Interposition of the demucosed colon segment into the small bowel

M. Sanal, K. Sinmaz¹, F. B. Sunay², I. Çavusoglu², M. Büyükçoban³
Department of Pediatric Surgery, SSK Children’s Hospital, ¹Pedicer Pediatric Surgery Center, ²Department of Histology and Embryology, Uludag University Hospital, ³Animals’ Hospital of Municipality of Bursa, Bursa, Turkey

Correspondence: Dr. Murat Sanal, Anichstr. 35 Kinderchirurgie 3N 6020 Innsbruck, Austria. E-mail: alimsanal@mail.com

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.¹²

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 sterile 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 Hematoxyline-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].

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 absorptive capacity similar to that of the small intestine.

ACKNOWLEDGMENTS

We would like to thank to veterinarian Dr. Mürsel Büyükçoban, Director of the Animals’ Hospital Nilüfer – Bursa for his contribution in our study.
Sanal, et al.: Interposition of the denumosed colon segment

REFERENCES


Source of Support: Nil, Conflict of Interest: None declared.

Free access to the Cochrane Library for everyone in India

Anyone in India with access to the Internet now has complementary access to reliable, up-to-date evidence on health care interventions from The Cochrane Library, thanks to sponsorship provided by the Indian Council of Medical Research (ICMR) that recently signed a three-year contract for a national subscription with the publishers, John Wiley & Sons. The Cochrane Library (available at www.thecochranelibrary.com) is considered by many to be the single most reliable source for evidence on the effects of health care interventions. It includes seven databases that are updated quarterly, four of which are the efforts of the 15,000 international contributors of the Cochrane Collaboration (www.cochrane.org).

The Cochrane Database of Systematic Reviews currently contains 4655 regularly-updated systematic reviews and protocols of reviews in preparation.

The Cochrane Controlled Trials Register currently contains references, mostly with abstracts, of more than 48,900 controlled clinical trials- easily the largest collection of such trials in the world.

The Cochrane Database of Methodology Reviews contains 22 systematic reviews of the science of reviewing evidence. The Cochrane Methodology Register contains the bibliography of 9048 articles that could be relevant to anyone preparing systematic reviews.

The three other databases in The Cochrane Library include the: Database of Abstracts of Reviews of Effectiveness, summaries of 5931 systematic reviews published elsewhere and quality appraised by the UK National Health Service (NHS) Centre for Reviews and Dissemination.

Health Technology Assessment Database that contains details of 6358 completed and ongoing health technology assessments.

NHS Economic Evaluation Database that contains 20,292 abstracts of quality assessed economic evaluations from around the world. Also available is information about the Cochrane Collaboration. One can search for interventions or health conditions across all these databases using free text terms or medical subject headings (MeSH).

From 29 January 2007 the Cochrane Library is freely available to all residents of India with Internet access thanks to funding from the Indian Council of Medical Research (ICMR) (www.ICMR.nic.in), and work of the South Asia Cochrane Network (www.cochrane-sacn.org).