Small bowel diseases causing chronic diarrhea
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SUMMARY
This thesis was made to study the existence of small bowel diseases in chronic diarrhea. As I already mentioned in the first chapter, chronic diarrhea is common in Indonesia, and not many studies have been published about chronic diarrhea in adults. I hope that this thesis can help many medical doctors in treating chronic diarrhea. Due to the limited facilities & abilities in Indonesia, I did not study the tumor or malignancy as the causes in the small bowel.

CHAPTER 1. Diagnosis of small bowel abnormalities as the causes of chronic diarrhea are discussed. The etiologies of chronic diarrhea can be divided according to the location as small bowel, large bowel and extraintestinal. The causes of chronic diarrhea located in the small bowel are infectious diseases, and non-infectious diseases. Usually watery and nonbloody-nonsteatorrheic stools are caused more by small bowel diseases and bloody stools are caused mainly by large bowel diseases. The abnormalities which can be found in physical examination are usually caused by nutrient, vitamin and electrolyte deficiencies. Patients with chronic diarrhea may suffer weight loss, edema, muscle hypotrophy, dry skin, anemia, glossitis, dermatitis, paresthesia etc. The supporting examinations which will be required are stool examinations, blood tests, other sophisticated examinations like abdominal ultrasonography, abdominal CT-Scan, ileocolonoscopy examination with histopathology, gastroduodenojunoscopy examination with histopathology, intestinal x-ray photography, endoscopic retrograde cholangiopancreatography, magnetic cholangiopancreatography etc. The treatment of chronic diarrhea consists of supportive therapy & causal therapy.

CHAPTER 2. In this chapter we discussed the normal histological appearances of the small bowel in Indonesian people. These normal histological appearances and measurements are useful as a control and pilot study for another study on pathologic disorders of the small bowel. This study revealed that the mean height of villi of Indonesian small intestine was shorter than in Western literature. Other measurements of Indonesian small intestine mucosa was the same as in other previous studies. The mean height of villi in the duodenal bulb was 265.00 ± 81.89 μm. The mean height of villi in the descending part of the duodenum was 317.27 ± 99.66 μm. The mean height of villi in the jejunum was 341.76 ± 76.06 μm. The mean height of villi in the terminal ileum was 235.41 ± 73.32 μm. There was no relation between the age with the height of villi or the height of crypt or the width of villi or the intervillous space. There was an increase of mean of goblet cells from the duodenal bulb to the terminal ileum, so the highest goblet cell number was found in the terminal ileum.

CHAPTER 3. This study revealed that the most frequent cause of adult chronic diarrhea in Indonesia was infection. The frequency of chronic infective diarrhea was 48.3%. The Parasitic causes were Candida albicans, Blastocystis hominis, Entamoeba histolytica, Giardia lamblia etc. Bacterial causes were pathogenic E. coli, Aerobacter Aerogenes, Mycobacterium tuberculosis, Geotrichum, Shigella sonnei, Salmonella paratyphi etc. The causes of chronic non-infective diarrhea were carbohydrate maldigestion, colorectal cancer, Crohn's disease, ulcerative colitis, irritable bowel syndrome, colorectal polyp etc.

CHAPTER 4. This study revealed abnormalities of the small bowel in chronic infective & non-infective diarrhea. Small intestinal abnormalities endoscopically and/or histopathologically were found in 65 (82.6%) patients, the rest were normal. The small intestinal abnormalities were infective non-tuberculosis ileitis (26%), infective non-tuberculosis duodenitis (26%), non-infective jejunitis (18.2%), villous atrophy of the jejunum (3.9%), follicle lymphoid hyperplasia of the terminal ileum (15.6%) etc. Large intestinal abnormalities were found in 85.7% cases. In chronic diarrhea, the small intestinal abnormalities were found less than the large intestinal abnormalities.
CHAPTER 5. This study revealed the usefulness of hydrogen breath test in supporting the diagnosis and management of diseases in chronic diarrhea. This test can detect bacterial overgrowth, rapid transit time, lactose intolerance. In the chronic diarrhea patients, there were 10% cases of rapid/accelerated transit time, 43.3% cases of bacterial overgrowth, 23.3% cases of lactose intolerance. The orocecal transit time in the chronic diarrhea group was more rapid than in the normal group (p<0.01). Bacterial overgrowth & lactose intolerance were found more in the chronic diarrhea group than in the normal group.

CHAPTER 6. This study was done to reveal the histopathological abnormalities of the small bowel in chronic non-infective diarrhea including inflammatory bowel diseases. In the descending part of the duodenum & jejunum, the lymphocyte infiltration, grade of inflammation, polymorphonuclear cell infiltration was higher in the chronic non-infective diarrhea group than in the normal group (p<0.01). In the terminal ileum, the lymphocyte infiltration, grade of inflammation and lymphoid follicle hyperplasia was higher in the chronic non-infective diarrhea group than in the control group (p<0.01). In chronic non-infective diarrhea, we could find histopathological abnormalities, which may play a role in the pathogenesis of diarrhea. If the number of patients were large enough, it was better that we groups the histopathological abnormalities according the diseases. The diseases included in this study were idiopathic/non-specific duodenjejunoileocolitis, irritable bowel syndrome, Crohn's disease, ulcerative colitis, polyp, eosinophilic duodenjejunoileocolitis.

CHAPTER 7. We studied the enzyme concentrations of lactase, maltase and sucrase from the specimen biopsies of the jejunum of the chronic diarrhea patients. These enzyme concentrations were compared with normal/control group. The lactase, maltase & sucrase concentrations in the jejunum of the chronic diarrhea group were much lower than in the jejunum of the control group (p<0.001).

This study showed that there is a low enzyme concentration of lactase, maltase and sucrase in adult chronic diarrhea.

CHAPTER 8. This study showed that intestinal candidiasis was present in 31.40% of chronic diarrhea patients. The most frequent characteristic of patients were: male, age 50-59, 3-4 weeks of diarrhea, soft frequent stools and there were other underlying diseases like malignancies, tuberculosis, other coinfections etc. Candidiasis could be considered as one of the causes of chronic diarrhea.

CHAPTER 9. This study revealed 11 cases with villous atrophy of the small bowel in chronic diarrhea. This histopathological abnormality was diagnosed with duodenjejunoscopy examination and biopsies. We found 3 cases of celiac sprue & 8 cases of giardiasis in this study. The height of villi of the villous atrophy group was shorter than of the control group (67.78 ± 32.32 μm vs 341.76 ± 76.06 μm). The mean height of crypts of the villous atrophy group was greater than of the control group (260.00 ± 126.19 μm vs 189.41 ± 58.15 μm). There was more intraepithelial lymphocyte infiltration in the villous atrophy patients than in the normal group. This study showed that it is very important to examine the small bowel histopathologically in chronic diarrhea cases in order to get the final diagnosis.

CHAPTER 10. In this study we studied the endoscopical & histopathological appearances of NSAID enteropathy in patients who consumed NSAID. There were 3 cases of nonbloody-nonsteatorrhea diarrhea in these patients. There were 79% NSAID enteropathy appearances in the duodenal bulb. There were 28.9% NSAID enteropathy appearances in the descending part of the duodenum. There were 7.9% NSAID enteropathy appearances in the jejunum. The NSAID enteropathy appearances were hyperemia, erosion & ulcer. Histopathologically, there were no differences of the height of villi, height of crypts between the NSAID subjects and the
normal subjects. The lymphocyte cell infiltrations, polymorphonuclear cell infiltrations, erosion, bleeding, hyperemia and fibrosis were more common in the NSAID enteropathy group (p<0.01). Goblet cells number were more increased in the duodenal bulb of the NSAID enteropathy group than normal (p<0.001). NSAID enteropathy could be considered also as one of the causes of chronic diarrhea.

CHAPTER 11. We studied the endoscopical & histopathological appearances of portal hypertensive enteropathy in liver cirrhosis. There were 2 cases of chronic diarrhea in these patients. In the duodenal bulb, the villous width in the portal hypertension group was wider than in the normal group (p<0.001) and the goblet cells in the portal hypertension group was higher than in the normal group (p=0.026). The mucosal villous vessel wall thickness in the portal hypertension group was thicker than in the normal group (p<0.001). The mucosal villous vessel diameter in the portal hypertension group was larger than in the control group (p<0.001).

So there were abnormalities of the histopathological appearance of portal hypertensive enteropathy, and these abnormalities could influence the pathogenesis of diarrhea.