

Effect of Peritoneal Lavage with Cetrимide-Chlorhexidine Solution on Survival and Adhesion Formation in Rat: An Experimental Study

CETRİMİDE-CHLORHEXİDİN İLE YAPILAN PERİTON LAVAJININ. RATTA ADEZYON OLUŞUMU VE YAŞAM SÜRESİ ÜZERİNE ETKİSİ

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Summary

In this study, the effects of cetrимide-chlorhexidine (Savlon®) solution on intraperitoneal adhesion formation and perioperative mortality is investigated. 48 rats were anesthetized and 2 ml of either (sterile) 0.5% cetrимide-0.05% chlorhexidine solution (Group 1, n=38) or 0.9% NaCl (Group 2, n=10) was instilled into the peritoneal cavity through a median laparotomy. Animals that survived the perioperative period were sacrificed at the postoperative tenth day and a necropsy was performed. In group 1, fifteen animals survived to the tenth postoperative day and at sacrifice one animal developed grade 4 and three animals grade 1 adhesions. In Group 2, all ten survived to the tenth postoperative day. At sacrifice five animals developed grade 1 adhesions. These results showed that although cetrимide-chlorhexidine did not increase the incidence of adhesions ($p>0.05$), the use of 0.5% cetrимide-0.05% chlorhexidine solution as a peritoneal washout solution can be dangerous because of its associated toxicity.

Key Words: Cetrимide-chlorhexidin-Peritoneal adhesion

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Injecting scolicedal solutions into the hydatid cysts and packing the operative field with sponges soaked in scolicedal agents have been used by many surgeons to avoid dissemination of the parasite during surgery. Cetrимide is one of the compounds used in this manner. Although it is recommended in very low concentrations (0.1-0.5%) (1-3), there are reported complications such as sterile chemical peritonitis and adhesion formation(4), methemo-

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Özet

Bu çalışmada Cetrимide-Klorheksidin'in (savlon) peritoneal yapışıklık ve perioperatif mortalite üzerine etkisi araştırılmıştır. Çalışma grubuna (n:38) 2 ml intraperitoneal savlon verilmiş, kontrol grubuna (n:10) ise 2 ml serumfizyolojik uygulanmıştır. Çalışma grubunda 23 rat perioperatif dönemde ölmüş, 15 hayvan çalışmayı tamamlamıştır. Bir hayvanda grade 4, üç hayvanda grade 1 adezyon saptanmıştır. Kontrol grubunda ise perioperatif mortalite olmamıştır. Bu grupta 5 hayvanda grade 1 adezyon saptanmıştır. Çalışmayı tamamlayan hayvanlar arasında yapışıklık açısından anlamlı bir fark saptanmamıştır ($p>0.05$). Savlon'un intraperitoneal uygulanması toksiktir ancak peritoneal yapışıklıkları arttırmaktadır.

Anahtar Kelimeler: Cetrимide-chlorhexidin, Peritoneal adezyon

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globinemia (5), convulsions and coma (6). In this report, we investigated the effect of cetrимide-chlorhexidine (Savlon®) solution which is reported to be the most potent scolicedal agent in an in vitro study (7), on intraperitoneal adhesion formation and perioperative mortality.

Methods

In this study, 48 rats were anesthetized by ether inhalation. After shaving and cleaning their abdomen with povidone iodine, a 1cm midline laparotomy incision was performed and 2 ml of either sterile 0.5% cetrимide-0.05% chlorhexidine solution (Group 1, n=38) or 0.9% NaCl (Group 2, n=10) was instilled into the peritoneal cavity. After

Table 1. Grading of adhesive bands (8).

Grade	Description of Adhesive Bands
0	Complete absence of adhesions
1	Single band of adhesions, between viscera or from viscera to abdominal wall
2	Two bands, either between viscera or from viscera to abdominal wall
3	More than two bands, between viscera, or viscera to abdominal wall, or whole of intestines forming a mass without being adherent to abdominal wall
4	Viscera directly adherent to abdominal wall, irrespective of number and extent of adhesive bands

five minutes, the fluid was aspirated and the abdominal wall was closed with 3/0 silk in two layers. Animals that survived the perioperative period were sacrificed with ether anesthesia at the tenth postoperative day and a necropsy was performed through a left paramedian incision which extends transversely through the upper and lower part of the abdominal wall. With this incision, the anterior abdominal wall was elevated as a flap and the original median laparotomy site can easily be studied on the peritoneal aspect. The number and extent of adhesions were noted and graded as it was previously described by Nair (8) (Table 1). Fisher's exact test was used in the statistical analysis.

Results

Of the 38 animals operated in Group 1, twenty three died within the first three postoperative days. Twenty-one of these animals died within 6 hours of surgery, one died on postoperative day one and one died on postoperative day three. The remaining fifteen survived to the tenth postoperative day when they were sacrificed. In this group, one animal developed grade 4 and three animals grade 1 adhesions. The other eleven were free of adhesions. In Group 2, all ten survived to the tenth postoperative day. At sacrifice five animals developed grade 1 adhesions (Table 2). No statistical difference can be

shown between the groups in terms of adhesion formation and total grade of adhesions.

Discussion

Irrigation of the intracystic and/or pericystic area with a scolical agent during surgery is the most commonly employed measure to prevent secondary hydatidosis. Cetrimide is one of the agents used for this purpose. Although many surgeons regard this maneuver as an inseparable step in hydatid cyst surgery, scolical agent usage is associated with many untoward effects (9-11). Methemoglobinemia, convulsions and coma are some of the complications related to local use of cetrimide (5,6). Gilchrist (4) reported three cases of sterile chemical peritonitis with massive adhesions after hydatid liver surgery which he attributed this complication to the peritoneal washout with 0.5% cetrimide. Although this is not a routine practice in liver hydatid surgery, it is frequently used when dealing with traumatic or spontaneous rupture of abdominal hydatid cysts.

In a recent in vitro study, scolical property of cetrimide-chlorhexidine solution in very dilute concentrations was confirmed (7). It is an agent of choice in intracystic injections of hydatid cyst surgery.

Table 2. Definition of the groups.

	Group 1	Group 2	
Number of Animals	38	10	
Washout Fluid	0.5%CED-0.05%CHD*	0.9%NaCl	
Perioperative Death	23	-	p<0.05
Necropsy	15	10	
Animals with adhesions	4	5	p>0.05
Total grade of adhesions	7	4	p>0.05

* CED:Cetrimide, CHDrChlorhexidine

In this study it is clear that early mortality seen in group I were due to the toxicity of 0.5% cetrimide-0.05% chlorhexidine solution as it is known that cetrimide can cause acute circulatory collapse and central nervous system toxicity (6). These results showed that although cetrimide-chlorhexidine did not increase the incidence of adhesions, it should not be used as a peritoneal washout solution if there is a need for peritoneal lavage.

Walling off the surgical field with sponges soaked in scolicedal agents is another widely applied measure to prevent peritoneal hydatidosis. The use of 0.5% cetrimide-0.05% chlorhexidine solution in this manner can be dangerous because of the associated toxicity. The contact of sponges soaked in 0.5% cetrimide-0.05% chlorhexidine solution to the visceral or parietal peritoneal surfaces should be avoided with normal saline soaked sponges to prevent any potential complications.

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