RECTAL INSUFFLATION AND TOPIC USE OF OZONE IN THE TREATMENT OF CASEOUS LYMPHADENITIS

USO DEL OZONO TOPICO E INSUFLACION RECTAL EN EL TRATAMIENTO DE LA LINFADENITIS CASEOSA

César Augusto Garcia¹, Renata Dias Rodrigues¹, Flávia Cristina Queiroz Rinaldi¹, Fernanda Gatti de Oliveira Nascimento¹, Filipe Campos Araújo¹, Gustavo Moya Rodrigues¹

Corresponding author at:

Av. Pará, 1720 – Faculdade de Medicina Veterinária, Universidade Federal de Uberlândia, Campus Umuarama - Bloco 2T, 38400-902 Uberlândia - Minas Gerais – Brazil. Tel.: +55 34 3218-2228.
E-mail address: drvirus@famev.ufu.br (C.A. Garcia).

* This work was supported by FAPEMIG.

¹ Faculty of Veterinary Medicine, Federal University of Uberlândia, MG, Brazil
RECTAL INSUFFLATION AND TOPIC USE OF OZONE IN THE TREATMENT OF CASEOUS LYMPHADENITIS

RESUMEN

Linfadenitis caseosa es una enfermedad infecto-contagiosa crónica que afecta a goatlike y ovinos. Caracterizado por un marco de abscesos en los ganglios linfáticos, pueden ser internos o superficiales, las consecuencias son graves: la difusión de abscesos produce la muerte de los animales. El agente etiológico es la bacteria Corynebacterium pseudotuberculosis. El ozono tiene varias acciones biológicas, es un gas inestable con propiedades bactericidas. En el estudio se incluyeron ocho ovejas y un reproductor de la raza Santa Inés, una cabra de raza mestiza, todos adultos y con el diagnóstico clínico de la enfermedad. En los animales con ruptura de los ganglios linfáticos se llevaron a cabo un tratamiento tópico que consistía en lavar las lesiones con agua ozonizada, aplicación aceite ozonizado y también fueron sometidos a tratamiento sistémico, que consistía en la insuflación rectal de 80 mL de la mezcla de oxígeno-ozono. En los animales con los ganglios linfáticos sin ruptura, aplicó de forma subcutánea 20 mL de la mezcla oxígeno-ozono alrededor del nódulo y/o abscesos. También se sometieron a tratamiento sistémico. Con un cutimetro los ganglios linfáticos fueron evaluados diariamente. Con un promedio aproximado de veinte aplicaciones de la mezcla de ozono-oxígeno, incluyendo el tratamiento sistémico y local, la reducción de los nodos se hizo evidente. Se concluye que esta forma de tratamiento fue efectiva, considerando la reducción del tamaño de los ganglios linfáticos y los animales sufrieron menos estrés y el dolor que con el tratamiento convencional.

Palabras clave: Ozono; Ovinos; Linfadenitis caseosa; Tratamiento
ABSTRACT

The caseous lymphadenitis is a chronic infecto-contagious disease that affects goatlikes and ovines. Characterized by a framework of lymph node abscess, the lymph nodes can be superficials or internals, the seriously consequences are: the animals impairment, the abscess dissemination, condemnation of carcasses and the animal death. The etiologic agent is the bacterium *Corynebacterium pseudotuberculosis*. Ozone has several biologic actions, it's an unstable gas with bactericidal proprieties. Eighth sheeps were used on this work, one breeder of Santa Ines race and one mixed sheep, all adults and with clinical proof of illness. In the animals that had ruptured lymph nodes, were performed the topic treatment that consisted in the lesions washing with ozonated water, ozonated oil application and they also underwent the systemic treatment that consisted in the rectal insufflation of 80 mL of the oxygen-ozonated mixture, through rectal via. In the animals without rupture in the lymph nodes performed subcutaneous applications of the ozonated gas containing 20 mL of the oxygen-ozone mixture around the nodes and/or abscesses was done. They also underwent systemic treatment. With the help of a cutimetro the lymphnodes were measured daily, periodically. With approximate average of twenty oxygen-ozone mixture applications, including the systemic and local treatment, the nodes reduction became evident. It was concluded that this kind of treatment was effective, considering a reduction of the size of the lymph nodes and also the animals suffers less stress and pain than with the conventional treatment.

**Keywords:** Ozone; Ovines; Caseous lymphadenitis; Treatment

INTRODUCTION

The caseous lymphadenitis is considered a chronic infectious illness that affects ovines and caprins. It is characterized by a picture of abscess of the lymph nodes that present dry material, purulent. (1)

The etiologic agent of the caseous lymphadenitis, bacterium *C. pseudotuberculosis*, was described for the first time for Nocard in 1885. The current nomenclature was adopted in 1948 in 6a edition of the Manual Bergey's, however the assignment *Corynebacterium ovis* is used as a synonymous. *C. pseudotuberculosis* is characterized as a bacillus short and irregular Gram-positive (0.5 the 0.6 μm for 1 the 3 μm), being able to present cocoid aspect, and can reveal isolated or forming irregular groupings or in pale. They are immovable bacilli, anaerobic physicians, fermentative and they do not form spores.2,3,4,5

The form of I still infect is controversy, but, probably, it occurs through the contact enters drained of the abscess and the skin, or mucosae of the healthy animals, or where solutions of continuity.6,7 The aerosol aspiration also is cited as form of I infect of this disease.5 From the initial injury or of the door of entrance, the bacterium arrives until the regional lymph nodes, mainly daily pre-crural and pre-scapular where it produces characteristic caseous injury.9,7 The control of the LC is basically made by the visual diagnosis and incision of the lumps that will count great amount of secretion and the agent *Corynebacterium Pseudotuberculosis*.

The conventional treatment of the illness consists of the draining and chemical cauterization of the abscesses, using itself iodine solution 10%. After isolation of the animal, trichotomy and asepsis of the place must be carried through a long vertical incision in the medium region to the inferior edge of the abscess to facilitate to the draining and internal cleanness of the same. The purulent material leaves all, having the care to store it in plastic bag, or bucket. Iodine solution is injected internally external 10% and, and sends regards to inside place a gauze with the same solution, with the
objective to absorb the remain infective material and at the same time, to facilitate the cicatrization of the injury.

The animal must be kept isolated. The gauze must more be changed in 24 hours and the repeated procedure two times. The recommended procedure with the materials used is to burn it, but first most is disinfected using alcohol 70% by immersion.

Cares special must be taken to prevent the ambient contamination preventing the dissemination of the agent and to protect the involved staff in the handling of the animals, since stories in the infection literature reported human being with \textit{C. pseudotuberculosis}.

The \textit{C. pseudotuberculosis} is sensible, in vitro, to some antibiotics, between them, penicillin, ampicillin, chloramphenicol, erythromycin, gentamicin and tetracycline.\(^{(11)}\)

However the use for the alive treatment in, of the infection for the \textit{C. pseudotuberculosis} is not efficient for diverse reasons as, the low level of the antibiotic in the abscess due to fibrous capsule or the presence of I put, and the intracellular localization of the micro-organism in the phagocytic cells, that the contact with substantial amounts of antibiotic hinders.

In this experiment use of the ozonetherapy became, being that this therapy was applied for the first time in First World to War in Germany in soldiers after-traumatic gangrenes, getting great success.\(^{(12)}\) The system of the generator created by Siemens using electric discharge, after to have been suitable for Hansler in 1950 for the medical use, dosed the certain amount of the concentration of ozone. This fact was decisive for the ozonetherapy, since a correct dose of ozone for each application was necessary; this comes today following until the manufacture of the modern ozone generators.\(^{(13)}\)

From 1960 the world knew the ozonetherapy. With this its antiinflammatory, anti-septic and circulatory properties, among others, had been displayed. The use of ozone for medicinal ends needs the presence of medicinal oxygen (pure oxygen), thus preventing possible presences of other probably toxic gases. When generating the ozone we will have a variation of concentration between oxygen and ozone being of up to 95% of oxygen and 5% of ozone. Therefore, the doctors need to have a safe ozone generator, with resistant material its disposal.\(^{(13)}\)

The use of medicinal ozone is defined as an oxidative therapy that generates one oxidative stress, resulting in the production of the antirust effect for the organism, aiming at to the improvement of the patient. It is a substance that presents the oxidation capacity when, through a chemical reaction, obtains to pass a proper electron for another substance.\(^{(13)}\)

To if finding with one tissue ozone biological active reacts with innumerable biomolecules that grouped, they form a system of antirust tampon. Most of these biomolecules have anti-inflammatory and analgesic paper that act of simultaneous form to the antirust action. The antimicrobial direct action against bacteria, virus and fungi that the ozone exerts, must to these microorganisms not have a system of antirust tamponade, it stress therefore it caused for ozone, finishes becoming them fragile. Already the indirect microbicide action of ozone is resultant of the metabolic changes that this provokes.\(^{(14,15,16)}\) Studies concluded in 1980 give account that this gas was effective in the destruction of bacteria and virus in pH of 6.0 the 8.5, while other data indicate that the ozone destroys bacteria and virus in pH 5.6 the 9.8.\(^{(17)}\) The ozone can be managed by saw endovenous, urethral, to intramuscular, subcutaneous, rectal and vaginal insufflation, intrarticular, intraperitoneal, intrapleural, intradiscal route and intraforaminal in the case of the dentists, intralesional when fistula or abscess will have one, insuffilation in “bags”, intramammary and through the topical use of ozonized water and/or oil.\(^{(12)}\)

Ozone is forbidden to the use for inhalation powder to it due its toxic effect in the trachea and bronchis; the direct application of ozone by endovenous and intra-arterial route also it is forbidden since 1984 for the inadequate use of it, therefore when great volumes are managed in a small interval of time they provoke oxygen pistons that can get the death.\(^{(12)}\) The necessity in defining a not brutal and less painful therapy to the
animals stimulated in us to carryout this study in order to evaluate the effectiveness of the mixture oxygen-ozone in the resolution of this pathology.

MATERIALS AND METHODS

The study was carried out in June through August in 2009, for 56 days, this experiment was conducted herd of Farm Experimental of the Capim Branco, belonging to the Federal University of Uberlândia in the state Minas Gerais, Brazil. Were selected eight sheep and one reproduction sheep, were pure breed Santa Ines, and one goat crossbreed (resulting from the crossing of different breeds), all animals were older than 24 months. The diagnosis of infection is given by clinical visual examination; the animals showed clinical signs of disease were treated with oxygen-ozone mixture.

All the animals had enlarged lymph nodes in various regions, predominantly the lymph nodes of the anterior (submandibular, paratid, pré-escapular, cervical superficial). We used the ozone generator (Ozone & Life O&L3.0RM®) calibrated to the concentration of 60 mg-O$_3$ / L, fed by oxygen ampoule with 99.5% purity at a pressure of about 250 kgf/cm$^2$ in a flow 1.0 L / min. Five liters of distilled deionized water, previously cooled, was ozonated for 20 minutes, wrapped in isothermal box containing ice packs, which were used immediately after preparation, the treatment employed. In the production of ozonized oil was used 200 mL of commercial sunflower oil that was subjected to the same protocol used in the ozonation of water, but the time of ozonation was only 5 minutes and adjusted to the concentration of 2.5 mg-O$_3$ / L . The ozonized oil was placed in isothermal box containing ice packs can be recycled and used soon after, the treatment employed.

In the research site, the ozonated water was used for to clean and topical treatment of the suppurative lymph. Then the ozonized oil was applied with the aid of gaze on these abscesses, the treatment was performed once a day, on consecutive days until clinical cure of the animal.

The subcutaneous injections of small doses of the mixture oxygen-ozone were applied around the nodules and/or injuries with a syringe of 20 mL, siliconized, disposable, charged through the hose coupling silicone ozone generator set for the concentration 20 mg-O$_3$/L.

Ozone therapy was also used by rectal insufflation of gas through the probe using four syringes with a capacity of 20 ml each, which are coupled via a silicone hose to the ozone generator brand Ozone & Life O&L3.0RM®, powered by bulb oxygen with 99.5% purity at a pressure of about 250 Kgf/cm$^2$ in a flow of 1.0 L/min, adjusted to a concentration of 32 mg-O$_3$/L. This procedure was performed after topical application of ozonized water and oil and subcutaneous injections, performed once a day, on consecutive days until clinical cure of the animal.

Evidence of clinical cure was established by measuring the lymph nodes with cutimetro which assessed the diameter of the lesions and also by the absence in detection of new nodules in animals treated.

RESULTS AND DISCUSSION

This study consisted of ten animals, all treated with oxygen-ozone mixture, eight animals showed over the course of the days decrease in diameter of lymph nodes, being conducted by measuring evidence of abscesses performed daily with the aid of cutimetro and also through photo taken every seven days. Regarding the 15 sheep, it showed no reduction in size of lymph nodes, and this fact can be explained by a few
applications of ozone, since it showed the typical nodulation lymphadenitis, when the research was in its final phase, so this animal was subjected to only seven treatment sessions. Regarding the 16 sheep, this small lesion showed suppurative and the region of the parotid lymph node at the beginning of research, therefore, over the days it had complete resolution of his injury and also did not indicate the emergence of new nodules during treatment.

Table 1. Measurements of lymph nodes with the aid of cutimetro before and after treatment with oxygen-ozone mixture in animals affected by caseous lymphadenitis.

<table>
<thead>
<tr>
<th>Identification of the animals</th>
<th>Lymph node</th>
<th>Diameter (mm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>Sheep - reproductor</td>
<td>mandibular</td>
<td>98,4 mm²</td>
</tr>
<tr>
<td>Sheep 06</td>
<td>parotid</td>
<td>37,4 mm²</td>
</tr>
<tr>
<td>Sheep 10</td>
<td>Superficial cervical</td>
<td>43,7 mm²</td>
</tr>
<tr>
<td>Sheep 12</td>
<td>pre-scapular</td>
<td>87,5 mm²</td>
</tr>
<tr>
<td>Sheep 13</td>
<td>Superficial cervical</td>
<td>133,2 mm²</td>
</tr>
<tr>
<td>Sheep 15</td>
<td>Superficial cervical</td>
<td>117,0 mm²</td>
</tr>
<tr>
<td>Sheep 16</td>
<td>parotid</td>
<td>Suppuration</td>
</tr>
<tr>
<td>Sheep 17</td>
<td>parotid</td>
<td>144,0 mm²</td>
</tr>
<tr>
<td>Sheep 18</td>
<td>retropharyngeal</td>
<td>111,6 mm²</td>
</tr>
<tr>
<td>Caprine 002</td>
<td>parotid</td>
<td>19,5 mm²</td>
</tr>
</tbody>
</table>
CONCLUSIONS

From the results in terms of conducting this work, we can infer that the treatment adopted, the situation was appropriate, the dose, concentration, form of application led to reduction of the nodules characteristic of caseous lymphadenitis.

BIBLIOGRAPHY REFERENCES

8. Chaplin PJ, De Rose R, Boyle JS, Mc Waters P, Kell J, Tennent JM, Lew AM, Scheerlinck JPY. Targeting improves the efficacy of a DNA vaccine against...