

## TREATMENT OF PERITONITIS CAUSED BY FOREIGN BODY USING INTRAPERITONEAL DIMETHYLSULFOXIDE (DMSO)

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**Summary:** Diffuse peritonitis was explored in 16 mature cows during operation (rumenotomy) that were previously diagnosed in clinical examination as acute-reticulitis-traumatica, caused by metallic foreign body(ies). Following the closure of operation wound, three liters of 10% DMSO (dimethylsulfoxide) in isotonic NaCl solution were given into the peritoneal cavity. In all the cases, beside the treatment with DMSO, wide-spectrum antibiotic was applied intraperitoneally for 3-4 days. After 24 hours of the operation and the treatments, the clinical examination revealed significant healing in 12 animals. These animals were therefore received no further DMSO treatment and recovered without any complication. Similar application was repeated once a day for 3 days in 4 remaining cases which showed persistent signs of peritonitis. One case healed without any problem after receiving this additional treatment and remaining 3 animals did not fully recovered.

As a result, the intraperitoneally application of DMSO with antibiotics was found to be effective for the treatment of peritonitis.

**Keywords:** Peritonitis, foreign body, dimethylsulfoxide, cattle.

### Yabancı Cisimlerin Neden Olduğu Peritonitilerin Sağaltımında İntraperitoneal Dimethylsulfoxide (DMSO) Kullanımı

**Özet:** Metalik yabancı cisimlere bağlı olarak akut retikulitis travmatika tanısı konulan 16 erişkin inekte operasyon (rumenotomi) sırasında diffuz peritonitis belirlendi. Operasyon açıklığının kapatılmasını izleyerek izotonik 3 litre NaCl içinde %10'luk çözeltisi hazırlanan DMSO (dimethylsulfoxide) peritoneal kaviteye verildi. Olguların tümünde bu sağaltıma ek olarak 3-4 gün süre ile intraperitoneal yolla geniş spektrumlu antibiyotik uygulandı. Olguların 12'sinde 24 saat sonraki kontrollerde belirtilerin hafiflediğinin saptanması nedeni ile yeniden DMSO uygulaması yapılmadı ve bu olgular kısa sürede iyileştiler. Diğer 4 olguda peritonitise bağlı bulguların sürmesi nedeni ile aynı uygulama günde 1 kez olmak üzere 3 gün sürdürüldü. Bunların 1'inde iyileşme belirlenirken diğer 3 olguda tam bir iyileşme sağlanmadı.

Sonuç olarak, intraperitoneal DMSO ve antibiyotik uygulamasının peritonitis sağaltımında oldukça etkili olduğu gözlemlendi.

**Anahtar sözcükler:** Peritonitis, yabancı cisim, dimethylsulfoxide, sığır.

### INTRODUCTION

Peritonitis in cattle occurs as a result of followings; penetration of foreign bodies to the reticulum, as a complication of laparotomy and rumenotomy, lesions affecting abdominal cavity, ruptures in urinary bladder as well as intestines, various obstetric complications, and some systemic infections such as tuberculosis. In addition, it causes high fever, pain, loosing appatite, which in turn loosing weight, and in severe cases can cause to death<sup>1-10</sup>.

It takes long period of time to treat peritonitis in cattle. In the case of peritonitis caused by foreign bodies penetrated to reticulum, removing perforating objects by rumenotomy proves effective treatment. Meantime, after having foreign bodies removed, adhesions that limits the contraction of stomach has to be seperated. Infections occurred as a result of peritonitis should be treated with intraperitoneal antibiotic administration. Alternatively, peritonitis in cattle can be treated by lavaging peritoneal

cavity with povidon iodine solution<sup>2,5,7,9,10</sup>.

The aim of the study was to reveal whether DMSO, which has antiinflammatory, antioxidant, analgesic, antimicrobial effects and increases tissue permeability, has an effects for the medical treatment of the peritonitis<sup>11-18</sup>.

### MATERIALS and METHODS

After having diagnosed with acute diffuse peritonitis caused by foreign body(ies) penetrated to the reticulum and reached into abdominal cavity, 16 cattle with varying age, breed and body weight were used in the present study. Foreign body(ies) was (were) removed by rumenotomy. After seperating adhesions and removing the present fluits, periton, muscle, and skin were closed.

DMSO was adjusted to a concentration of 10% in isotonic saline and saline three liters of this solution, together with wide-spectrum antibiotics were

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administered intraperitoneally at 30 minutes after the operation. While twelve of the cases were received the combination of DMSO and antibiotics treatment only once, the remaining 4 cases received the same treatment for once a day for 3 days. On the other hand antibiotic treatment was extended for 3 (in 12 cases) and 4 (in 4 cases) days.

Pulsation, respiration rate, body temperature, appetite, rumen motility, and pain findings were recorded before operation and 1/2, 1, 12 and 24 hours, 1, 2 and 4 weeks following operation in all the cases. Pain assesment was carried out with respect to heart-respiratory rates, appatite and some clinical findings such as palpation, percussion and groaning and restlessness. Appatite was evaluated according to the animals desire for and intake of food and water. Peritoneal adhesions were controlled radyo-graphically 4th week after operation.

## RESULTS

Pulsation, respiration rate, body temperature, appatite condition, rumen motility, and pain findings of all the cases were recorded and presented in table-1.

As indicated in the table, mean heart rate decreased to its normal levels after 12 hours and remained in normal range after 24 hours. Respiratory rate and rectal temperature also decreased to normal range after 12 hours.

**Table 1.** The recorded clinical findings of the cases.  
**Tablo 1.** Olguların belirlenen klinik bulguları.

	P	R	T	RM	
<b>Before operation</b>	89.8±8.6 (72-106)	37.3±4.6 (32-46)	39.7±0.6 (38-40.3)	0	
<b>After Operation</b>	<b>30<sup>th</sup> min</b>	103.6±7.4 (92-120)	44.9±4.5 (40-52)	38.6±0.2 (37.2-39.3)	0
	<b>1<sup>st</sup> h</b>	81.3±6.7 (70-92)	29.5±5.4 (20-42)	38.4±0.4 (37.6-39.1)	0
	<b>12<sup>th</sup> h</b>	71.0±4.6 (64-80)	23.8±3.1 (18-28)	38.1±0.3 (37.6-38.9)	0.8±1.2 (0-3)
	<b>24<sup>th</sup> h</b>	65.4±4.5 (58-72)	21.0±2.6 (18-26)	38.0±0.3 (37.5-38.8)	3.4±1.9 (0-6)
	<b>1<sup>st</sup> Week</b>	64.8±5.1 (56-72)	20.6±3.1 (16-26)	37.8±0.2 (37.5-38.2)	6.8±3.1 (2-11)
	<b>2<sup>nd</sup> Week</b>	64.2±4.8 (58-72)	20.5±2.8 (18-26)	37.9±0.2 (37.6-38.2)	9.3±3.7 (2-13)
	<b>4<sup>th</sup> Week</b>	63.9±4.6 (58-72)	20.8±2.6 (18-26)	37.9±0.3 (37.6-38.5)	11.1±3.3 (4-14)

P: Pulsation (1 min), R: Respiration (1 min), T: Rectal Temperature °C,  
RM: Rumen Motility

Ruminal motility ranged between 2 and 3 during 12 hours in 5 cases postoperatively and gradually increased for all cases except for 3 cattle. Ruminal stasis was still present at 4<sup>th</sup> weeks postoperatively for those 3 cases.

Desire food and water was not good at 1 hour postoperative examination for all cattle, but improved after 12 hours except for 3 cattle.

10 cattle with mild degree of pain and 6 with no pain were present following DMSO application. But no sign of pain was noted for all cases after 12 hours.

## DISCUSSION

For the treatment of peritonitis cattle caused by a foreign perforating object, wide-spectrum antibiotics are used postoperatively after the removal of foreign body(ies). Apart from the above application, peritoneal lavage by antiseptic solution is another alternative treatment. However, lavaging may take a long period of time and sometimes a successful result is not obtained<sup>2,7,9</sup>. Since DMSO has been found to be effective in certain inflammatory disorders and also has antimicrobial and analgesic properties<sup>11-14</sup>. Intraperitoneal application of this solution was carried out in the present study. In order to determine its effectiveness in the treatment of peritonitis in cattle. Of our 16 cases, 12 recovered completely after one application of DMSO. Of the remaining 4 cases, 1 recovered completely after treatment with DMSO once a day for three days, while the other 3 showed partial recovery with the disappearance of the acute signs of peritonitis.

DMSO causes a toxicity for the body when used as a pure solution. Therefore, a solution of DMSO diluted by saline or Lactated Ringer's solution is usually preferred<sup>11</sup>. DMSO solution diluted between 20 and 40% has been succesfully used for cases with arthritis<sup>11,13</sup>. Furthermore, a 10% DMSO in saline solution was used with a hig rate of success, in the treatment of 120 human patients with acute appendicitis<sup>12</sup>. In our study, a 10% DMSO solution in isotonic NaCl was chosen because of the wide absorbtion area of the periton and the sensitivity of its surrounding tissue. Our observations showed that a 10% concentration of DMSO caused no adverse effects.

If inflammation continues postoperatively in peritonitis cases, previously treated adhesions may relapse<sup>8,9</sup>. In this study the antioxidant and

antiinflammatory effects of DMSO were demonstrated, since at the postoperative examination, no signs of adhesion were detected either clinically or radiographically in 13 cases.

Pain usually occurs in cases of peritonitis at the postoperative stage or during the separation of adhesions operatively<sup>8,9</sup>. With the benefit of DMSO, pain disappeared almost completely within one hour and had disappeared totally after 12 hours. The disappearance of pain was supported by clinical findings such as normal heart and respiratory rate, calming of the cattle, and restored appetite. In addition, there was no indication of pain was received when the abdominal area was palpated or percussed.

Wide-spectrum antibiotics are generally administered by IV, IM route or with saline solution into the peritoneal space. Additionally, the periton is irrigated by povidone iodine or antibiotic solution. However, irrigation with antiseptic solution may cause peritoneal irritation<sup>2,5,7</sup>. In the present study, intraperitoneal antibiotic administration was performed together with DMSO, and no sign of infection appeared. Moreover, the body temperature and appetite of the cattle returned to normal levels, which indicated that DMSO had antibacterial effects.

In conclusion, this study shows that the intraperitoneal application of DMSO, together with antibiotics in cases of peritonitis caused by a piercing foreign object, is a practical and economical alternative treatment.

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