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## EVALUATION OF THE TISSUE ADHESIVE AND SUTURE PATTERN AFTER CHOLECYSTOTOMY IN DOGS

(With 3 Fig.)

By

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### تقييم استخدام لاصق الانسجه وخيوط الديكسون بعد فتح جدار الحوصلة المراريه فى الكلاب

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أجريت هذه الدراسه على عدد ١٢ كلب من كلا الجنسين والسليمه اكلينيكيًا. تم فتح جدار المراره لهذه الحيوانات ثم قسمت إلى مجموعتين. فى المجموعه الأولى تم استخدام لاصق الانسجه لاعادة توصيل جدار المراره بينما استخدمت خيوط الديكسون لنفس الغرض فى المجموعه الثانيه. وتم تقييم النتائج راديولوجيًا ومجهريًا. أظهرت النتائج أن لاصق الأنسجه أعطى نتائج أفضل من استخدام خيوط الديكسون.

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### SUMMARY

The present study was carried out on 12 clinically healthy adult dogs of both sexes. Cholecystotomy was performed in all dogs. These animals were divided into two equal groups. In the first group, the gallbladder wall was closed using N-Butyl-cyanoacrylate tissue adhesive while in the second group, dextron plus was used. The radiological and histopathological findings cleared that the use of tissue adhesive gave a good result in comparison to the use of dextron plus suture.

### INTRODUCTION

The principal indications for cholecystotomy are internal decompression of the biliary tract, gangrenous, cholecystitis, drainage of inspissated bile, biliary flukes (in cats) and cholelithiasis in dogs and cats (BREZNICK, 1983). Cholelithiasis is recognized by relatively infrequently diagnosed entity in the dog and cat. Opaque choleliths are readily identified on plain radiographs which have been illustrated by SCHALL et al. (1973), GILLET et al. (1977) and O'BRIEN (1978).

The discovery of the adhesive properties of methyl 2-cyanoacrylate was rapidly followed by its application to experimental surgical procedures. HAFNER et al. (1963) and WEISSBERG et al. (1966) used the tissue adhesive for nonsuture anastomosis of blood vessels. AVERY (1982) used Butyl-cyanoacrylate in maxillofacial and cranio-facial bone. The effect of tissue adhesives and suture patterns on experimentally induced teat lacerations in lactating dairy cattle was studied by MAKADY et al. (1991).

The purpose of the present study is to evaluate the effect of the tissue adhesive (N-butyl cyanoacrylate) and suture material (dextron plus) on the repair of gallbladder wall after cholecystotomy in dogs.

### MATERIALS AND METHODS

The present study was performed on 12 mongrel clinically healthy dogs of both sexes. The animals were weighing from 8-20 kg. They were divided into two equal groups. The animals were sedated with intramuscular injection of chlorpromazine hydrochloride (Neurazine-Misr) in a dose of 1 mg/kg. b. Wt. General anaesthesia was induced by intravenous injection of thiopental sodium until all reflexes were abolished. The ventral abdominal wall was prepared for aseptic operation. Pre-umbilical, median laparotomy was performed. The content of



the gallbladder was evacuated into the duodenum by gentle pressure. The fundus of the gallbladder was grasped and fixed with noncrushing clamp. An incision 3 cm in length was performed on the lateral surface of the gallbladder near the right central lobe of the liver.

In group I: The blood oozing from the wall of the gallbladder was controlled by tamponade. A thin layer of N-butyl-cyanoacrylate monomer tissue adhesive (Vet. Bond, Animal Care Products, 3 M Center, St. Paul Minn) was applied to the edges of the gallbladder wound.

In group II: The incision of the gallbladder was closed with connell suture pattern using 3/0 dexion plus. The abdominal wound was closed as usual. Post-operative application of streptomycin and penicillin G. for five successive days was applied. Skin sutures were removed 7 days following the operation.

#### **Radiographic examination:**

Cholecystograph was done one week before the operation and one month after the operation to demonstrate the changes which occurred in the wall of the gallbladder and the biliary ducts. Slow intravenous injection of biligrafin 50% (Schering AG Berlin, Bergkamen, Germany) in a dose of 1 ml/kg.b.wt. was performed. A lateral radiograph of the cranial part of the abdomen and anterior to the xyphoid sternum were taken using a mobile x-ray apparatus with factor, 55 K.V., 70 mAs and 90 cm f.f.d. The radiographs were taken at intervals 30, 60, 90 and 120 minutes.

The animals of each group were euthenised after one month following operation to study the tissue reaction following application of tissue adhesive and suture material. The gallbladder specimens were fixed in 10% formaldehyde. Dehydration of specimens was done using ascending solutions of ethyle alcohol. Cleaning of the specimens was performed by xylene and embeded in paraffin. 5 micron sections were prepared and stained using H & E and Masson trichrome.

#### **RESULTS**

The use of tissue adhesive or dexion plus for closure of the gallbladder wall after cholecystotomy revealed no complication during or after operation. Cholecystography showed that the gallbladder, cystic duct, hepatic duct and common bile duct could be seen after 90 minutes from injection of the contrast media. The gallbladder appeared as a pear shape shadow. The dimensions of the gallbladder were not changed from



before or after operation. It varies between 5.5-6.0 cm long and 3.5-4.0 cm in its greatest width. The fundus extended to the diaphragm at the level of the 6<sup>th</sup> and 7<sup>th</sup> intercostal spaces in both groups (Fig. 1a,b&c). In the 2<sup>nd</sup> group, the site of suturing appeared as a radiolucent line parallel to the gallbladder wall at the fundus (Fig.1 c).

Histopathological examination revealed that the healing in the 1<sup>st</sup> group occurred by fibrosis. The scar tissue was almost mature form of fibroblasts and mature collagen bundles (Fig. 2). In the 2<sup>nd</sup> group healing occurred by fibrosis but the scar was still formed of granulation tissue (fibroblasts and capillaries) with less mature collagen bundles (Fig. 3)

### DISCUSSION

In the present study, cholecystotomy is advised because it was not followed by any complication in the biliary system. In an experimental study on the effect of cholecystectomy in the dog, Mahour et al. (1968) and WAKIM and MAHOUR (1971) recorded that extrahepatic biliary ducts were found to be dilated as a result of intraductal tension increases until it overcomes the powerful sphincter mechanism at the intramural portion of the common bile duct. In the histopathological study herein, it has become apparent that the tissue adhesive permits powerful bonding between living tissues. The fibroblasts and collagen bundles were mature in the 1<sup>st</sup> group while in the 2<sup>nd</sup> one they were less mature in the same time. These results are in agreement with that given by HAFNER et al. (1963). BRENZOCK (1983) said that the wall of the gallbladder closed usually with interrupted 3-0 chromic catgut and a second layer of inverting Lembert or Connell.

The findings of the cholecystograph indicate that presence of homogenous radioopaque density at the site of operation. The wall of the gallbladder from inside and outside was smooth in the 1<sup>st</sup> group. A radiolucent line at the site of suturing indicates of a filling defect due to invagination of wound edges and scar formation. It is concluded that the tissue adhesive can be safely and easily applied in case of cholecystotomy with minimal cost and without any complications.

Various adhesive materials have been tried, it must be nontoxic, non irritating material and retaining its adhesive properties for a sufficient length of time to be finally replaced by growing tissue (WEISSBERG et al., 1966). Recently N-butyle cyanoacrylates is the group of materials that have been used most extensively as tissue adhesive. They are clear fluids that polymerize instantly on contact with wet tissue.



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They form an insoluble flexible plastic that adheres strongly to wet surface (Silver, 1976).

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### LEGENDS

- Fig. 1a: Normal cholecystograph showed the hepatic duct (H), common bile duc (C), cystic duct (S) and gallbladder (G.B) after 90 minutes from injection of biligraphin.
- Fig. 1b: Cholecystograph after closure of the gallbladder wall by N-Butyl-Cyanoacrylate. The gallbladder showed homogenous radioopaque density with smooth wall.



- Fig. 1c: Cholecystograph after closure of the gallbladder wall with dextron plus suture. The gallbladder wall showed a radiolucent line (L) at the site of suturing.
- Fig. 2 : Showing mature fibrous tissue after using of tissue adhesive (H&E. x250).
- Fig. 3 : Showing immature fibrous tissue after using of dextron plus (H&E. x250).

