online newsroom website*, <https://www.who.int/news-room/fact-sheets/detail/animal-bites>