



Effect of the humidity and temperature of insufflation gas on intact peritoneum

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Abstract

Effect of the humidity and temperature of insufflation gas on intact peritoneum.

Objective: To determine the effect of insufflation gas humidity and temperature on intact peritoneum.

Design: Histologic study of peritoneum by light microscopy.

Setting: Laboratory.

Patients: Freshly explanted tissue (large bowel, abdominal sidewall) from dogs sacrificed for other reasons.

Interventions: Standard carbon dioxide gas was painted onto areas of 2 x 2cm of the peritoneum covering either the large bowel, or parietal peritoneum at a standard pressure (5psi), distance (2cm) and time (30 seconds). Gas was passed through an INSUFLOW® (Lexion Medical, Inc.) device with or without conditioning. During conditioning, gas was humidified and warmed to 37°C.

Tissues were then dissected, processed for histology and stained with haematoxylin & eosin, or trichrome stains. The appearance of the mesothelial layer was determined by light microscopy.

Measurements & Main Results:

Few mesothelial changes were observed for sidewall tissues. For the intestinal tissues, mesothelial damage consisting of mesothelial denudation was evident following cold, dry gas. Mesothelial damage was greatly attenuated when gas was conditioned by warming and humidifying. Tissue exposed to conditioned gas, appeared comparable to control tissue.

Conclusions: Mesothelial damage due to dry gas exposure can be detected by simple light microscopy. Visceral peritoneum appears more sensitive to dry gas than parietal peritoneum. Mesothelial damage is attenuated when gas is humidified and warmed.



Background

- Conventional laparoscopy uses cold, arid CO₂ insufflation gas
- The use of warm, humidified gas is associated with

Maintenance of core temp.

Reduced post-op pain, hypothermia

Reduced post-op hospital stay



Wind Chill

- Cold arid gas effects tissue by laparoscopic gas evaporative jet cooling
- Cooling reduced by warming and humidifying laparoscopy gas



Question

What is the effect of cold and dry gas on intact peritoneum?



Method

Freshly explanted canine tissue (large bowel, abdominal sidewall)

Standard CO₂ painted onto areas of 2 x 2cm of the peritoneum

Gas passed through INSUFLOW® (Lexion Medical, Inc.) with or without conditioning.

Pressure, distance, time

5psi, 2cm, 30 seconds

Conditioned gas

Humidified and warmed 37°C.

Tissues processed for histology

H&E, Trichrome

Light microscopy

Mesothelium examined

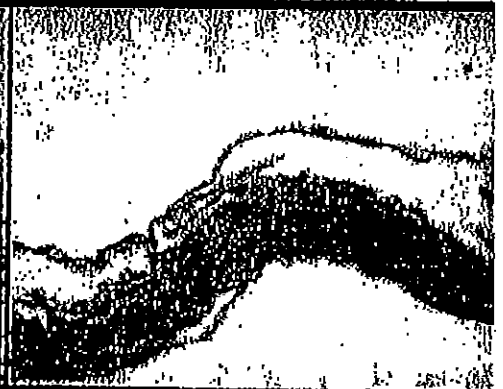
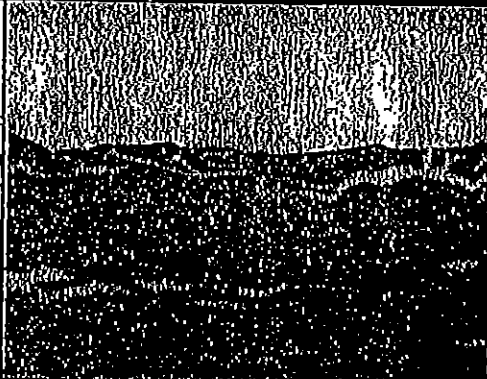


Sidewall

Virgin

Warm, humid

Cold, dry



Few mesothelial changes evident

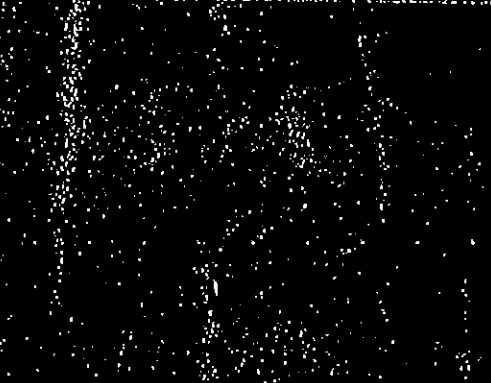


Large Bowel

Virgin

Warm, humid

Cold, dry



Mesothelial damage attenuated, comparable to control tissue

Mesothelial denudation evident



Conclusion

- Mesothelial damage due to dry gas exposure can be detected by simple light microscopy.
- Visceral peritoneum appears more sensitive to dry gas than parietal peritoneum.
- Mesothelial damage is attenuated when gas is humidified and warmed.