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Interposition of the demucosed colon segment into the small bowel

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ABSTRACT

The aim of this study is, could we transform demucosed colon into the small bowel? To find the answer, this study was investigated the surface changes of demucosed colon segment, interposed into the small bowel fashioned as a blind loop. This study was performed in five healthy young stray dogs. A blind loop was fashioned, using a 5 cm long demucosed colonic segment and a 20 cm long ileal segment. Ileal and colonic continuity were restored by primary anastomosis. Four weeks later, blind loop was resected and examined histologically under light microscopy. Histological findings revealed that demucosed colonic segment interposed into the small bowel fashioned as a blind loop, was covered with small bowel epithelium.

KEY WORDS: Colon interposition, short bowel syndrome

INTRODUCTION

Short bowel syndrome (SBS) is the given term to the complex malabsorption problem associated with inadequate intestinal absorptive surface.[1]

Different strategies have been employed for the treatment of SBS. The surgical therapies aimed; slowing the intestinal transit time - increasing the absorptive surface - and small bowel transplantation.[1,2]

There are many surgical approaches in SBS. Could we transform demucosed colon into the small intestine? To find the answer of this question, we investigated the surface changes of the demucosed colon segment, which interposed into the small bowel fashioned as a blind loop.

MATERIALS AND METHODS

The study was performed in five healthy young stray dogs weighed 8-10 kg, aged 6-8 months. They were kept in quarantine for 3 weeks.

The study was officially approved by the authorities in compliance with the protection of law of animals. All operations were used under general anesthesia by a veterinarian under steril conditions in the Animal Hospital Nilüfer - Bursa. Neither hazardous procedures nor chemicals are involved in this study.

Dogs were allowed to drink only water for 3 days before the operation. General anesthesia was performed with xylasine (10 mg/kg) and ketamine (6-8 mg/kg).

The abdomen was opened through a midline incision; a 5 cm pedicled segment of transverse colon was prepared. Saline solution was injected between the mucosal and muscular layers for facilitating demucosation. Mucosa was easily stripped from the muscular layer with blunt dissection. A 20 cm ileal segment was isolated from the middle portion of the ileum with its mesentary. A blind loop was created using the demucosed colon and the isolated ileal segment.

3-5 mm of the denuded colonic coat was spared for histological examination as control [Figure 1A].

Ileal and colonic continuity were restored by primary anastomosis. The post-operative period was uneventful. Animals were isolated in separate cages after the operation and were given analgesics. They were allowed to drink only water on the first post-operative day and fed with soft food starting from the second day.

Dogs were re-operated on the post-operative 4th week.

Blind loop was resected and abdomen was closed. Tissue specimens were fixed in 10% neutral formalin solution, stained with Hematoxylene-Eosine (H/E) and investigated under light microscope.

RESULTS

The histology of the normal colon is shown in Figure 1A. Histological examination of the denuded colon at the start of the study showed muscular coat without any trace of tunica mucosa, muscularis mucosa, and sub-mucosa [Figure 1B].

At the end of the study, after 4 weeks, it was considered unnecessary to sacrifice the dogs and they were returned to their environment of the animals' hospital.

The pedicled blind loop was dilated and filled with mucosal secretion. The denuded colonic segment was contracted like a ring causing some degree of obstruction. The surface of the demucosed colonic coat was totally covered by granulation tissue. Monolayer cubic epithelial cells and intestinal glands were found within this granulation tissue, located mainly near the anastomosed ends [Figure 2].

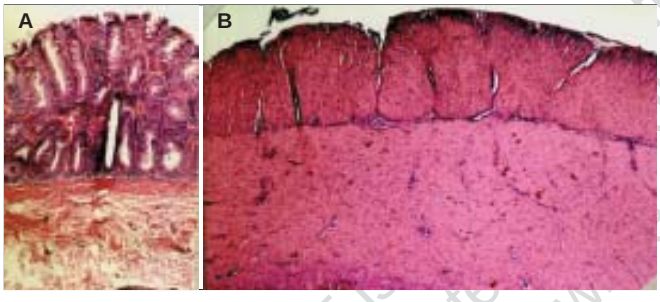

Figure 1: A. Histology of the colon (H/E, Light microcope, 10x), B. Histology of the demucosed colon (H/E, Light microcope, 4x)

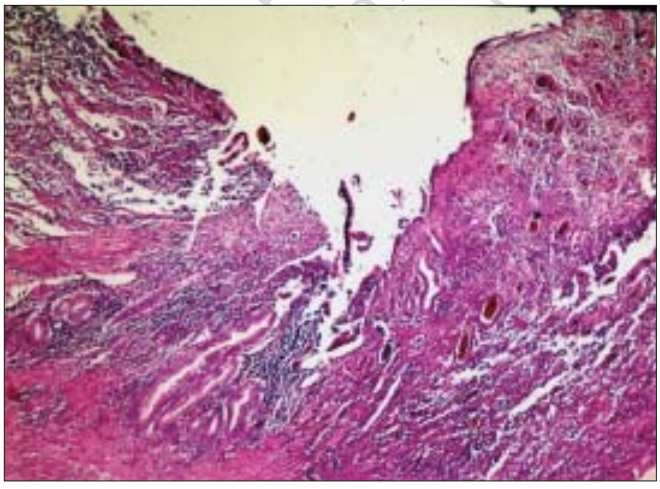

Figure 2: Covering of the muscular layer of the interposed colonic segment with granulation tissue and monolayer cubic epithelial cells and intestinal glands (H/E, Light microscope, 4x)

DISCUSSION

Colon interposition is one of the various surgical techniques for the treatment of SBS.[1]

The interposition of such segments improve lifestyle by, increasing the transit time and diminishing the number of diarrhea episodes.[3] Fatal intestinal obstruction is an undesired side effect, seen with the antiperistaltic colon segment.[4,5]

The length of the inter-positioning colon segment is a matter of debate. Authors have utilized segments of colon ranging from 3 to 24 cm.[1-7] For technical reasons and to preserve normal colon as much as possible, we preferred to use 5 cm in our model.

In some studies, significant increase of the thickness of intestinal wall is reported that colonic segment contracts like a ring and obstructs the passage.[3]

We have also observed the same changes in our model. Using an intraluminal stent may prevent such an obstruction.

Some previous studies have shown that the neomucosa of the denuded colonic segment resemble colonic mucosa rather than small bowel's.[1,8]

This may be because of the inadequate removal of the colonic mucosa.

We removed the colonic mucosa totally and confirmed histologically that no remnant was left [Figure 1B]. Covering the entire colonic muscular matrix with granulation tissue is a prominent finding that we encountered. The neomucosa formed by monolayer cubic epithelial cells and intestinal glands originated from small bowel epithelium [Figure 2].

Even Zachariou's study showed typical characteristics of the small bowel mucosa as villi and crypts in the 6th week after transplantation.[2]

After these findings, we think that, small bowel epithelium the demucosed colonic coat as neomucosa covered. Further detailed studies are required to understand whether this segment has absorbtive capacity similar to that of the small intestine.

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