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The Effect of Alcohol on Human Gallbladder Mucosa: An *in Vitro* and *in Vivo* Study

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ABSTRACT. The effect of absolute alcohol on the human gallbladder mucosa was examined on freshly removed gallbladders and also in *in vivo* just before its removal. The histologic examination shows that extensive sloughing and ulceration of the mucosa occurs after 20 minutes of direct contact. No ulceration in the deeper layers of the gallbladder wall occurs. There are also no other side effects related to the use of absolute alcohol *in vivo*.

KEY WORDS: Gallbladder, Nonsurgical ablation, Alcohol, Mucosal destruction.

Introduction

Although cholecystectomy is the standard treatment for cholecystolithiasis, other treatment modalities are being increasingly investigated, especially for high risk patients or for those who are unwilling to undergo surgery[1-3]. The major disadvantage of such nonsurgical percutaneous treatment options is the stone recurrence. Chemical destruction of the gallbladder mucosa with subsequent obliteration of its lumen alleviates the risk of stone recurrence. To achieve this, one has to find a suitable chemical which destroys the gallbladder mucosa without damage to the deeper layers

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of the wall or any systematic side effects and a fail safe way of occluding the cystic duct to avoid spillage of the chemical into the biliary passages and to avoid mucosal regeneration[4-7].

The aim of this study is to evaluate the efficiency of absolute alcohol in destroying the human gallbladder mucosa.

Materials and Methods

The study was conducted in 2 stages. In the first part of the study freshly removed human gallbladders were used. The contents of the gallbladder were removed through a small opening in the fundus which was then closed by a purse string suture. Absolute alcohol was then injected into the lumen until the gallbladder was maximally distended to ensure contact of the alcohol with the whole mucosa. After 20 minutes the gallbladder was opened longitudinally and immersed into buffered Formalin for histologic evaluation.

As control 3 freshly removed gallbladders were evacuated as mentioned above, but no alcohol was injected. After 20 minutes, the gallbladders were opened longitudinally and put into buffered Formalin for histologic evaluation.

In the second part of the study, four patients undergoing elective opened cholecystectomy for cholecystolithiasis agreed to participate in the study. (At the time we conducted the study – September 1989 till August 1990 – laparoscopic cholecystectomy was not available). None of the patients had any history of liver disease or acute biliary disease.

After dissection of the cystic duct, an intraoperative cholangiogram was done to ensure normal biliary passages. Then, the cystic duct was divided between ligatures. A cholecystostomy was made in the fundus of the gallbladder for stone extraction. The gallbladder was then flushed clean with normal saline. After insertion of a 5 Fr. feeding tude the cholecystostomy was closed with a purse string suture. Through the feeding tube a cholecystogram was done to exclude any aberrant bile ducts or any leak from the gallbladder. The gallbladder was then emptied and absolute alcohol was injected through the feeding tube until full expansion of the gallbladder. After 20 minutes, the alcohol was aspirated. The cystic artery was identified and divided between ligatures and cholecystectomy was performed. After haemostasis, the transverse abdominal incision was closed in layers using absorbable sutures without insertion of abdominal drains. The removed gallbladder was opened longitudinally and immersed into buffered formalin. Blood was taken from each of the 4 patients preoperatively, 6 and 24 h. post-operatively and on the *5th* post-operative day for estimation of Bilirubin, alkaline phosphatase, SGOT, SGPT, jGT and amylase.

Results

The histologic examination of the 3 control gallbladders showed a wall thickness of 0.2-0.4 cm with some strands of fibrosis in the wall. No mucosal ulceration was present.

The 12 gallbladders, which were subjected to alcohol after removal, showed, in addition to the above mentioned changes in the wall, extensive ulcerations and sloughing of the mucosa with mild submucosal oedema and a few inflammatory cells.

The examination of the gallbladders, which were subjected to alcohol injection before removal, showed, beside the extensive mucosal sloughing, dilated and blood engorged blood vessels in the beds of the ulcerated areas and collections of acute inflammatory cells. Some of these ulcerated areas were covered with fibrin. There was marked congestion of the whole wall.

None of the 4 patients in this series had any post-operative complication or any increase in analgesics consumption.

There were also no changes in any of the biochemical parameters examined.

Discussion

There have been a few works on the effect of absolute alcohol (with or without additives) on animal gallbladder mucosa. Absolute alcohol has also been used to sclerose renal and hepatic cysts[3,9] without negative systemic effects.

The results of this study show that absolute alcohol can be efficiently and safely used to destroy the human gallbladder mucosa. Twenty minutes of continuous direct contact seem to be sufficient to destroy the whole mucosal lining. In animal studies, this mucosal destruction is followed by fibrosis which eventually obliterates the lumen of the gallbladder.

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تأثير الكحول على الغشاء المخاطي لمرارة الإنسان

طلال محمد بخش ، و أسامة إبراهيم ناصف ، و عدنان عبد المعطي مرداد ،
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المستخلص . تم اختبار تأثير الكحول الإثيلي على مرارات الإنسان بعد استئصالها مباشرة في بعض الحالات أو قبل استئصالها في حالات أخرى . وقد وجد عند الفحص المجهري تقرحات شديدة بالغشاء المخاطي المغلف للمرارة من الداخل مع عدم وجود تأثير على الجدار العضلي للمرارة .

لا توجد أية تداخلات موضعية أو عامة عند استخدام الكحول في المرارة بداخل المرضى قبل استئصالها .