

Falk Symposium 178



Diverticular Disease: A Fresh Approach to a Neglected Disease

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Center
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Abstracts
Poster Abstracts

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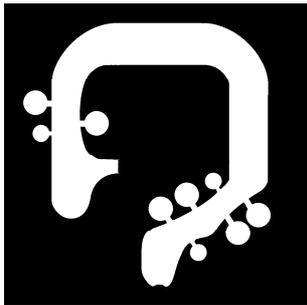
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Abstracts of Invited Lectures
Poster Abstracts

Falk Symposium 178

**DIVERTICULAR DISEASE:
A FRESH APPROACH TO A
NEGLECTED DISEASE**



Cologne (Germany)
September 2 – 3, 2011

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Session I

Pathogenesis

Changing epidemiology: Does it increase our understanding?

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Diverticulosis is the most common structural abnormality of the colon. Its associated complications account for a significant health care burden. During the last decade there has been an increasing interest in the occurrence and mortality associated with diverticular disease and its associated complications. There have been a number of reports using routinely collected health care administration data and from large cohort studies that have attempted to describe changes in the occurrence and identify risk factors for the development of the condition along with reporting its associated mortality.

Studies reporting the occurrence and mortality associated with diverticulosis, diverticular disease and the complications of diverticular disease notably, bleeding, perforation, fistula, stricture and abscess formation have been identified.

There is strong evidence of an increasing health care burden associated with diverticular disease in terms of hospitalization. There is evidence of an increase in the incidence of some the associated complications of diverticular disease notably perforation. The mortality associated with hospital admission for diverticular disease is significant as is the excess mortality associated with a diagnosis of one of the complications of diverticular disease. This excess mortality seems to be influenced by type of admission, comorbidity and social class. A number of risk factors such as body mass index, comorbidity, smoking and concurrent medications such as opiate analgesics and steroids may predispose to the development of complications.

This lecture will summarise the current understanding of the epidemiology of diverticular disease, with particular reference to disease occurrence and mortality, and how this might influence strategies to improve outcomes associated with this condition.

Biomarkers of past and present inflammation

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Recent data found that diverticular disease (DD) of the colon shows similarities with inflammatory bowel diseases (IBD). In particular, the detection of microscopic inflammation and the clinical response to mesalazine seem to confirm the hypothesis that inflammation may be a key point for the appearance of symptoms and development of complications.

In light of this hypothesis, several studies have recently focused their attention on the role of biomarkers in predicting and in monitoring the course of the disease. C-reactive protein (CRP), white blood cell count (WBC), erythro-sedimentation-rate (ESR), and fecal calprotectin (FC) have been therefore investigated. As in IBD, CRP seems to be the most effective marker of histological and clinical severity of the disease. In particular, a CRP below 50 mg/l suggests an acute uncomplicated diverticulitis (AUD), whereas a CRP higher than 200 mg/l is a strong indicator of DD complicated by perforation. As in IBD, FC seems to be a non-invasive sensitive marker of DD severity. In particular, FC may show slight increased values already in symptomatic uncomplicated DD (SUDD) (FC value ≥ 15 $\mu\text{g/ml}$ seems to be predictive of SUDD). As expected, FC shows higher values in AUD (FC value ≥ 60 $\mu\text{g/ml}$ seems to be predictive of AUD). Finally, FC seems to be useful also in monitoring the therapeutic response in DD. In fact FC values decreased significantly in patients responding to therapy, whereas persisted increased in patients who failed to obtain remission.

Abnormalities of neuromuscular anatomy in diverticular disease

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Diverticular disease (DD) is the most common morphological abnormality of the large intestine characterized by multiple mucosal herniations throughout the colonic wall. The pathogenesis of DD is still poorly understood and considered to be multifactorial. Whereas classical pathogenetic concepts have focused on risk factors including increasing age, low-fiber diet and connective tissue disorders, novel concepts take into account that patients with DD exhibit disturbed intestinal motility patterns (that may result in functional obstruction and painful sensations) therefore postulating an underlying enteric neuro-/myopathy.

The idea that DD may be primarily defined by an “acquired neuromuscular derangement” was introduced already four decades ago by Macbeth and Hawthorn who were the first to describe enlarged and ectopically located myenteric ganglia in colonic specimens of DD. Recent studies were able to confirm alterations of enteric nerves, neurotransmitters, and musculature as the key mediators of intestinal motility by modern methodical approaches.

As a result, quantitative evaluations of the enteric nervous system (ENS) in DD yielded hypoganglionic conditions of both the myenteric and submucosal plexus as well as a nerve tissue remodelling in chronic DD. The disturbed neuro-muscular communication was proven by demonstrating alterations in several enteric neurotransmitter systems, exemplified for the cholinergic, serotonergic, nitrergic system as well as for vasointestinal peptid, galanin and tachykinins.

Novel lines of evidence have added the involvement of neurotrophic factors that are supposed not only to promote the development of the ENS but also to regulate its maintenance in adulthood. An essential neurotrophic factor is Glial cell line-derived neurotrophic factor (GDNF) that has been shown to increase neuronal survival and plasticity in enteric nerve cell culture models and that is down-regulated in the tunica muscularis of patients with DD arguing for a lack of neurotrophic support.

Consistent with the hypothesis of an enteric myopathy, deficits in smooth muscle integrity and composition could be delineated. Alterations of the enteric musculature in patients with DD range from hypertrophy and fibrotic transformation to deficits in gene expression profiles of several smooth muscle proteins of the contractile apparatus.

Taken together, the structural and functional findings on alterations of the ENS and the enteric musculature in DD provide evidence to strengthen the hypothesis that an enteric neuro-/myopathy may contribute to the development of colonic diverticula and the generation of symptoms in the course of the disease.

Colonic diverticular disease: Abnormalities of neuromuscular function

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Although diverticular disease of the colon (diverticulosis) is a frequent finding in Western countries, its pathophysiologic grounds are still only partially understood. Traditionally considered as an age-related condition, colonic diverticulosis is probably the final result of several factors concurring together to determine the anatomic-functional abnormalities eventually causing the outpouching of the viscus' mucosa. Among these factors, a relevant role seems to be played by an abnormal neuromuscular function of the large bowel, as shown by abnormal myoelectrical and motor function repeatedly described in these patients, as well as by altered visceral perception. These anomalies might be related to the recent demonstration of derangement of enteric innervation (especially involving interstitial cells of Cajal and enteric glial cells), mucosal neuropeptides, and mucosal inflammation. The latter may have a role of paramount importance in the development of visceral hypersensitivity, responsible for abdominal pain in a subset of patients.

Patterns of colonic mucosal inflammation in diverticular disease

Professor N.Y. Haboubi, FRCS (Eng), FRCP (Glasg), FRCPath
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The aim of this talk is to draw the attention to the histological changes that affects the luminal aspect of the sigmoid colon in patients with diverticular disease (DD) and in which there are some endoscopic, clinical and pathological changes which may warrant its recognition.

In patients with DD there are four possible mucosal histological patterns:

1. Ulcerative colitis-like changes:

Cryptitis, increase of mononuclear inflammatory cells in lamina propria and basal lymphoid aggregates are the main microscopic findings. Those were found in all of the 23 cases in one study (1). Other microscopic findings were prominent but less common such as distortion of crypt architecture 20 (87%) and paneth cell metaplasia 11 (48%).

In practice, it is very difficult to differentiate between ulcerative colitis and diverticular colitis (DC) on the basis of sigmoid mucosal biopsies alone. Therefore it is important to have other data like involvement of the rectum and extension of inflammation into the colon as rectal involvement practically rules out the diagnosis of DC (2). This information often becomes available in the most important regular clinico-pathological meetings where the final diagnosis can be arrived at.

2. Crohn's disease-like changes:

Crohn's disease by and large is strictly a clinicopathological condition but has certain histological features which if present in the background of inflammatory bowel disease become diagnostic. The most common of these features are non-caseating sarcoid type granulomas, transmural inflammation, focal mucosal involvement and fissuring ulcerations. Relying on the clinical outcome, the literature is divided whether Crohn's type features are found in cases of DC or simply the two conditions coexist. The consensus is in favour of the former proposal. Meyers et al. study showed that there are 10 out of 21 cases of diverticulosis had granulomas. The microscopic features for this pattern closely mimicked the changes seen in ordinary Crohn's disease. Also, characteristic non-caseating granulomas were found in 17 out of 21 cases of resected colon for diverticulosis and in the regional lymph nodes in 6 of the cases, whereas deep fissuring ulcers were remarkable in 3 of the cases. On the other hand, Goldstein et al. had in their study 24 cases with numerous non-necrotizing granulomas in all the layers of the bowel wall out of 29 resected specimens. Moreover granulomas were not only detected in the mucosa and submucosa of the diverticula but they also were involved in the wall of the peri-colonic adipose tissue and lymph nodes (4).

Gledhill and Dixon (5) reported eleven cases of Crohn's disease type diverticulitis with typical "classic" histological features of Crohn's disease-like, transmural inflammation, granulomas and ulceration. In nine patients the features were confined to the resected specimens only and none of these patients progressed clinically to full blown Crohn's disease. Their conclusion is that the histological changes representing

Crohn's disease are reaction process to diverticulosis rather than to Crohn's disease. We also believe that some cases of DD may show histological features akin to Crohn's disease but should not be regarded as Crohn's cases.

3. Prominent mucosal folds:

These are defined as expansion of the fold more than 5 mm above the inner aspect of the muscularis propria. Goldstein et al. (6) found the prominent mucosal folds were seen in 91 out of 100 sigmoid colon resection specimens removed for diverticulitis whereas these changes were noticed in 3 cases out of 34 cases in other study. In another study of 8 cases of surgically resected sigmoid colons with diverticular disease, contained protruding mucosal folds or polyps numbered from one to eleven per specimen, ranged from 0.5 to 3.0 cm in greatest dimension. The histological features of the mucosal folds is characterised by polypoidal protrusion of the mucosa which shows an assortment of acute and chronic inflammatory cell infiltrate, fibrosis of lamina propria, crypt distortion and formation of tear drop or diamond shape crypts and sometimes proliferation of the muscularis mucosa.

Two special forms may be seen, cap polyp and polypoidal mucosal prolapse (myoglandular polyp). The cap polyp is characterised by ulceration of the luminal part of the polyp and replacement by a variably thick layer of a "cap" made up of acute inflammatory cells and fibrin. The myoglandular polyp has features similar to solitary ulcer (mucosal herniation syndrome)

4. Microscopic colitis:

On occasions we have observed thickening of collagen layer just below the surface epithelium with or without increase in intraepithelial lymphocytes in patients with DD and who have no other clinical symptoms or endoscopic features of microscopic colitis.

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Session II

Course of the disease

Impact of lifestyle

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The high prevalence of diverticular disease in industrialized Western compared to Eastern or undeveloped cultures prompted the long-standing belief that dietary fiber insufficiency, and perhaps other lifestyle factors, leads to diverticulosis.¹ However, such ecological observations are prone to error, and the relationship between fiber and diverticular disease remains uncertain. A recent cross-sectional study of over 2000 patients undergoing colonoscopy found no relationship between dietary fiber, red meat, fat or physical activity and uncomplicated diverticulosis.² Several small randomized trials have shown that fiber decreases bowel symptoms in uncomplicated diverticular disease, but others have not.³⁻⁷ Data on fiber and the prevention of diverticular complications, diverticulitis and diverticular bleeding is sparse. A prospective cohort of 51,000 men enrolled in the Health Professionals Follow-up Study (HPFS), found an inverse relationship between fiber intake and symptomatic diverticular disease, but did not specifically examine diverticulitis and diverticular bleeding.^{8,9} One prospective study of 56 patients with symptomatic uncomplicated disease found that patients consuming more than 25 grams of fiber per day were less likely to have subsequent complications, including diverticulitis, than those consuming less fiber.¹⁰ Contrary to a long-standing belief, a recent study of the HPFS found that nuts and corn did not increase the risk of diverticulitis or diverticular bleeding.¹¹ Red meat may also increase the risk of symptomatic diverticulosis; whereas caffeine and alcohol have shown no association.^{8, 12-14} Three prospective cohort studies as well as a number of retrospective studies have found positive associations between obesity and diverticular complications.¹⁵⁻²³ Central obesity may be particularly important, and the magnitude of risk may be higher for diverticular bleeding than for diverticulitis.²² Findings regarding smoking and diverticular complications have been inconsistent, but suggest that smokers are at increased risk for complications, particularly perforation.^{12, 17, 20, 24-27} Vigorous physical activity appears to lower the risk of diverticulitis and diverticular bleeding.^{15, 28} In conclusion, multiple lines of evidence point to the importance of lifestyle in the course of diverticular disease. Further research is needed to define the role of lifestyle modification in the primary and secondary prevention of diverticulosis and its complications.

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What determines the evolution to diverticulitis?

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Although colonic diverticulosis is a frequent condition in Western populations, only 5–10% of the patients will experience a severe complication of diverticular disease: the occurrence of diverticulitis, leading to peritoneal abscess peritonitis.

The pathophysiology of diverticulitis has until now remained poorly understood. It is classically related to an increase in pressure in a diverticulum, leading to perforation. Peritoneal abscess or peritonitis results from this perforation with diffusion of air and stool outside the colonic lumen. The increase in intradiverticular pressure may be related to the presence of faeces in the diverticulum or slow colonic transit. However, very few data sustain this hypothesis.

Life style and dietary factors have also been advocated to increase the risk of diverticulitis such as obesity, use of non-steroidal anti-inflammatory drugs or aspirin, low fibre intake. On the contrary, physical activity might decrease the frequency of complications such as diverticulitis. More recently, some data have suggested a role for mild inflammatory changes triggered by changes in the colonic microflora. However, these changes seem to be linked with mild symptomatic episodes, rather than severe complications.

Is diverticular disease associated with colonic malignancy?

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Colon cancer and diverticular disease have common characteristics; there are increases in the incidences in both disease entities and these diseases are more common in the westernized world compared to the rest. There is also an increase in the age-specific incidence with advancing age. Similar dietary features have been implicated for both diseases and already during the 1960's, it was postulated by Burkitt that there is an association.

Observational studies initially, were able to demonstrate that patients with a history of diverticular disease of the colon had an increased risk of colon cancer, especially in the left side. However, the results from these studies have not been consistent, and problems like selection bias and confounding by indication have been major drawbacks in order to interpret the results and infer causality. Recent studies, which have had a better assessment of diverticular disease by new diagnostic methods, do not to the same extent as previously support such an association. Moreover, surveillance bias has become an increasing problem as patients with diverticular disease of the colon are subjected to a higher diagnostic intensity than other individuals in a population-based setting. A critical evaluation of the studies published so far therefore clearly indicate that the proposed association between diverticular disease and colonic malignancy is not evidence based which should have an impact on clinical practice as well as how to deal with these patient groups within the realms of a screening program.

Session III

Diagnosis

Diagnostic criteria and accuracy – From the surgeon’s point of view: The indispensable role of the CT

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Aim: To determine the immediate and later role(s) of initial CT in patients presenting with their first episode of acute left-colonic diverticulitis

Methods: Prospective inclusion of 542 patients hospitalized in the University Hospital of Geneva between 1986 and 1997. Four-hundred and sixty-five (86%) patients had a CT. CT-grading of diverticulitis was divided between moderate diverticulitis (no sign of colonic perforation) and severe diverticulitis (signs of colonic perforation)

Results: During the index hospitalisation, young male patients (≤ 50 years old) had the higher proportion of CT-severe diverticulitis. Surgical treatment of the first episode of acute diverticulitis was needed in 33% of patients with CT-severe diverticulitis compared to 7% for patients with CT-moderate diverticulitis. On long-term follow-up after medical treatment of the first episode, incidence of remote complications was the highest (39%) for patients with CT-severe diverticulitis and the lowest (14%) for patients with CT-moderate diverticulitis

Conclusion: CT is the indispensable tool both to confirm the suspected diagnosis of acute diverticulitis and to appreciate the risk of surgical treatment during the initial acute episode. Moreover, CT-grading of diverticulitis is a statistically significant prognostic parameter of the chance of secondary complicated outcome after a first acute diverticulitis successfully treated medically. Finally, CT gives the exact location of diverticulitis. In case of elective surgery this colonic segment should be removed.

Diagnostic criteria and accuracy – US in the diagnosis of diverticulitis

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Over all, the diagnosis of diverticulitis is more reliably made by CT than by US. However, since US is often used as a first modality in acute abdomen, it is important to be aware of the US signs of diverticulitis. Besides, in not too obese patients, US may be superior to CT.

US is most useful in early, uncomplicated diverticulitis. Daily, repeated US examinations in patients with diverticulitis has taught me that diverticulitis, in the majority of cases, runs a predictable and benign course.

Initially, there is local wall thickening of the colon with preservation of the US layer structure. Within the inflamed diverticulum a fecolith is present and the diverticulum is surrounded by hyperechoic, non-compressible tissue, which represents the inflamed mesentery and omentum “sealing-off” the imminent perforation.

US follow-up shows evacuation of the fecolith to the colonic lumen, with or without the transient development of a small paracolic abscess, sometimes with disintegration of the fecolith. This process of spontaneous evacuation of pus and fecolith via local weakening of the colonic wall at the level of the original diverticular neck towards the colonic lumen, takes place within one or two days, rarely more.

The residual inflammatory changes remain present for several days after the evacuation, and it is not uncommon to find an empty diverticulum at first presentation. If, in such cases, patients are specifically asked for their symptoms, they invariably declare that “the worst pain is over”...

Whenever diverticulitis takes a complicated course, CT is superior to US, especially in the detection of free air, fecal peritonitis and deeply located abscesses, and in general in obese patients.

Finally, US, if necessary followed by CT, has an important role in the diagnosis of alternative conditions: ureterolithiasis, pyelonephritis, perforated peptic ulcer, appendicitis, Crohn disease, epiploic appendagitis, gynecological conditions, colonic malignancy, pancreatitis, etc.

Right-sided colonic diverticulitis in many respects differs from its left-sided cousin. Diverticula of the right colon are usually congenital, solitary, true diverticula containing all bowel wall layers. The fecoliths within these diverticula are larger and the diverticular neck is wider. There is no hypertrophy of the muscularis of the right colonic wall. My observations with US and CT in 110 patients with right colonic diverticulitis clearly show that it invariably has a favorable course and never leads to free perforation or large abscesses. Although relatively rare (left:right = 15:1), it is crucial to make a correct diagnosis, since the clinical symptoms of acute RLQ pain may lead to an unnecessary appendectomy or even right hemicolectomy.

Diagnostic criteria and accuracy – The role of endoscopy in diverticular disease

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Colonoscopy is not any more contraindicated in patients with diverticular disease. Barium enema is however more sensitive than colonoscopy in identifying sigmoid diverticuli. Barium enema cannot discern clinical relevance in symptomatic patients. Colonoscopy on the other hand, may identify an inflammatory process adjacent to the diverticuli known as segmental colitis associated diverticulosis (SCAD). SCAD is associated with symptoms such as diarrhea (75% of patients), rectal bleeding (71%) and abdominal pain (67%). Once SCAD is confirmed, remission is easy to obtain, often with only a short 5-aminosalicylic acid (5-ASA) cycle of therapy.

Acute diverticulitis occurs in 10–25% of patients with diverticulosis. Colonoscopy is advised after an attack of acute diverticulitis in order to completely evaluate the colonic lumen and exclude a potential malignancy. However, it is a common practice to postpone colonoscopy until symptoms have fully subsided and to perform colonoscopy at least six weeks after discharge, in order to avoid the potential risk of converting a sealed perforation into a free perforation. This policy is not evidence based. We conducted several studies aimed to evaluate the feasibility and safety of early colonoscopy in patients with acute diverticulitis.

Consecutive patients hospitalized for acute diverticulitis were included. In the first phase of the study, patients with adjacent peri-diverticular air/fluid on CT were excluded. In the second phase of the study, we included patients with peri-diverticular air/fluid on CT as well. Only patients with free intra-peritoneal air were excluded. During the first phase of the study, 39 patients underwent uneventful colonoscopy. During the second phase of the study, 40 patients underwent colonoscopy and one out of 6 patients with peri-diverticular air perforated her sigmoid colon. Colonoscopy to the cecum or to the obstructing tumor during the acute phase was achieved in 82% of patients. A second colonoscopy performed 6 weeks later, was successfully completed in all patients. Findings during the first colonoscopy were polyps in 7, polyp with infiltrating adenocarcinoma in one, obstructing adenocarcinoma in one and a bone stuck in a diverticulum in another patient. The last patient had the bone removed and the diverticulitis subsided on the same day. The last two patients had a more protracted course and were clearly those who benefited most from the early colonoscopy. Based on our study we concluded that early colonoscopy in acute diverticulitis is feasible. It should be reserved either for all patients with no air adjacent to diverticuli on CT or just for those with more protracted course. In the third phase, a prospective randomized study was conducted on patients with acute diverticulitis with no peri-diverticular air. Such patients were randomized into those who underwent early colonoscopy and those who underwent colonoscopy 6 weeks later. All patients in both groups underwent a previous abdominal CT to exclude cancer. Eighty-three patients were included in both groups and in none a significant lesion has been identified (except polyps). It seems therefore that the current abdominal CT with its excellent resolution is enough to exclude colonic cancer. Colonoscopy should be reserved only for patients with protracted unresolved course of acute diverticulitis.

Diagnostic criteria and accuracy – Clinical cases and decision making with panel discussion

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An interactive case presentation that should provide discussion and some answers on many of the following issues:

- What is the accuracy of the clinical diagnosis of acute diverticulitis?
- To rule out or confirm “acute diverticulitis” will you use diagnostic imaging?
- Is that different for mild or severe disease presentation?
- Are antibiotics part of the treatment of mild acute diverticulitis?
- If conservative treatment, what makes sense as component of this treatment?
- To drain or not to drain? When, how?
- Which patients need surgery? And what type of surgery?

Session IV

Hypothesis and future directions of research

Is it IBS or is it diverticular disease?

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Any chronic recurrent pain has both a central and peripheral component whose relative importance varies in different diseases. Emotional and psychological factors influence the central processing of painful stimuli, while peripheral factors influence the character of the pain and its location. Although IBS and diverticular disease are both characterised by recurrent abdominal pain and altered bowel habit there are important differences. The incidence of IBS peaks in the 20s and 30s with marked female predominance while diverticular disease increases steadily after the age of 60, with only a slight female excess suggesting rather different aetiologies.

There is strong evidence that emotional factors influence IBS symptoms which are correlated with anxiety and somatisation. A proportion of IBS (Postinfectious IBS, PI-IBS) begin with an infectious gastroenteritis which causes increased gut permeability, increased mucosal lymphocytes and 5-HT-containing enteroendocrine cells¹. Thus peripheral factors may also play role in both postinfectious and other subtypes of IBS in which there is evidence of increased gut permeability², low grade inflammation and, in IBS with diarrhoea, impaired serotonin transporter (SERT) leading to excess mucosal serotonin (5-HT)³. Some of these peripheral gut changes may be due to stress activating gut mast cells.

By contrast in diverticular disease there are more obvious peripheral abnormalities, with diverticula and evidence of inflammation in at least some⁴, together with decreased SERT⁵. However as with PI-IBS a high proportion of patients hospitalised for acute diverticulitis experience new recurrent abdominal pain in the 2 years post discharge⁶, a finding confirmed in a prospective 7 year follow up study. This showed that previous acute diverticulitis increased the risk of recurrent pain 4 fold, while the presence of elevated anxiety increased the risk 2.5 fold⁷ suggesting that in diverticular disease peripheral factors are more important than central ones. Recent data suggests that mesalazine may reduce accelerated epithelial cell turnover and reduce symptoms in diverticular disease⁸. This may have relevance for IBS since recent trials have suggested mesalazine may reduce mast cell numbers and possibly symptoms in IBS⁹.

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The role of visceral fat

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Until a decade ago the fat tissue has been exclusively considered as an endocrine organ. The emerging functional characterization of adipokines as well as adipocytes and preadipocytes suggested for the first time a close link between the endocrine and the immune system. This is emphasized by the changes of the expression pattern of adipokines when the fat tissue is adjacent to inflamed sites, in addition, adipokines are capable in regulating adaptive and acquired immune responses. Remarkably adipocytes express functional pattern recognition receptors and can consequently respond to conserved antigens. This seems to be highly relevant for intestinal inflammation and here in particular transmural inflammation where bacteria or bacterial antigens do translocalize into the mesenteric fat tissue. Besides phagocytosis of these antigens, adipocytes as well as preadipocytes can be activated resulting in a release of adipokines and chemokines mediating the infiltration of immune cells thus allowing for an immune response. Recent data suggest that the adipokine milieu of the fat tissue closely regulates the polarization of infiltrating immune cells. This is of increasing interest since the pattern of infiltrating cells allows for a characterization of the underlying disease. Thus in obesity pro-inflammatory M1 macrophages dominate this site while in Crohn's disease a robust infiltration of M2 macrophages can be found. Remarkably in colorectal carcinoma the presence of M1 and respectively M2 macrophages represents a prognostic marker for the disease course. In conclusion, the visceral fat tissue represents a complex organ with multifaceted function linking the endocrine and the immune system.

Genetics and inflammation – A paradigm for complex inflammatory diseases

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Clustering of inflammatory bowel disease in large families and the observation of an increased concordance between monozygotic twins suggests heritable components in these disorders. The high concordance in monozygotic twins (> 55%), which is not seen in dizygotic twins (< 5%) points to strong contribution of genetic susceptibility to the overall risk for disease. IBD represents a “complex disease” and may involve a large number of interacting disease genes.

Crohn's disease has become a paradigm example for the successful molecular exploration of a polygenic etiology. Crohn's disease was not known before 1920. Incidence has increased since now leading to a lifetime prevalence of up to 0.5% in Western industrialized countries. The current hypotheses propose unknown trigger factors in the life style of Western industrialized nations that interact with a polygenic susceptibility.

It appears that increased expression and production of TNF and an enhanced state of activation of the NFκB system are main drivers of the mucosal inflammatory reaction. The exploration of inflammatory pathophysiology of Crohn's disease using full genome, cDNA and oligonucleotide based arrays, respectively, has generated large sets of genes that are differentially expressed between inflamed mucosa and normal controls. While this may lead to new targets for a pathophysiology oriented therapy, it appears, however, that the dissection of the inflammatory pathophysiology does not allow to identify the multifactorial etiology of the disease.

In 2001 three coding variations in the NOD2 gene were identified that are highly associated with development of the disease. All variants affect a part of the gene that codes for the leucine rich part of the protein that appears to be involved in bacteria induced activation of NFκB in macrophages and epithelial cells. A particular sub-phenotype with localization of the disease in the ileocecal region is highly associated with the variants in the NOD2 gene.

Variants in the NOD2 gene by far not explain the genetic risk for Crohn's disease. With the advent of high-density, genome wide association studies enormous progress has been made to discover the remaining disease genes. More than 40 disease genes have been identified unto today, which however still explain less than 30% of the total genetic risk. In addition to innate immune barrier genes, cytokine response genes (e.g. IL-23R, IL12B, STAT3) and autophagy related genes (e.g. ATG16L1, IRGM) have been identified.

In ulcerative colitis GWAS studies are just at the beginning. The first three published studies pointed among several cytokine and macrophage function related genes point to a locus in the 3' end of the IL10 gene. In this regard the IL-10 knockout mouse becomes interesting again that in its phenotype is closer to ulcerative colitis than Crohn's disease.

The further genetic exploration of Crohn's disease and ulcerative colitis will result in molecular risk maps that are presently completed with amazing speed. Most interestingly, parallel GWAS in psoriasis, atopic dermatitis and other inflammatory diseases shows an unexpected overlap in identified disease genes and regions between the different types of inflammatory barrier diseases. The creation of medical systems biology of disease will lead to new models and eventually new therapies. However, before a comprehensive view of the genetic risk map is reached etiologic discoveries remain interesting but are not yet helpful new tools for the clinician. In selected individuals, however, genetic exploration including full genome sequencing can be used to aid the choice of alternative, probatory therapies after the standard repertoire has been exhausted.

Perception and origin of symptoms

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Colonic diverticulosis is a common condition in developed countries affecting approximately 5% of people in their fifth decade of life increasing to around 50% in their ninth. Although most patients remain asymptomatic a significant proportion suffers with complications. Abdominal pain is the most common symptom associated with diverticular disease for which admission to hospital is required and often indicates that inflammatory complications have developed. Patients typically present with unremitting severe abdominal pain, pyrexia and signs of peritonitis. However, in addition to these, there is a much larger proportion of people with colonic diverticula who experience unexplained, recurrent, short-lived but often debilitating abdominal pain and alteration in bowel habit. These patients account for the many thousands of people seen in the community each year with a diagnosis of diverticular disease and for whom we have very little to offer. These patients have radiological or endoscopic evidence of diverticula but no evidence of perforation, abscess, inflammation or mechanical obstruction. When present, there seems to be a general acceptance that these symptoms are due to a functional disorder or constipation although other mechanisms have been hypothesised. Over the past ten years, advances in neurogastroenterology have increased our understanding in this area and this lecture reviews the possible mechanisms thought to be responsible for these symptoms.

Session V

Diverticulitis: First attack

Diverticulitis – Classification

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Through the development of laparoscopic surgical techniques in recent years, the management of sigmoid diverticular disease has become the focus of partially controversial discussions about establishing the correct indication and performing the necessary pre- and postoperative treatment. Precise pretherapeutic staging is essential in selecting the treatment procedure for acute diverticulitis. Here computed tomography (CT) is a valuable diagnostic tool, since it can determine the extension of the disease and differentiate complicated from uncomplicated stages. CT stages of complicated disease are considered to comprise transmural phlegmon and covered perforation for elective interventions and free perforation for emergency interventions. Hansen-Stock classification has proved to be a valuable staging system that enables pretherapeutic determination of all stages of diverticular disease. Here stage 0 denotes irritation-free diverticulosis with detection of only gas- or contrast-filled diverticula and no inflammatory signs in the CT. Stage I is the stage of acute uncomplicated diverticulitis. The CT morphological correlative here is bowel wall thickening. Stage II designates acute complicated diverticulitis and is further subdivided into stages IIa, IIb and IIc according to the severity of inflammation. Stage IIa involves peridiverticulitis or phlegmonous diverticulitis with spread of the bowel inflammation to the pericolic fatty tissue. The CT shows inflammatory infiltration of pericolic fat. Stage IIb is characterized by CT morphological detection of a mesocolic or retroperitoneal abscess or an abscess in the minor pelvis. In stage IIc, the CT detects free air and/or fluid as the correlative of a free bowel perforation. Stage III is the stage of chronic recurrent diverticulitis, and classification here is based not only on the CT but also on the patient's history. The typical CT sign of chronic inflammation is bowel wall thickening, sometimes with stenosis or fistulas.

To clarify the surgical indication, it is necessary to have a precise pretherapeutic classification which covers all stages of the disease and to know the natural course of the disease.

Table 1: Hansen-Stock classification

Stage	Description	CT Scan
0	Diverticulosis	Gas- or contrast-filled diverticulum
I	Acute uncomplicated diverticulitis	+ bowel wall thickening
II	Complicated diverticulitis	
IIa	Peridiverticulitis, phlegmonous diverticulitis	+ inflammatory reaction in pericolic fatty tissue
IIb	Abscess-forming diverticulitis, covered perforation, fistulation	+ mesocolic or retroperitoneal abscess, lower pelvis abscess
IIc	Free perforation	Free air, free fluid, abscesses where applicable
III	Chronic recurrent diverticulitis	Bowel wall thickening, stenosis or fistula where applicable

Conservative management

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The majority of the patients suffering from a first attack of diverticulitis can be successfully treated by conservative measures. On the other side, it is absolutely necessary to consider in individual patients the limitations of non-interventional treatments and to choose the appropriate timing for surgery. Beside the clinical course, follow up laboratory testing may be helpful to estimate the severity of the diverticulitis attack. But the most important and sensitive diagnostic methods for scoring severity and detecting complications are cross sectional imaging by techniques as CT-scan or ultrasound.

The initial decision in a patient with acute diverticulitis concerns the mode of patient care – hospitalization or as outpatient. Arguments are severity of the disease, comorbidity and risk factors for complications. Severity should be assessed as mentioned. Comorbidity is subject to general clinical standards. Recently, several factors for a more serious prognosis were reported, including immunosuppression, high body mass index and malnutrition with low serum albumin levels and anemia.

Conservative management comprises the choice of the appropriate medication (as mentioned in other contributions of the symposium) and more general measures. One question is nutrition, either nothing by mouth, any diet or fibre enriched. To let the patient eat or not can not be answered by scientific evidence. It makes sense to give a patient severely ill and/or at high risk for surgery nothing by mouth. Fibre supplementation has been studied, but inconsistent results have been reported. It may be useful in diverticular disease with constipation but not in diverticulitis.

In daily practice, a frequent discussion refers to the mode of administration of antibiotics – oral or i.v. In mild to moderate cases antibiotics with good systemic bioavailability, e.g. ciprofloxacin, have been reported to be successful, also when given orally. Non-absorbable antibiotics, e.g. rifaximin, have shown to prevent recurrence of diverticulitis, but data in the acute situation are limited. Interestingly, some studies have demonstrated therapeutic effectiveness of sequentially administered antibiotics, given for some few days i.v. and afterwards by mouth.

Abdominal pain is a predominant symptom of acute diverticulitis. NSAIDs seem to play a bad role in the pathogenesis of complicated diverticulitis and are, therefore, not recommended. If aspirin or acetaminophen influence the course of the disease is a matter of ongoing discussion. The nature of the pain are, most likely, muscular spasms. Thus effective spasmolytic therapy makes sense. A note of caution affects the use of narcotics which may, at least, hamper the correct clinical diagnosis of the abdominal status.

Hartmann's procedure or primary anastomosis

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Perforation following acute diverticulitis is a typical scenario during the first attack. Different classification systems exist that classify acute perforated diverticulitis. While the Hinchey classification which is based on intraoperative findings is internationally best known, the German Hansen-Stock classification which is based on CT-scan is widely accepted within Germany.

When surgery is necessary, sigmoid colectomy is the standard of care. An important question is whether patients should receive primary anastomosis or a Hartmann procedure. A priori there are several arguments for both procedures. Hartmann's operation is extremely safe and is the best option in severely ill patients and/or extensive peritonitis. However, this operation carries a high risk of stoma non-reversal, or, when reversal is attempted, a high risk in terms of morbidity and mortality. In contrast, primary anastomosis with or without loop ileostoma is a slightly more lengthy procedure as normally the splenic flexure needs to be mobilized and construction of the anastomosis may consume more time than the Hartmann operation. The big advantage of primary anastomosis, however, is that there is no need for the potentially risky stoma reversal operation.

The most interesting question is when to do the Hartmann operation. Several comparative case series were published showing that primary anastomosis is feasible in many patients. However, no randomized trial is available to date. It is of note, that all case series are biased i.e. that patients in better conditions received anastomosis and those with severe peritonitis underwent Hartmann's operation. This bias is undoubtedly present, even if not obvious in the published manuscripts! Our own data suggest that this decision should not be based on the extent of peritonitis but rather on patient condition and comorbidity.

In conclusion, sigmoid colectomy and primary anastomosis is feasible and safe in many patients who need surgery for perforated diverticulitis, particularly when combined with loop ileostomy. Based on our own published analysis, however, we recommend to perform Hartmann's operation in severely ill patients who carry substantial comorbidity, while the extent of peritonitis appears not to be of pre-dominant importance.

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Session VI

Medical treatment in details

Modifying the microbiota

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Colonic diverticular disease is an extremely common disorder. In most cases it remains asymptomatic for the entire life. Approximately 20% of subjects with colonic diverticula experience symptoms (e.g., abdominal pain and changes in bowel habit) and a minority develop complications (predominantly diverticulitis). Changes in intestinal microbiota, entrapment and overgrowth of “pathogenic” bacteria within diverticula, increased intestinal permeability and stimulation of mucosal immune responses have been postulated as mechanisms involved in the pathogenesis of symptoms and complications. Attempts to modify intestinal microbiota in patients with diverticular disease include the use of probiotics and antibiotics. However, the majority of available studies are affected by severe methodological limitations which may include open, uncontrolled design and small sample size. There are several potential properties of probiotics which may be of benefit in the context of symptomatic diverticular disease. These include competitive bacterial inhibition, improvement of the intestinal mucosal barrier and anti-inflammatory effects. In general, efficacy of probiotics on symptoms associated with diverticular disease has been reported in the majority of trials. A recent systematic review of the Literature identified only one long-term double-blind placebo-controlled study on non-absorbable antibiotics. This study showed that rifaximin plus fiber was superior to fiber alone in improving symptoms. Similarly, a recent meta-analysis showed improvement of symptoms with rifaximin in 1660 patients. One-year gain in primary prevention of complications was statistically, but likely not clinically relevant. Recent evidence indicates that besides the well known anti-inflammatory properties, mesalazine may also modulate intestinal microbiota as demonstrated by a significant 46% decrease of fecal bacterial phyla profiles in patients with irritable bowel syndrome. Three studies showed that high dose mesalazine was significantly more effective than rifaximin in obtaining relief of symptoms. Another study showed a significant improvement in symptoms and a higher rate of symptom-free patients at the end of a 1-year follow-up. In conclusion, symptoms associated with diverticular disease and related complications are thought to involve to some extent intestinal microbiota. Probiotics, non-absorbable antibiotics and possibly mesalazine may modulate microbiota profiles and improve symptoms and possibly prevent some complications. Confirmatory well designed controlled studies are now needed.

Antibiotics

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Recommendations in the treatment of uncomplicated diverticulitis are based on medical dogma and expert opinion and usually consist of bowel rest, intravenous fluids and antibiotics.

A systematic review of the literature was performed to define the role of the use of antibiotics in the treatment of uncomplicated diverticulitis.¹ Out of 549 articles only 4 were found to address the use of antibiotics in diverticulitis. One study compared treatment with and without antibiotics and showed no difference in outcome between the two groups. Other studies, comparing oral versus intravenous administration of antibiotics, comparing two different kinds of antibiotics and comparing antibiotics with and without anaerobe coverage could not establish a difference in success rate of treatment.

In our own series the treatment in two hospitals was compared, one of which prescribed antibiotics as a standard treatment whereas the other hospital did not. Groups were comparable at baseline and had imaging confirmed diverticulitis. CRP and WBC did not differ between groups, however in the antibiotics group there were significantly more patients with a temperature above 38.5° C on admission. Treatment failure did not differ between groups.²

In conclusion, our own results as well as a systematic search of the literature do not support the need of antibiotics in the treatment of uncomplicated diverticulitis.

Interestingly enough, all published guidelines (the SSAT, the ASCRS, the EAES, the ASG and the WGO) do recommend the use of antibiotics in diverticulitis: no reference to original research is given. Surveys among American, British and Dutch surgeons and gastroenterologists show a difference in whether or not antibiotics should be administered, the Dutch specialists believing antibiotics are not mandatory.³

Furthermore, the avoidance of use of antibiotics has obvious benefits: presumably no in hospital treatment, cost reduction, diminished development of antibiotic resistance and fewer side effects. Although the aetiology of diverticular disease is unknown, more and more evidence is gathered that uncomplicated diverticulitis may be a result of inflammation (IBD like disease) instead of infection⁴, where the use of probiotics⁵ or mesalazine⁶ are more useful than antibiotics.

In order to answer the question whether or not antibiotics are mandatory a prospective multicenter trial is being performed in the Netherlands (DIABOLO trial).

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Aminosalicylates

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Aminosalicylates have a broad spectrum of anti-inflammatory activities. They inhibit many key factors of the inflammatory cascade. In addition, they interfere with the interaction of intestinal bacteria and epithelial cells. Aminosalicylates might therefore be protective for the colonic mucosa. This is the rationale for their use to prevent symptomatic diverticular disease and diverticulitis.

A few randomised, but not placebo-controlled studies showed that mesalazine given either as cyclic (e.g. 10 days/month for 12 months) or as continuous treatment has beneficial effects on the symptoms of patients with uncomplicated diverticular disease. Some studies even showed a reduction in the recurrence rate of diverticulitis.

Only one randomised placebo-controlled clinical study tested mesalazine in patients with painful diverticular disease. After a short-term treatment with 3 g mesalazine per day for 4 weeks the primary study endpoint (i.e. the pain score) showed no significant difference between mesalazine and placebo, whereas a combined symptom score missed the significance level only marginally ($p = 0,06$), and patients global assessment showed a significant advantage for mesalazine ($p = 0,03$). A long-term randomised placebo-controlled study with mesalazine to prevent recurrent diverticulitis is underway.

A distinct entity is diverticular colitis, i.e. diverticular disease associated with a segmental inflammatory bowel disease-like colitis. Several case reports show that treatment of diverticular colitis with mesalazine is largely successful.

In summary, there is some evidence for the efficacy of mesalazine in preventing symptoms of diverticular disease. However, high evidence-level based results on the effects of mesalazine in the prevention of recurrence of diverticulitis are not yet available. In diverticular colitis mesalazine seems to be the medical treatment of choice.

Session VII

Recurrent diverticulitis

Clinical presentation and risks

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A recurrent diverticulitis is a new distinct episode of acute inflammation (AD) after a period of complete remission of symptoms, at least 1–3 months after the previous episode.

Outdated literature from the '60s suggested a high recurrence rate (> 40%) and a worse clinical presentation with less chance of conservative treatment. More recent studies showed a more benign course of the disease. These studies showed a 25–35% of recurrence rate at 5 years f-u with reduced risk of severe complications (i.e. perforations), a risk of subsequent emergency surgery of 2–14% and a 0–2.7% risk of stoma and related death. Several risk factors of recurrence have been advocated: family history, length and site of involved colon, abscess, severe CT stage, comorbidities, NSAIDs. Young age is still matter of debate. These studies have different limitations: retrospective, lack of definition of AD, small number of pts, long recruiting time, short f-u, studies population or hospital-system based.

In 1998 we started a multicenter study including pts hospitalized with a clinical and radiological diagnosis of left sided AD in a 2 year period prospectively ('98–'99) and for other 2 years retrospectively ('96–'97). Of 1043 pts, 743 responded to the inclusion criteria: 242 (32.6%) underwent same admission surgery (ST), with an operative mortality of 4.5%. Sixty six presented with a free perforation, 9% of all pts and 27.7% of surgically treated pts: 58 (88%) of them were at their first episode of AD. The other 501 were medically treated (MT). The follow up ended on December 31st 2007: 474 (64.8%) pts were available (320 MT, 153 ST). Among MT patients, 61% were asymptomatic, 22% complained of chronic symptoms: the 12 year actuarial risk of recurrence, emergency surgery, stoma and deaths was respectively of 21.2%, 8.3%, 1%, 0. Recurrence was related to very young age (< 40 y) and more than 3 previous episodes of AD. Four pts presented with a free peritonitis, 1.3% of all MT pts, 7.3% of all recurrences, 19% of pts submitted to emergency operation. In the ST group the 12 years incidence of recurrence, emergency surgery, stoma and death were respectively 11.8%, 1.9%, 0 and 0.6%.

This study confirms the benign course of diverticulitis treated conservatively with a low long term risk of serious complications and death. Surgery doesn't fully protect against recurrence.

Smoldering vs. recurrent diverticulitis

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The classifications of acute uncomplicated diverticulitis and complicated diverticulitis have served us well for many years. However, in recent years, we have noted the prevalence of variations of uncomplicated diverticulitis, which have not precisely fit under the classification of "acute resolving uncomplicated diverticulitis," which manifests itself with the typical left lower quadrant pain, fever, diarrhea, elevated white blood count, and CT findings, such as stranding, and which resolves fairly promptly and completely on oral antibiotic therapy. For these other variations, I would suggest we use the term chronic diverticulitis, as a subset of uncomplicated diverticulitis, meaning there is no abscess, stricture or fistula, but the episode does not respond to the usual antibiotic treatment, and there is a rebound symptomatology once the treatment has stopped, or there is continuing subliminal inflammation that continues, typically, for several weeks after the initial episode without complete resolution. This variation could also be termed "smoldering" diverticulitis.

A second variation of uncomplicated diverticulitis should be termed atypical diverticulitis, since this variant does not manifest all of the usual components of acute diverticulitis, particularly an absence of fever, and even white blood count elevation, and there may be a lack of diagnostic evidence of acute diverticulitis. This diagnosis must be compared with diarrhea predominant, irritable bowel syndrome, and it is sometimes very difficult to distinguish between these two entities. The character of the pain in irritable bowel syndrome is typically cramping intermittently, compared with the more constant pain in smoldering diverticulitis. In our study by Horgan, McConnell, Wolff et al. (1) 5% of 930 patients who underwent sigmoid resection fit into this category of atypical uncomplicated diverticulitis. These 47 patients all had diverticulosis, and 76% that had surgery had evidence of acute and chronic inflammation, and 15% had an unsuspected pericolic abscess. There was no mortality and a low complication mortality rate (4.2%). Complete resolution of symptoms was achieved in 76.5% with 80% being pain free. Therefore, this is mostly a diagnosis of exclusion, and clinicians must be careful to perform a thorough workup and evaluation before proceeding to surgery with this as a diagnosis. Ischemic colitis is also in the differential diagnosis, and many patients who have diverticulitis, have irritable bowel syndrome as well, so caution must be used in predicting positive outcomes after surgery in these patients.

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Differences in early outcome after open or laparoscopic sigmoid resection – What is the evidence?

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Laparoscopic surgery has been widely studied in colorectal cancer and its feasibility and safety has proven to the extent that in the UK a national laparoscopic colorectal surgery programme has been established. The advantages of laparoscopic surgery have been studied less systematically in diverticular disease (DD). Several prospective uncontrolled studies have demonstrated that laparoscopic surgery for DD is feasible with low morbidity and mortality rates. A large population study the USA has demonstrated elective laparoscopic surgery for diverticular disease to have reduced hospital stay by 1 day, lower rate of intra-operative post-operative complications over open surgery. Some of the reported differences may be attributable to selection bias of more complex cases to open surgery. A Cochrane systematic review examining 11 non-randomized and one randomized study showed laparoscopic surgery to be feasible in DD although there might be a higher minor complications rate in laparoscopic resections. Attention has been focusing to surgical techniques as means to reduce complications. There is a belief that preservation of the inferior mesenteric and superior rectal artery protects from anastomotic leak but a study from the USA looking into that point did not find a difference. The application of hand-assisted laparoscopy seems to be help coping with complex diverticular masses and colovesical fistulas. New hybrid techniques incorporating specimen extraction via rectum may reduce complications further. Single incision laparoscopic surgery SILS has recently been shown to be feasible. Although minimally invasive techniques appear superior in terms of early outcomes than open surgery the choice of minimally invasive technique seems to be less relevant to outcomes if accompanied by appropriate level of surgical experience and expertise. Patient related factors such as comorbidities or degree of disease complexity are more likely to be related to complications rates.

Diverticular disease: Long-term outcome of elective surgery: Symptoms, cicatricial hernia, ileostomy/colonostomy rate

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Introduction: In the literature, persistent gastrointestinal symptoms following surgery of diverticular disease are noted in up to 27%. However, the range and severity of such symptoms are very large, recurrent diverticulitis is less frequently observed and may occur in 1–10%. This study was conducted to evaluate the occurrence of persistent symptoms, cicatricial hernia as well as the ileostomy/colostomy rate in our own patients collective after elective surgery for diverticular disease.

Methods: We performed a retrospective review of all patients undergoing elective surgery for diverticular disease from 2003–2008 in the Cantonal Hospital of Fribourg. Data were obtained from a prospective database of all patients undergoing colonic resection at our department. Follow-up data have been collected by a systematic questionnaire (including SF-12) performed in April 2011. A total of 109 patients (42 females, 67 males) with a mean age of 63 (36–92) years have been identified. Indication for surgery was recurrent non-complicated diverticulitis in 93 (85.4%) and complicated diverticulitis (stenosis, fistula) in 16 (14.6%) patients. Surgery consisted in a standardized intervention with resection of the rectosigmoid colon and with a lower resection line in the proximal rectum. Laparoscopic surgery was performed in 98 (90%) patients (6 [5%] patients needing conversion to laparotomy) and open surgery in 11 (10%) patients, respectively. A bowel discontinuity operation was necessary in 14 (12%) patients (13 protective ileostomies, 1 Hartmann procedure). 93 (85%) patients could be contacted for follow-up, with a mean follow-up time of 69 (29–99) months. 6 (5%) patients had died in the mean time and 10 (9%) could not be contacted any more (lost for follow-up).

Results: Persistent symptoms were divided into severe (diarrhoea, crampy bowel pain, severe constipation > 1 x/w) and mild symptoms (diarrhoea, abdominal distension, occasional constipation < 1 x/w). After the mean follow-up time (69 months), severe persistent symptoms were found in 14 (15%) patients and mild persistent symptoms in 49 (53%) patients. All patients with bowel discontinuity operations underwent successful re-establishment of bowel continuity. Incisional hernia's were observed in 7 (7.5%) and recurrent diverticulitis in 2 (2.2%) patients (both recurrences treated by antibiotics). Quality of life at the last follow-up was judged as “good” by 59%, “satisfying” by 35%, “unsatisfying” by 5% and “bad” by 0% of all patients, respectively.

Conclusion: In view of the high frequency of persistent symptoms in this collective, elective surgery should only be performed in patients with complicated diverticular disease or in patients with a high recurrence rate after conservative treatment.

Session VIII

**Critical issue: When should we operate
for recurrent diverticulitis?**

Statement – The gastroenterologist's view

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Diverticulosis can be considered a normal phenomenon in the ageing population, and episodes of diverticulitis confer an increasing problem. The current debate is not upon perforating diverticulitis and the emergency situation (also increasing over the last decade) but focusses on (i) mild episodes at the interface of ambulant medicine versus hospitalisation on one and (ii) at the interface of conservative clinical versus operative treatment on the other hand. Mild diverticulitis requires a differential diagnosis of the irritable bowel syndrome, and C-reactive protein, fecal calprotectin, and high-resolution ultrasonography are considered objective helpful parameters while endoscopy with biopsy may confuse because mild inflammatory histologic distress may be visible also in the IBS.

Diverticulitis apparently is a seasonal disease with a sinusoidal prevalence lowest in february and highest in august and thus closely resembles nonperforating appendicitis. Clinically, the term „left sided appendicitis“ thus may be justified not only for symptom description.

Considering the indication for operation, the traditional rule introduced by Parks 40 years ago that operation after 2 attacks of diverticulitis appears mandatory, guidelines have quoted this experience until the year 2000 (Roberts et al., 1995; Wong et al., 2000; Stollman et al., 1999). This strict procedure has not only be questioned but was disenchanting by Janes et al. (2005). Subsequently, however, a firm guideline is missing, and the question is whether or not there can be one at all.

Nonperforating diverticulitis is well managed by conservative measures with an emphasis on gastroenterological training and experience (Zarling et al., 1997), and neither operations nor mortality are higher with the gastroenterological approach (Shaikh & Krukowski, 2007; Chautems et al., 2002). Furthermore, a rate of approximately 25% of patients with ongoing symptoms after bowel resection and a substantial rate of complications in clinical praxis do not endorse the operative approach if only up to 25% of patients at all experience disease recurrences. On the other hand, no significant number is available, to what extent the resection of the sigmoid colon per se prevents colonic cancer simply by reducing the area at risk.

Attempts have been made to calculate the best timing of elective (“preventive”) surgery after diverticulitis (Salem et al., 2004; Richards & Hammitt, 2002), and the result was that timing was best after the third attack. However, the description of what is actually considered an attack, i.e. an episode of acute diverticulitis, is crucial. Obviously, these criteria will not have been the same underlying Parks' data summed up until 1969 and subsequent, more recent studies. Moreover, there are substantial continental and cultural differences in handling the diagnosis and differential diagnosis of diverticulitis. Ultrasonography, for example, is completely disregarded

(and underdeveloped) in the United States, a matter of peripheral interest of British radiologists only, but held of prime importance e.g. in continental Europe. As a matter of fact *“the best evidence for diagnosis of diverticulitis in the literature is on ultrasonography; only one small study of good quality was found on CT or MRI-colonoscopy”* (Liljegren et al., 2007). It appears doubtful that a single diagnostic parameter accurately might reflect the indications for colectomy, while the clinical pattern, the patient’s age and social demands as well as personal thoughts and her/his individual diverticulitis-“career” come to the fore.

In general, left sided lower abdominal pain with a slight-to-moderate inflammatory laboratory response but without abdominal tenderness in a patient with sigmoidal diverticulosis is not inevitably a sign of diverticulitis. Mesenteric inflammatory veno-occlusive disease e.g. is such a rare differential diagnosis. A second flare with fever, a palpable mass, abdominal tenderness, and bloating on the other hand would fit with the view that resection of the sigmoid is entirely adequate.

Frequently, difficult or incomplete passage of the sigmoid at post-diverticulitis colonoscopy or simply a narrow sigmoid at barium enema is considered an indicator for a significant organic obstruction which is thought to correlate with an increased risk of forthcoming flares of increasingly complicated acute diverticulitis attacks. This long held view, however, is not compatible with newer data on the natural history of acute diverticulitis and patterns of recurrence (Eglinton et al., 2010). Furthermore, the goal to prevent further recurrent acute attacks with worsening prognosis by timed sigmoidal resection, which is one of the principal justifications for surgery, cannot be archived because most patients with diverticulitis do not undergo a second flare and much less a substantial number of recurrent attacks. The second justification hallmark for elective surgery is the prevention of disease progression towards serious complications. Again, current data do not support the view that colectomy fits this aim because survival in a conservatively treated cohort does not differ with respect to disease recurrences (Eglinton et al., 2010).

Special forms of diverticular disease (e.g. polypoid prolapsing mucosal folds) as well as interference with infections (rotavirus) or medical therapy (e.g. NSAIDs) or critical perfusion conditions (“colitis of old age”) might deserve more attention in the future and in clinical practice. It is the gastroenterologist’s task to (i) think about the relative importance of mainstream categories and peripheral nuances in a given patient with apparent diverticulitis, and (ii) to think twice, if an operation is planned. Currently, elective sigmoid resections appear useful in patients with ongoing symptoms and serious structural changes or convincing physical findings of diverticulitis which imply a deterioration of life quality.

“Before therapy, the gods have interposed the diagnosis” – this phrase has been (probably incorrectly) accredited with Professor Franz Volhard, the late em. Director of the Department of Internal Medicine at the University of Frankfurt (1872–1950). The Greek original is attributed to Hesiod (*Before prosperity the eternal gods have set the sweat*). In times of changing attitudes of diverticulitis therapy one might be tempted to adapt it as follows: *Prior to operation, the gods have introduced cooperation.*

Statement – The surgeon’s view

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Diverticular disease affects up to 50% of people by the time they reach the age of 80. The major complications of diverticular disease (abscess, perforation, fistula, obstruction and bleeding) have their own management pathways, but the treatment of uncomplicated diverticulitis is controversial.

On initial presentation, diverticulitis is always treated conservatively. Whether this should be followed by resectional surgery has been the subject of speculation for many decades. The Americans tended to be more aggressive than the Europeans. Much of the initial work underpinning their policies was based on seminal studies by Parks in the 1960's and 70's who followed cohorts of patients with diverticular disease and examined their outcomes. Based on these data it was often recommended that an elective resection following two or sometimes even one attack of acute diverticulitis was warranted. However, these studies were based on inaccurate diagnostic data. The diagnosis was made primarily on clinical grounds. Investigations such as barium enema or colonoscopy were not reliable in confirming the presence of inflammation.

Since CT scanning has become routine, the diagnosis of acute diverticulitis can now be made accurately. In recent years much work has been done, such as by Ambrosetti, who has produced evidence predicting the outcome of diverticulitis based on CT findings. More recent papers, in which the diagnosis of acute diverticulitis is likely to have been made more accurately, confirm that there is a very low incidence of serious complications after long term follow up.

It has also become apparent that the majority of patients who present with the major complications of diverticulitis, specifically abscess, perforation and fistula, do so as their first presentation of the disease, without previous episodes of diverticulitis. The corollary of this is that although recurrent diverticulitis is relatively common after the first attack, the more serious complications are rare, so that patients having had acute diverticulitis do not run the risk of developing life threatening complications without elective surgery.

The complications of left sided colonic resection are not inconsiderable with anastomotic leaks, the formation of a stoma, either temporary or permanent, as well as mortality. When these data are put alongside the very low risk of serious harm to the patient after diverticulitis, the balance of opinion is now swinging heavily in favour of a more conservative approach both east and west of the Atlantic.

In addition to this there are modern and innovative medical therapeutic approaches to the treatment of diverticulitis such as 5ASAs, mesalazine and probiotics.

The Association of Coloproctology of Great Britain and Ireland earlier this year published a position statement on elective resection for diverticulitis. The authors state that “the majority of patients presenting with acute diverticulitis can be managed

with a conservative medical approach in the longer term". "The decision on elective resection should be made on an individual basis". In addition, they also state that "there is no clear evidence that younger patients [...] exhibit a more aggressive form of the disease".

In conclusion, the modern consensus of opinion is that there is no specific recommendation for elective surgery after episodes of acute diverticulitis and a conservative approach is warranted with good outcomes. Surgery should be offered on an individual basis when the frequency of the attacks is out of proportion to having a satisfactory quality of life. There is minimal risk of long term serious complications.

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POSTER ABSTRACTS

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Enhanced Recovery After Surgery (ERAS) programmes can be safely expanded to include patients undergoing resection for diverticular disease

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From January 2009–January 2011 33 patients underwent operations for diverticular disease of whom 13 were on the ERAS programme. There were 19 elective patients (13 on ERAS) and 14 performed as emergencies (none on ERAS). There were 17 female and 16 male patients with a mean age of 65.7 years (range 46–89), mean age of 62.4 years for ERAS patients and 67.8 years for those not on ERAS. The overall median length of stay was 18.0 days, with 10 days for those on ERAS, 22.0 days for those not on ERAS. Overall 36.4% of patients had a laparoscopic operation, with 57.9% of elective operations laparoscopic and only 7.1% of emergency. 46.2% of ERAS patients underwent laparoscopic resection, in comparison to 30% non ERAS. There was an overall 9.1% mortality (3 out of 33 patients), none of whom were on the ERAS programme, and 2 were emergency patients (14.3%) and 1 elective (5.3%). Of the 20 patients not on ERAS, 80.0% had a stoma (either ileostomy or colostomy) formed at their initial operation, compared to only 29.4% of those on ERAS. Of those patients who had an anastomosis; 2 from the 7 non-ERAS patients had evidence of a collection or leak compared to 1 from the 12 ERAS patients.

Patients who underwent an elective resection for diverticular disease had a lower length of stay, lower rate of stoma formation and a lower incidence of post-operative collection or leak. If possible patients at high risk of future acute diverticular complications requiring surgery would benefit from elective surgery and can safely be managed on an enhanced recovery programme.

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Primary anastomosis with a defunctioning stoma versus Hartmann's procedure for perforated diverticulitis – A comparison of stoma reversal rates

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Objective: The ideal treatment of patients with perforated diverticulitis is still controversial. Hartmann's procedure has been the gold standard for decades but primary resection and anastomosis is increasingly becoming an accepted alternative. The aim of this study was to evaluate the stoma reversal rates for Hartmann's procedure versus primary anastomosis with a defunctioning stoma.

Methods: A retrospective review of the data from patients with perforated sigmoid diverticulitis (Hinchey II–IV) presented to our clinic in the period of January 2002 and December 2010 undergoing a Hartmann's procedure (HP) versus a primary anastomosis with a defunctioning stoma (PA) was performed.

Results: A total of 92 patients were identified, 66 undergoing a Hartmann's procedure and 26 patients a primary anastomosis with a defunctioning stoma. While 77% of the patients with PA have had their stoma removed, only 40% of the patients with a HP had a stoma reversal ($P = 0,007$).

The median period until stoma reversal was 18 weeks for HP and 11.5 weeks for PA ($P = 0,015$). The 30-day-mortality for PA was 15.6% and 31.8% for HP.

Conclusion: The stoma reversal rates for PA are significantly higher than for HP. Thus, primary resection and anastomosis with a proximal defunctioning stoma may be the procedure of choice for perforated diverticular disease.

Double balloon enteroscopy for the diagnosis of Meckel's diverticulum: A novel approach to an old disease

Yavuz Beyazit, Mehmet Ibis

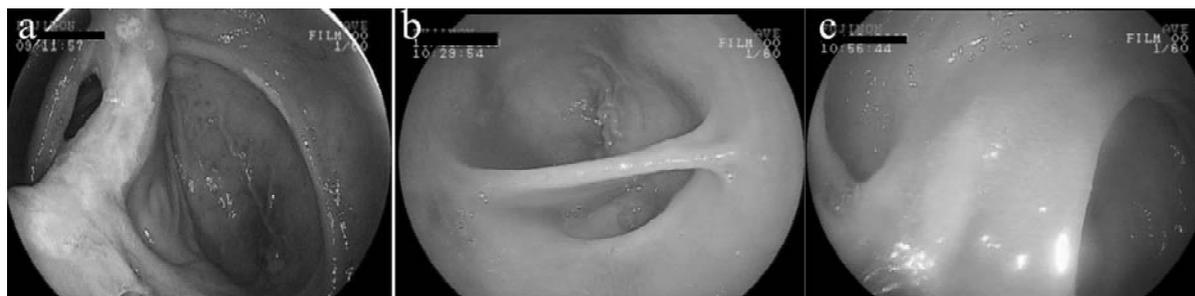
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Meckel's diverticulum (MD) is a small bulge in the small intestine present at birth and is the most frequent malformation of the gastrointestinal tract. Although MD is usually of no medical significance, tendency to gastrointestinal bleeding can require clinical attention. Despite the availability of modern imaging techniques, diagnosis is still challenging. We herein report three cases of undiagnosed gastrointestinal bleeding despite a number of imaging techniques. In both of these cases double balloon enteroscopy (DBE) was successfully used and the diagnosis of MD was established. We discuss the use of this successfully technique in obscure gastrointestinal (GI) bleeding caused by MD in relation to the pertinent literature.

Methods: Three patients with a complaint of lower gastrointestinal bleeding were admitted to our tertiary referral center in a 4 months period. Initial evaluations with upper and lower gastrointestinal endoscopy showed no signs of bleeding. Capsule endoscopy, small-bowel barium study, technetium-99m per-technetate scintigraphy were also found to be normal. DBE via the oral route revealed MD (figure 1) in the distal part of the ileum. Histological findings from biopsy samples showed ectopic gastric mucosa surrounding the ulcer scar in all the cases.

Discussion/Conclusion: MD is the most common congenital abnormality of the small intestine; caused by an incomplete obliteration of the vitelline duct of the gastrointestinal system, with an incidence of 0.3–4% in autopsy series. The diverticulum is usually located 40–130 cm from ileocecal valve and MD is the cause of the bleeding in 4.7–8.7% of patients with small intestinal bleeding. Although imaging techniques for detecting the source of bleeding in the small intestines have small diagnostic benefits, DBE enables examination of the whole small intestine with real time tissue sampling and a variety of therapeutic interventions. DBE allowed endoscopists to access intestinal areas, which were recently inaccessible with the conventional endoscopes. Through this technique, obtaining a precise diagnosis is much more possible than others including video capsul endoscopy.

Fig. 1: Enteroscopic images of three patients (a, b, c) showing Meckel's diverticulum localised to the distal part of ileum



The prevalence and localization of diverticulosis coli in Turkish population: Single-center data

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Introduction/Aim: Diverticulosis of colon is an acquired condition that results from herniation of the mucosa through defects in the muscle layer. Diverticular disease of the colon is common especially in Western countries. In developed countries, studies show that prevalence of diverticula is about 30% in those aged over 50 and 50% in those aged over 70. Prevalence of diverticulosis is linearly and directly correlated with increasing age. Recent studies also show no difference in the gender distribution of diverticular diseases. Diverticulosis in Western countries is predominantly left-sided and diverticulosis is usually right-sided in Asian countries. The aim of this study was to evaluate the prevalence and localisation of diverticula in our population and detect the changes with ages.

Materials/Methods: We retrospectively reviewed the colonoscopy records that underwent total colonoscopy between 2007 and 2011 at Ankara University Medical School, Gastroenterology Department, Endoscopy Unit. Patients with inadequate colon cleaning and emergent procedures were excluded from the study. The age, sex and localization of diverticula were evaluated. Right colon was determined as caecum, ascending colon, hepatic flexura, and transverse colon; left colon was determined as splenic flexura, sigmoid colon and rectum.

Results: We identified 5211 colonoscopies with a mean age of 47. 51% of patients were male and 49% were female. 330 patients (183 M, 147 F) had diverticulosis (6.63%). Mean age of patients with diverticulosis was 64.5 (29–95, median: 65). Frequency of diverticulosis in patients < 40 years old, 40–50, 51–60, 61–70 and > 70 years old was 1%, 2.8%, 5.8%, 6.9%, 12.5% respectively. 64% of patients had left-sided diverticulosis, 19.5% of patients had right-sided and 16.5% of patients had full colon diverticulosis.

Conclusion: In our population, frequency of diverticulosis was found as 6.63%. This percentage is lower than Western countries. In Western countries studies showed that no gender difference in diverticulosis patients but there is male predominance in our population. Previous studies in Turkish population showed 1–4% incidence of diverticulosis. This study reveal the incidence of the diverticulosis coli is increasing in Turkish population maybe due to increasing in Western type nutrition and obesity.

Rectal bleeding and colonoscopy – Clinical and etiological aspects

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Introduction: Rectorrhagia is a common reason for hospitalisation, especially among elders. Colonoscopy can establish a definitive or probable diagnosis in majority of cases. Early colonoscopy may be the best strategy in improve outcomes and reduce the costs.

Methods: We included 121 patients with rectorrhagia, who performed colonoscopy for diagnosis. We analysed the demographical and etiological data, according to etiology and age.

Results: The etiology of rectorrhagia was as follows: hemorrhoids (37.19%) and non-hemorrhoidal diseases (62.81%). The second patients group have many causes: inflammatory bowel diseases (42.11%), colorectal cancer (19.74%), diverticular disease (14.47%), postpolypectomy (5.26%), irradiation (5.26%), ischemic (2.63%) and infectious (2.63%) colitis, anal fissures (3.95%), angiodysplasia (2.63%) and no evident cause (1.32%).

The patients with diverticular disease were admitted mainly after 72 hours from the start of rectorrhagia (73%) and the hospitalisation was generally short, a mean 5.27 days and in 50% of cases the median was 3.5 days, according to the mild severity of hemorrhage. The anemia was occurred in 36.36% of these patients, mainly mild/moderate, and only one patient needed blood transfusion. For this patient group, no re-examination necessary and all are resolved with conservative treatment.

Discussion/Conclusion: This study reveals the importance of colonoscopy for the etiological diagnosis of the rectal bleeding with malignant and non-malignant causes, early colonoscopy may be the best strategy in improve outcomes and reduce the costs.

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Lower gastrointestinal bleeding and the diverticular disease – Clinical aspects

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Introduction: Rectorrhagia is a frequent indication for colonoscopy, and this investigation is essential for the etiological diagnosis. The diverticulosis is one of the most frequent causes of lower gastrointestinal (GI) bleeding in adults.

Methods: We included 121 patients with rectorrhagia, admitted in our hospital in 2005, who performed colonoscopy for diagnosis. We analysed the demographical and etiological data, according to etiology and age.

Results: From a total of 4792 patients admitted in our department on 2005, 121 subjects (2.5%) were diagnosed with rectorrhagia. No differences between gender was observed (the male/female ratio was 0.95) with a mean age 53.74 ± 14.68 yrs.

The etiology of rectorrhagia was as follows: hemorrhoids (37.19%) and non-hemorrhoidal diseases (62.81%). The last patients group have many causes: inflammatory bowel diseases (42.11%), colorectal cancer (19.74%), diverticular disease (14.47%), postpolypectomy (5.26%), irradiation (5.26%), ischemic (2.63%) and infectious (2.63%) colitis, anal fissures (3.95%), angiodysplasia (2.63%) and no evident cause (1.32%). Inflammatory bowel diseases has an increased frequency in young adults hospitalised for rectorrhagia and the colorectal cancer and diverticular disease are more common in adults after 50 yrs, with different impact in patients survival.

According age, rectorrhagia due to diverticular disease was more frequent after 50 yrs. old (81.8% vs. 18.2%, $p < 0.05$), with a mean age 64.54 ± 10.73 yrs. In this last patients group, the anemia was occurred in 36.36%, mostly mild/moderate (27.27%) and severe (9.09%) and the anticoagulant drugs use were recorded in 3 patients.

Discussion/Conclusion: Inflammatory bowel diseases has an increased frequency in young adults hospitalised for rectorrhagia and the colorectal cancer and diverticular disease are more common in adults after 50 yrs, with different impact in patients survival.

Management of diverticulitis. Results of a survey among gastroenterologists and surgeons

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Introduction: The aim of this study is to investigate current management strategies for left-sided diverticulitis and compare it to current international guidelines. Furthermore differences between surgeons and gastroenterologists and between gastrointestinal and non gastro-intestinal surgeons are assessed.

Methods: A survey concerning the different treatment options for uncomplicated and complicated diverticulitis was sent to all surgeons and gastroenterologists in the Netherlands. Only surgeons were surveyed about surgical strategies.

Results: A total of 292 surgeons and 87 gastroenterologists responded representing 92% of all surgical departments and 46% of all gastroenterology departments. 90% of respondents treat mild diverticulitis without antibiotics. A minority (18% of gastroenterologists and 19% of surgeons) view a CT scan as mandatory in the initial assessment. The majority of both surgeons and gastroenterologists use a form of bowel rest, would consider outpatient treatment and perform a colonoscopy on follow-up. For Hinchey 3 diverticulitis 78% of surgeons would consider a resection and primary anastomosis. Laparoscopic lavage is viewed as a valid alternative for Hinchey 3 diverticulitis by 30% of gastrointestinal surgeons and 2% of non-gastro-intestinal surgeons. For Hinchey 4 diverticulitis 46% of gastro-intestinal surgeons and 72% of non-gastrointestinal surgeons would always perform a Hartmann procedure.

Discussion/Conclusion: The treatment of diverticulitis in the Netherlands shows major discrepancies when compared to guidelines. Considerable variation in treatment exists for all stages of disease.

Diverticular disease: Conservative management

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Introduction: Diverticulitis occurs when there is inflammation and infection in one or more diverticula. This usually happens when outpouchings become blocked with waste, allowing bacteria to build up, causing infection. Symptoms of diverticulitis may include: alternating diarrhea with constipation, painful cramps or tenderness in the lower abdomen, chills or fever. People who have diverticulosis without symptoms or complications do not need specific treatment, yet it is important to adopt a high-fiber diet to prevent the further formation of diverticula. Laxatives should not be used to treat diverticulosis and enemas should also be avoided or used infrequently. To reduce toxicity and improve the morpho-structural state of the mucous of the colon, we employ enterosorbents.

Methods: ENTEROSGEL[®] is a space-organized silicious matrix, with an internal arrangement similar to the fungus, of which the “nano”pores allow the sorption (binding-up, absorption) of mainly medium molecular-sized toxic substances. As compared to the other sorbents, Enterosgel surface has an extraordinary hydrophobicity. This property is achieved by prevailing of methylic radicals on the surface of Enterosgel globules. Both pathogenic and conditionally pathogenic microflora first adhere to the Enterosgel and second becomes disintegrated, while the non-pathogenic microflora is not exposed to adhesion and remains intact. Components of killed pathogenic and conditionally pathogenic bacteria, including fragments of their walls, remain linked on the surface of Enterosgel. Enterosgel contributes to the decrease of gas production within the intestine and the cessation of diarrhoea, but, unlike espumisan and loperamide, it influences the cause of the disease, destroying and eliminating the pathogenic organisms responsible for diarrhoea, not only the symptoms of this disease.

Results: The administration of Enterosgel is recommended immediately during antibacterial treatment of diverticulitis. In this case the drug decreases the incidence of dysbiosis. The mean therapeutic dose of Enterosgel in adults – 1 tablespoon (15 g) tid. The mean duration of treatment is 21 days. The minimal duration of treatment is 10–15 days, because within this period the regeneration of the predominant part of gastrointestinal mucosal membrane occurs. The courses of enterosorption are recommended twice per year: in the autumn and in the spring.

Discussion/Conclusion: Due to an exceptional hydrophobia of its surface, Enterosgel remains an absolutely safe agent and can be used long term.

Medical treatment in details: Use enterosorbent for modifying the microbiota in patients with diverticular disease

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Introduction: Diverticulosis of the colon is a common condition that afflicts about 50 percent of the adult population by age 60 and nearly all by age 80. The bowel dysbacteriosis usually develops as a result of the diverticular disease, during which the critical changes in quantitative, qualitative, functional and topographic parameters of the intestinal microflora are observed. The disorder of intestinal microbiocenosis exerts a multiple pathogenic action on the human digestive and immune system.

Methods: Enterosgel used in dose of 15 g 3 times a day for 10–14 days. During the treatment there were not revealed any complications or side effects in patients. Normal microbial flora is characterized by a high affinity to enterocyte receptors and is tightly attached to them. Pathogenic flora does not possess this property and uses other ways of binding to attach to the mucosal surface. Due to the electrostatic interaction with the surface of Enterosgel, the destruction of pathogenic bacteria starts before the contact with the mucosal surface, and components of the bacteria attach to Enterosgel.

Results: Enterosgel positively supports the bowel colonization by normal microflora and suppresses the alien pathogenic microflora by sorbing the metabolic products of the latter. Enterosgel actively adsorbs on its surface the opportunistic and pathogenic microflora, destroying the cell membrane and sorbing the cellular contents. The antimicrobial action of this preparation is sufficiently intensive: 1 g Enterosgel adsorbs on its surface more than 10^{14} pathogenic bacteria. At the same time, the normal intestinal microflora (lacto-, bifidum-bacteria, E. coli) is neither absorbed from the intestine nor is it inhibited there. The immunomodulative effect has been identified as conditioned by the normalization of eubiosis and the decreased inflammation activity in the intestinal mucosa.

Discussion/Conclusion: A high clinical efficiency of Enterosgel preparation has been determined and its positive effect on the intestinal mucosa condition, digestion and absorption processes, the composition of small and large intestine-related microflora. The immunomodulative effect has been identified as conditioned by the normalization of eubiosis and the decreased inflammation activity in the intestinal mucosa.

Diverticular disease: The effects of psyllium hydrophilic mucilloid

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Introduction: Diverticula (singular, diverticulum) are outpouchings of the bowel wall, which do not possess the capability to empty themselves. As a result of this lack of an active emptying function, these outpouchings are prone to filling with fecal deposits. This may result in inflammation as bacteria penetrate the bowel wall.

Methods: Inflammation of these bowel segments may lead to disturbances of bowel movements and patients often experience a long period of constipation. In some cases, however, patients instead report diarrhea, bloating or increased flatulence (passing intestinal gas). Other complications may occur later in the course of the inflammation. More dangerous is the situation in which pain, despite treatment, does not abate, if patients develop fever or the abdomen becomes hard.

Results: It is believed that the development of diverticular disease in most patients is associated with a deficit in the diet of dietary fiber. More than two thirds of patients with diverticulosis do not have severe symptoms. Fibers are the only basic therapy for diverticulosis. Not only patients with severe clinical picture, but also asymptomatic patients with diverticular disease should receive treatment in the form of dietary fiber diet or using drugs. The most frequently reported symptom of diverticulitis is pain in the left lower abdomen. Goal of therapy in patients with diverticulosis not reporting any symptoms is to regulate the bowel movements and prevent complications. Patients are advised to consume a diet rich in dietary fiber or to supplement their diets with bulking agents, such as psyllium (Mucofalk®).

Discussion/Conclusion: Mucofalk® – the only drug of dietary fiber, containing a standardized dose of high-fiber diet balanced stock (three fractions in optimal proportions). When diverticular disease with regular admission Mucofalk® reduces the likelihood of complications, normalizes motor function of the bowel, has prebiotic effect.

Diverticular disease of the colon in children with inflammatory bowel disease

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Diverticular bowel disease – a disease characterized by the formation of diverticula of the intestinal wall. False diverticula (pseudodiverticula) represent the protrusion of the mucous membrane through the gaps in the muscular layer. What causes diverticula varies. The emergence of the disease was more akin to a combination of factors, not the action of one of them. The frequency of diverticular disease of the colon up to 20% in the population, with age, the frequency increases, reaching 40–50% among patients aged 60–80 years. Up to 40 years is rare.

Introduction: Diverticular disease of the colon in patients with immunocompromised (patients with severe infectious disease, receiving chemotherapy and immunosuppressive therapy, including corticosteroids) is characterized by low severity of clinical manifestations, a penchant for complicated course of disease.

Methods: All children with IBD who are on admission at the institute conducted a total colonoscopy.

Results: The Institute observed 5 children with inflammatory bowel disease, which revealed a diverticular disease. 4 of them with ulcerative colitis, 1 with Crohn's disease of the colon. All the children carried out hormone therapy. On the background of clinical remission in these developed pseudodiverticula, mainly in the right departments.

Discussion/Conclusion: Hormone therapy in inflammatory bowel disease in addition to known side effects causes the development diverticular disease of the colon, which may be an additional factor in the development of complications such as perforation of the colon, toxic dilatation.

Emergency and elective surgery for diverticular disease

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Introduction: Diverticular disease is the most common organic disease of the colon and has a high incidence in Western countries. Treatment depends on clinical severity. It's still under discussion the appropriate timing for surgery and type of surgical approach itself, however, indicated in cases of perforation, colonic stricture, fistula (Hinchey IIb) or persistent symptoms in the intercritical episodes and in immunosuppressed patients.

Methods: We have assessed the patients who underwent surgical resection for diverticular disease (in acute or recurrent) from 2007 to 2010 at the Department of Surgery of our Institute. We evaluated the data on the surgical procedure, complications and their treatment, in cases submitted to primary anastomosis compared to Hartmann and urgency in cases compared to the election. The statistical significance was assessed by *t* test and Chi-square test.

Results: From 1997–2010, 262 patients underwent surgical resection for diverticular disease in our department. Emergency surgery was performed in 49 (18.7%) patients for acute complicated diverticulitis and elective surgery in 213 (81.3%) patients with recurrent acute diverticulitis. Patients were 120 males (45.8%) and 142 females (54.2%), with an average age of 63 ± 12.6 years. In the 49 emergency patients there was clinical and instrumental evidence of perforation in 25 cases (51%) and colonic obstruction in 24 cases (49%). 17 patients had a history of cholelithiasis and hiatus hernia (Saint's triad); 15 of these were female. 250 patients (95.4%) were evaluated radiographically with CT-scan; 193 (73.7%) underwent ultrasound of the abdomen and 209 (79.8%) a barium enema. The patients underwent laparotomic resection in 122 cases (46.6%) and laparoscopic resection in 140 (53.4%) cases. In 7 emergency cases a Hartmann procedure was performed (HP); in 35 cases a resection with primary anastomosis (RPA) was performed and protected with ostomy; in 220 (84%) cases a resection with primary anastomosis was performed, without loop ostomy. Among the 42 patients who underwent colostomy, in 34 cases (80.9%) it was subsequently reverted, in an average time of 3.5 ± 2.1 months. 8 patients had not colostomy reversion. The former group had a mean age of 63 ± 14 years, the latter 77 ± 9.7 years ($p = 0.01$). The rate of ostomy reversion was 57.1% after HP and 88.2% after RPA ($p = 0.05$).

Among the 220 patients with resected primary anastomosis without a stoma 17 (7.7%) experienced an anastomotic leak clinically detectable. The rate of anastomotic fistula sorted by Hinchey score was as follows: 2% in the mild clinical recurrent diverticulitis, 7.1% in Hinchey I, 12% in Hinchey II, 25% in Hinchey III stage ($p = 0.05$). Among patients with anastomotic leakage, 10 (58.8%) underwent revision surgery and ostomy (in 5 cases a HP was performed). 7 cases were treated conservatively with maintenance of anastomotic drainage. In 13 cases, a CT scan was evaluated in emergency (76.4%).

The emergency operations were performed in 61.2% of cases with open surgery technique, compared with 43.2% of elective operations ($p = 0.01$). ASA III patients were 25 (11.7%) in elective surgery and 8 (16.3%) in emergency ($p = ns$). 51% of

patients had an emergency surgery in Hinchey III or IV versus 0% of patients operated electively ($p = 0.000$). Among patients in Hinchey stage II, 92% were operated in emergency and 0.9% in elective surgery ($p = 0.003$). The rate of colostomy in elective operations was 8.9% instead of 46.9% in emergency ($p = 0.000$) and their rate of reversion 84.2% and 78.3% ($p = \text{ns}$). The rate of anastomotic leak in the emergency operations was 14.3%, whereas it was 4.7% in elective patients ($p = 0.02$).

Discussion/Conclusion: Elective surgical treatment of diverticular disease is indicated for recurrent diverticulitis or in immunocompromised patients; in these cases, laparoscopic RPA is a viable option, with a low rate of anastomotic leakage. In emergency digestive diversion is justified by the higher rate of anastomotic leak and overall patient conditions.

Prophylactic effects of mesalamine in diverticular disease. Hypothesis and facts

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Introduction: Reports suggest that mesalamin has prophylactic effects in diverticular disease. Our aim was to evaluate if this observation has relevance in 120 patients (77 M/43 F) with colonoscopy-confirmed diverticulosis, receiving either low doses of mesalamin or placebo during a follow-up of 40.47 ± 1.28 months.

Methods: Mean age at inclusion was 62.19 ± 1.08 . Diverticulosis was pancolonic (PC) in 50 patients (41.7%), left-sided in 49 (40.8%) and right-sided in another 21 (17.5%). Patients were randomly assigned either to treatment group (M) receiving 514.7 ± 30.5 mg mesalamin/day (68 pts) or to control group (C) receiving placebo (52 pts). Drug has to be taken on a regularly base every morning at the same hour and compliance was rigorously monitored. Complete colonoscopy was performed in each case before inclusion and patients with polyps, cancer, inflammatory bowel disease, history of abdominal wall hernias, peritonitis, uterine fibromatosis/salpingitis, and pelviabdominal surgery or radiation therapy were excluded. Stool tests including cultures were also performed at screening in order to exclude parasitic or bacterial diseases. Study parameters were occurrence of diverticulitis, time to first flare, number of flares and need for surgery.

Results: At least one flare of diverticulitis occurred in 33.82% (23/68) patients from group M vs. 53.84% (28/52) from group C ($p = 0.044$, $\chi^2 = 4.049$). Time to first flare was significantly higher in group M: 37.39 ± 1.8 months vs. 23.09 ± 1.75 months ($p = 0.001$). The estimated relative risk of diverticulitis occurring in group C was 2.47 times (95% CI = 1.38–4.43) higher than in group M. Number of flares during follow-up was also significantly lower in mesalamin group (0.9 ± 0.17 vs. 3.25 ± 0.46 , $p = 0.001$) while need for surgery occurred in 14.7% (10/68) patients from group M and 34.6% (18/54) from control group ($p = 0.02$, $\chi^2 = 5.464$). Extension of diverticular disease has no impact on any of the study parameters.

Discussion/Conclusion: Irrespective of extension or localization of colonic diverticula, low doses of mesalamin taken on regularly base seems to have prophylactic effects in terms of reducing the risk of diverticulitis, as well as the number of flares and the need for surgery thus improving prognosis of diverticular disease.

Relation between the periampullary duodenal diverticulum (PDD) and pathology of the pancreas (retrospect analysis)

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Introduction: The purpose of the present note is to compare our analysis of the relation between the duodenal diverticulum and the pancreas pathology to some of the results, published by foreign authors. In our research endoscopic retrograde cholangiopancreatography (ERCP) was performed on 3259 patients for the period between 1989 and the first half of 2009.

Methods: The examinations were done in the Endoscopic Department of the University Hospital "Queen Joanna". The protocols were processed in a table with different indicators. In the present analysis are compared some of them – age, sex, presence of duodenal diverticulum, attendant pancreas pathology. The latter includes acute or chronic pancreatitis, cancer, benign tumor, inborn anomalies. The patients are set in two groups – with or without periampullary duodenal diverticulum.

Results: It has to be taken into consideration the level of the endoscopic diagnostics and the s-ray equipment in Bulgaria, as well as the conditions for making ERCP. For example, patients with acute pancreatitis are rarely done endoscopic examination – the analyzed count of such cases is small.

Discussion/Conclusion: The analysis of the data shows that overall there is no significant difference in the frequency of pancreas pathology of patients with duodenal diverticulum and those without it. It can be observed age peak for males at 50 years with acute pancreatitis in both groups.

The relationship between periampullary duodenal diverticula and biliary disorders

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Introduction: The purpose of this retrospective analysis of the large population was to investigate the frequency of JPDD and its association with disorders of the biliary system in patients undergoing ERCP.

Methods: Patients examined to the Endoscopy Unit of the Department of Gastroenterology with collaboration of the Department of Radiology between 1989 and 2009 were included in this study. All these patients were examined with respect to evidence and location of PDD and presence of biliary disorders.

Results: 3259 patients were examined by endoscopic retrograde cholangiopancreatography because of presence of current or previous pancreaticobiliary disease. 775 of those patients had periampullary diverticula and 61 had more than one diverticulum. 48.91% are male, 51.09% are female. In our series the incidence of choledocholithiasis is 48.51% in patients with periampullary diverticula compare to 36.27% in patients without diverticulum. The prevalence of purulent cholangitis was more frequent in patients with PDD than in control the control patients (4% vs. 3.3%). Gallbladder stones with cholecystitis were found in 26.32% in group with PP vs. 20.28% in controls. The incidence of previous cholecystectomy is 34.96% in patients with PDD, and 30.75% in patients without DD. Papillitis stenosans was found in 58.45% in patients with PDD, and in 40.37% in patients without PDD.

Discussion/Conclusion: To our knowledge this is a largest study yet published in our country concerning the relationship between periampullary duodenal diverticula and biliary disorders. The incidence of diseases of biliary tract associated with duodenal diverticula is higher than that of non-associated. In our retrospective analysis, an association of choledocholithiasis and PDD was shown. A higher frequency of gallbladder stones and cholecystitis was evident. Previous cholecystectomy and papillitis sclerosans were also more frequent in patients with PDD.

Endoscopic retrograde cholangiopancreatography (ERCP) in patients with periampullary diverticula

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Background: Periampullary duodenal diverticulum (PAD) is associated with increased incidence of biliary pathology presumably due to dysfunction of the sphincter of Oddi and ascending bacterial infection from the duodenum. Furthermore, ERCP may be technically more challenging in patients with PAD. The aim of this study was to compare ERCP performance characteristics and outcomes in patients with and without PAD.

Methods: This is retrospective cohort study of all patients that have undergone ERCP in our institution from 1989–2009. ERCP outcomes and performance parameters were compared between patients with PAD (study group) and without PAD (control group). Specific outcomes evaluated included patient demographics, incidence of biliary pathology and utilisation of ERCP based therapeutic maneuvers.

Results: A total of 3259 patients were included (775 with PAD and 2484 without PAD). PAD patients were significantly older (mean age 65 ± 1 vs. 58 ± 0.7 years). Common bile duct stones were more common in patients with PAD (48.51%) compare with the PAD-free group (36.27%) ($p < 0.001$).

Selective cannulation of the bile duct was highly successful in both groups (98% vs. 99%). Therapeutic ERCP was more common among patients with PAD ($t = 4.6$; $p < 0.001$) and endoscopic sphincterotomy (ES) and stone extraction were performed more frequently in the PAD group ($p < 0.001$). A trend towards more frequent use of mechanical lithotripsy was seen in the PAD group but the difference did not reach statistical significance ($p > 0.10$).

Conclusion: Patients with PAD undergoing ERCP are older and have higher incidence of biliary pathology. Selective bile duct cannulation and bile duct stone clearance can be successfully accomplished in the vast majority of patients with PAD but the use of use of therapeutic maneuvers is required more frequently.

Diverticular bleeding – Does the use of aspirin and NSAIDs influence it?

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Introduction: Bleeding from colonic diverticula occurs relatively frequent in patients with diverticulosis. In this prospective study we investigated the influence of NSAID or aspirin consumption on diverticular bleeding.

Methods: All patients that underwent colonoscopy in our unit in a 24 months period were questioned about NSAID and aspirin consumption. We investigated a total of 2228 colonoscopies (1236 female, 994 male), with the mean age of 53.4 years (range 17–92 years).

Results: 483 (21.67%) of the 2228 investigated patients presented diverticulosis and 57 of them (11.8%) had previous episodes of diverticular bleeding. 48 (84.21%) of the subjects with diverticular bleeding used regularly NSAIDs or aspirin, and from the non-bleeding group only 123 (28.87%) were NSAID or aspirin users ($p < 0.01$ – Chi-square test).

Discussion/Conclusion: In our study, the use of NSAIDs or aspirin increased significantly the risk of bleeding of colonic diverticula ($p < 0.01$). Patients at risk of diverticular complications should carefully consider the potential risks and benefits of using these medications.

Diverticular disease-associated segmental colitis: A 14-year follow up

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Introduction: Diverticular disease-associated segmental colitis is a variant of chronic colitis which is limited to the rectal area, which is associated with diverticular disease. Histologically it can be differentiated from idiopathic colitis with limited inflammation to the segment and sparing the rest of the colon. There is no long term data on the natural history of this entity. We followed 14 patients over a 14 year period.

Methods: This study was a prospective follow up on 14 patients who presented with recurrent abdominal pain, with bloody mucousy diarrhoea. Patients were referred either from the emergency room of a teaching hospital or from private offices. All patients were investigated for possible infectious causes or for idiopathic inflammatory bowel disease.

Investigation included haematological and biochemical parameters, stool cultures including *C. difficile* toxin. Colonoscopy with multiple biopsies was performed on all patients at admission. Colonoscopy was repeated at one year and every three years or earlier.

Patients who had acute diverticulitis with CT scan finding of abscess or stricture were excluded. Similarly patients who were diagnosed with acute colitis were excluded. All patients were started on mesalamine and some received intermittent courses of topical 5ASA therapy.

Results: There were 9 males and 5 females with a mean age of 53.2 ± 14.5 . The mean duration of symptoms was 34.8 ± 27 weeks. All patients fitted the criteria for diverticular disease-associated segmental colitis. Endoscopically the mucosa revealed patchy hyperaemic changes without any evidence of ulceration. This involvement was restricted to the segment with diverticular involvement. Histologically the biopsies showed moderate chronic colitis with moderate gland distortion, mucin loss and lymphoid hyperplasia. The biopsies proximal and distal to the involved areas were reported to be normal. Five patients stopped their medications and relapsed within six weeks, and were restarted on mesalamine. The mean follow was 10.4 ± 4.2 years. All patients were treated with mesalamine at a dose of 1220 ± 600 mg. Three patients underwent resection for persistence of symptoms and remained asymptomatic. One patient developed severe diverticulitis and perforated. Three patients had intermittent flare ups of symptoms. He subsequently died.

Discussion/Conclusion: Diverticular disease-associated segmental colitis may respond to 5-aminosalicylate with improvement in symptoms. These patients are at the risk of developing diverticulitis and recurrence in symptoms. A tough mesalamine appears to control the symptoms flare ups are not uncommon. A proper placebo controlled study is needed to ascertain the natural history of this entity.

Utilisation of high frequency mini-probe ultrasound in the assessment of colonic wall thickness in patients with diverticular disease – A pilot study

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Introduction: Assessment of diverticular disease is routinely undertaken by colonoscopy and computed tomography. Improvements in high frequency ultrasound of the colon have enabled us to evaluate the colorectal wall structure in detail. The aim of this study was to compare the thickness of the sigmoid colon in patients with symptomatic diverticular disease and in normal subjects.

Methods: Seventeen patients with diverticular disease and 11 normal subjects were recruited into the study after informed consent and ethical approval. All patients underwent high frequency ultrasound of the sigmoid colon (in the region of the populated diverticula for diverticular disease patients) during their routine scheduled colonoscopy. Acoustic coupling was achieved using water in the colon and excess air in the colon was suctioned. 20 MHz ultrasound (Olympus Keymed UM-3R, Japan) was undertaken and measurements of the different layers of the colonic wall were recorded with respect to the mucosa (m), submucosa (sm), muscularis propria (mp) and total wall thickness (tw). The thickness of colonic wall between normal and diverticular patients was compared with Fisher's exact t test using GraphPad Prism version 5.00.

Results: 17 patients with symptomatic diverticular disease were recruited with a mean age of 61 year (range 43–81). Measurements of the sigmoid colon wall thickness were obtained in 100% of patients. The muscularis propria of diverticular disease patients was thicker than that of the submucosa which was in turn thicker than that of the mucosa (Table 1). In an observational comparison with 11 normal controls, the mucosa, submucosa, muscularis propria and total wall thickness were significantly thicker in patients with symptomatic diverticular disease (Table 2).

Table 1: Thickness of the sigmoid colon in diverticular disease patients during colonoscopic ultrasound using 20 MHz mini probe

Colonic wall layers	Mean/mm	Range	SD +/-	SE	95% CI
Mucosa	0.8	0.5–1.2	0.20	0.05	0.73–0.94
Submucosa	1.3	0.6–2.2	0.38	0.10	1.09–1.48
Muscularis propria	2.8	0.9–4.6	1.06	0.26	2.31–3.39
Total wall	5.6	2.4–8.9	1.87	0.45	4.68–6.61

Table 2: Comparison of mean colonic wall thickness in normal and diverticular disease patients (DD)

Colonic wall thickness /mm	Normal patients (n = 11)	DD (n = 17)	P value
Mucosa	0.5 ± 0.2	0.8 ± 0.19	0.0007
Submucosa	0.8 ± 0.30	1.3 ± 0.38	0.001
Muscularis propria	0.8 ± 0.19	2.8 ± 1.06	< 0.0001
Total wall	2.5 ± 0.42	5.6 ± 1.87	< 0.0001

Table 3: Thickness of the sigmoid colon in normal patients during colonoscopic ultrasound using 20 MHz mini probe

Colonic wall layers	Mean/mm	Range	SD +/-	SE	95% CI
Mucosa	0.5	0.4–1.0	0.2	0.06	0.40–0.67
Submucosa	0.8	0.4–1.4	0.3	0.09	0.58–0.98
Muscularis propria	0.8	0.6–1.2	0.19	0.06	0.67–0.93
Total wall	2.5	2.0–3.4	0.42	0.13	2.26–2.83

Conclusion: Patients with symptomatic diverticular disease have an increased thickness of their sigmoid colon when compared to controls, especially within the muscularis propria layer. This may be useful in the assessment of diverticular disease in the future.

Conversion and complications in laparoscopic procedures for diverticular disease – Analysis, management, implications

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Introduction: Laparoscopic surgery for diverticular disease is still in controversial discussion. Poor data concerning mechanisms leading to complications or conversion are published. As developing less invasive surgical approaches requires analysis of the failures of laparoscopic colo-rectal surgery a critical work-up of own procedures seemed opportune.

Methods: Patient record data of 161 laparoscopic interventions for HANSEN/STOCK grades II and III were retrospectively analysed to determine the mechanisms leading to conversion or complication with its ensuing management: 153 resections were indicated based on the EAES consensus-declaration. 8 interventions for grades IIb and c were carried out as lavage/drainage followed by secondary resection. Complications were differentiated in intra-operatives and post-operatives according to the DINDO-classification. Conversion was considered a failure to the initial minimally invasive strategy not a complication.

Results: Conversion rate was 8.0% (with 2.4% as intra-operative complication management), mortality zero and overall morbidity 14.2%. None of the 8 “two-times procedures” was affected corresponding to observations of other authors. In decreasing order of relevance, eventually interactive factors of impact for adverse effects were: complicated diverticulitis, difficulties of anatomical identification, technical pitfalls including lack of expertise and misinterpretation of anastomosis quality. Half of all complications needed laparotomy and a third could be controlled by endoscopic or laparoscopic means.

Discussion/Conclusion: Patient and surgeon dependent risk factors for failure of minimal invasive concepts are currently to be considered as potential contraindications for further minimized surgical approaches. Correlating to existing literature they may serve as guidelines for a careful patient selection for SILS-, LESS- or hybrid-notes procedures.

Absence of cytomegalovirus (CMV) in perforated diverticulitis – A pilot study

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Background: Authors from Sweden have suggested cytomegalovirus (CMV) infection to be present in up to 69.9% of diverticulitis cases, and it may contribute to the perforation of sigmoid diverticulitis.

Methods: In this pilot study, we aimed to gather initial data on the prevalence of CMV infection in a set of ten consecutive cases of perforated sigmoid diverticulitis in a North American population. From October 14 to December 31, 2010, cases of sigmoid diverticulitis with evidence of clinical or pathologic perforation were included in the study, all of which derived from the Department of Pathology at the University of North Carolina at Chapel Hill. All of the histologic slides (at least 6 slides per case) were searched for CMV viral inclusions on H&E sections. Immunohistochemical stains for CMV were performed on four cases.

Results: None of the cases showed evidence of CMV infection, either by H&E or by immunohistochemistry. Chunky brown globules were seen within the inflamed tissue in the immunohistochemical stains of one case, but they were also present on the negative control slides, confirming them to be nonspecific. It is paramount to not misinterpret nonspecific brown staining in sigmoid diverticulitis for a positive CMV stain, especially in the absence of a visible viral cytopathic effect. A larger study including nonperforated cases of diverticulitis is warranted to determine with certainty the role of CMV infection in diverticulitis in a Western population.

Conclusion: In our small pilot study, evidence for CMV infection was absent in all cases of perforated sigmoid diverticulitis.

The clinical significance of breath test to diagnose lactose malabsorption in patients with diverticular disease of the colon

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Introduction: The role of lactose malabsorption in diverticular disease (DD) is controversial. The aim of this study was to compare the prevalence of lactose malabsorption in a group of diverticular disease patients and a control group and to modify lactose consumption in view of the results.

Methods: Lactose malabsorption (LM) was studied using the hydrogen breath test (HBT) in 34 patients with DD and 24 controls after ingestion of 25 g of lactose. A questionnaire on ingestion of milk products was also administered. Level of LM was assessed with hydrogen breath testing (HBT) with the help of the device Gastro plus (Bedfont Scientific Ltd., UK). The partial pressure of hydrogen (PPT) has been defined in the basal conditions, further each 30 minutes during 3 hours after intake lactose. Graphico-mathematical analysis has done, the results were compared with clinical symptoms (diarrhoea, pain and gaseousness).

Results: Of the 34 patients with DD, 22 (64.7%) presented lactose malabsorption compared with 9 of the 24 (37.5%) controls ($p = 0.032$). Twenty-two patients (46%) had been advised to completely eliminate lactose from their diets. Ten patients (29.4%) had been recommended the use of Laktazar, 2 capsules with meals 3 times a day for 1 month. Laktazar (Farmstandart, Russia) contains 3,450 units of the enzyme lactase. After a course of basic therapy (oral mesalazine 2 g/day and dietary fiber supplementation (at least 20 g/day), eliminate lactose from their diets and Laktazar) the level LM was detected in only 34.2% of patients.

Discussion/Conclusion: When DD recorded a high level of LN. This fact encourages the use in the treatment of patients with reduction in milk version of the diet and Laktazar (6900 units) for at least 4 weeks.

A clinico-pathological study of serotonin of sigmoid colon mucosa in association with chronic symptoms in uncomplicated diverticulosis

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Introduction: Neurotransmitter imbalance is hypothesised as a pathogenetic mechanism in several bowel conditions. We previously reported increased 5-HT in the sigmoid mucosa of colon resected for complicated diverticular disease (DD). We aimed to identify if abnormal 5-HT expression is associated with symptoms of uncomplicated DD.

Methods: This was a prospective comparative study and follow-up survey of symptoms. We examined the differences in 5-HT between DD patients and controls as well as the presence of bowel symptoms at time of endoscopy and also 2 years later. Sigmoid biopsies were collected at colonoscopy. Immunohistochemical staining for 5-HT cells was performed.

Results: 87 patients were recruited, 37 (42.5%) DD and 50 (57.5%) controls. No patients underwent surgery. There was no significant difference in total mean number of 5-HT-positive cells in DD compared to controls nor between patients and controls with abdominal symptoms. 41 patients (47.1%) responded to questionnaires at median 57.8 months from biopsy. 18 (43.9%) were DD and 23 (56.1%) controls. 5-HT counts showed no significant association to symptom persistence.

Discussion/Conclusion: Although 5-HT expression has previously been found to be increased in complicated DD in whole bowel resected specimens, the same is not confirmed on colonic mucosal biopsies. This raises the suggestion that 5-HT may be involved in the development of acute complications but may not be involved in the pathogenesis of chronic symptoms.

Sigmoid colon complicated diverticulosis (case report)

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The uncomplicated intestinal diverticulosis doesn't give evident clinical manifestation and may be unnoticed for years, but if complicated may cause a life-threatening condition. Here we present the case with complicated diverticulosis:

46 years old female was hospitalized at The Tbilisi Antisepsis Center's Surgery Department with the diagnoses of intra-intestinal abscess (31 x 38 mm) by CT 10 days after the development of protracted episode of high fever (38.5° C), abdominal pain and diarrhea with greenish liquid like stool.

Patient was on insulin therapy due to Type 2 DM and received prolonged-action steroids due to rheumatoid arthritis. She had periodic GI dysfunction within the last 1.5 years, often induced by eating fatty foods. Colonoscopy revealed diverticulum of colon. She was successfully treated with fluoroquinolones and metronidazole for 5–7 days when having GI disorders and tried the same regimen for the last episode as well but without success.

Surgical intervention revealed consolidated conglomerate of the distracted diverticulitis of the sigmoid colon, purulent-necrotic endometritis, left-sided purulent salpingo-oophoritis, secondary appendicitis as well as the purulent peritonitis. Patient was discharged from the hospital on the 15th day of the surgical intervention after the relevant antibacterial and symptomatic care.

Discussing the case we may conclude that:

1. Intestinal diverticulosis may get complicated by the life-threatening diseases;
2. Patients having intestinal diverticulosis, accompanied by diabetes mellitus and/or are treated by steroids have the high risk of developing diverticulitis with life threatening complications and therefore, well-organized monitoring of such patients should be considered.

Laparoscopic sigmoid resection for diverticular disease – Change of surgical treatment

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Introduction: Diverticular disease, and particularly diverticulitis is a common disease in the western countries. Conservative management is usually indicated for uncomplicated diverticulitis, complicated diverticular disease requires surgical treatment. In order to prevent a high-risk acute operation, it is advised to perform elective sigmoid resection after two attacks of diverticulitis. Laparoscopic surgery is increasingly accepted as the surgical approach of choice, with good results.

Our aim was to present our initial laparoscopic resections for sigmoid diverticular disease.

Methods: From 2006–2011, 102 patients were admitted to our department with sigmoid diverticular disease. In 21 cases of diverticulitis conservative management was applied. In complicated cases, acute operations were performed in 58 patients. Hartmann's procedure was mostly performed (32 cases). 12 elective open sigmoid resections were done. Lately, we've tried to perform elective laparoscopic operation, if it was possible. We've analyzed details of our initial 11 laparoscopic sigmoid resections.

Results: The reasons for laparoscopic resections were: 4 recurrent diverticulitis, 4 diverticular bleeding, 3 stenosis. In two operations there were dense adhesions. Other intraoperative complications didn't occur. There was no postoperative morbidity or mortality. Median length of hospital stay was 4.3 (3–7) days. Conversion to an open operation was performed in one case.

Discussion/Conclusion: To avoid the serious complications, elective laparoscopic resection is recommended after two episodes of diverticulitis. It can be achieved with good results, short length of hospital stay and low rates of morbidity, therefore it has to be a method of choice of elective operation for diverticular disease.

Localization of diverticulosis on colonoscopic examination

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Introduction: Diverticula is a sac-shaped hernia of the large intestinal wall. They are commonly localized in the sigmoid colon and are usually multiple. The main etiologic factors are high intraluminal pressure and abnormal colon motility. The aim of our study is to determine the localization of diverticulae in patients undergoing colonoscopies for various reasons.

Method: The records of 375 patients who underwent colonoscopies at Pendik State Hospital and Central Hospital between January 1, 2010–December 31, 2010 were reviewed. The age, sex, localization of diverticulae and accompanying conditions were identified for each patient.

Results: Diverticulae were found in 50 (13.3%) of the 375 patients who underwent colonoscopies. 22 patients were male and 28 were female. The mean age was 63.4 (43–84). The mean age of males was 61.2 years and that of females was 65.1 years. Diverticulae were found only in the sigmoid colon in 37 patients, in the sigmoid and the descending colon in 6 patients, in the whole colon in 4 patients, and in the ascending colon and transverse colon in 1 patient. Other than one diverticula seen in the ascending colon, all of the others were multiple. Accompanying lesions were seen in 16 patients. Colonic polyps were seen in 8 patients, elongated colon in 6 patients and inflammatory bowel disease in 2 patients.

Discussion and Conclusion: 6% of patients had diverticulae in the segments of colon other than sigmoid colon while 94% had diverticulae in the segments including the sigmoid colon. This result showed that the most common localization of diverticulae was in the sigmoid colon although other colonic segments could be involved.

Acute lower gastrointestinal bleeding

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Introduction: In majority of cases, the acute lower gastrointestinal bleeding is not so dramatic life-threatening incident as upper gastrointestinal bleeding; its lethality ranges around 2%. The most often causes of lower GI bleeding are diverticular disease and angiodysplasia of small intestine and large intestine. A relatively new complication of the therapeutic endoscopy is iatrogenic bleeding. Endoscopy and methods of endoscopic haemostasis, in combination with radiology and intensive conservative treatment are the most important procedures used both in diagnostics and therapy.

Set of Patients and Methodology: In 2006–2010, the 2nd Internal Clinics admitted 81 patients with lower GI bleeding, 46 men and 35 women, of the average age of 68.2 years. Patients who were hemodynamically unstable (32 patients, 39.5%) underwent an urgent gastroscopy. As soon as the upper GI bleeding was excluded, all patients underwent the examination of large intestine (78x colonoscopy, 9x angiography, 6x erythrocyte scintigraphy, 5x CT colonography, 1x barium x-ray examination).

Results: The most often cause of the lower GI bleeding was diverticular disease of large intestine (38 patients, 46.9%), followed by angiodysplasia (11 patients, 13.6%), hemorrhoids (7 patients, 8.6%), complications of therapeutic endoscopy (6 patients, 7.4%), inflammations (5 patients, 6.2%), and tumors (2 patients, 2.5%). In 12 patients, the source of lower GI bleeding was not found. All patients were hospitalized at the intensive care unit for a necessary period and treated conservatively, endoscopically, angiographically and surgically. Two patients (2.6%) in our set (both with diverticular disease) died of the lower GI bleeding.

Conclusion: Diverticular disease of large intestine is the most often cause of the life-threatening lower GI bleeding. The care for these patients must be comprehensive, based on close cooperation of intensivists, gastroenterologists and surgeons. This is the only way how to decrease lethality, make the treatment more effective and thereby reduce the costs.

Relevance of comorbidity for postoperative lethality and morbidity after emergency surgery for perforated diverticulitis

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Introduction: Perforated diverticulitis of the sigmoid colon is a common cause for emergency laparotomy. Several non-randomized studies reported in recent years that a sigmoid colectomy with primary anastomosis in Hinchey I–III patients yields similar results when compared to the Hartmann procedure, while avoiding the frequently difficult operation for take-down and reanastomosis of the colostomy. The aim of this study was to review the results of this practise in our hospital and to identify patients at risk for morbidity and lethal outcome.

Methods: All patients who were admitted to our hospital with the diagnosis „diverticulitis of the sigmoid colon“ from 1996–2006 were identified by the institutional data base and the patient charts reviewed. While 787 patients were admitted, 73 were operated on an emergency basis i.e. within 24 h after hospitalization (f:m ratio 1.3:1; median age 66 years, range 42–91). The primary end points were lethality, anastomotic leakage in patients with primary anastomosis and leakage of the rectal stump following Hartmann’s procedure. Statistical analysis was performed by Chi-square test.

Results: Of the 73 patients who were operated on an emergency basis, 36 (49%) had a primary anastomosis without any stoma. 11 (15%) patients received a primary anastomosis and a loop ileostomy. A Hartmann procedure was performed in 26 (36%) patients. Complications were observed in 27 (37%) of all patients. Anastomotic leakage occurred in 9 of 36 patients (25%) following primary anastomosis without protective loop ileostomy and in 1 of 11 patients (10%) who had an additional loop ileostomy. Seven patients died. Six of them had undergone a Hartmann operation and two primary anastomosis; one with and one without loop ileostomy (total mortality 10%). The incidence of anastomotic leakage was independent of the Hinchey classification (Hinchey I: 3 pts, Hinchey II: 4 pts, Hinchey III: 2 pts; n.s.), but associated with the comorbidity of the patients (ASA II: 1 pt; Asa III: 5 pts; ASA IV: III pts; $p < 0.05$).

Conclusions: Lethality and morbidity following operations for perforated sigmoid diverticulitis are high. Anastomotic leakage was primarily associated with severe comorbidity and was not dependent on the extent of the abdominal infection according to the Hinchey classification. The indication for a primary anastomosis following emergency surgery for sigmoid colectomy in perforated diverticulitis should not be based on the local intraabdominal findings but rather on the extent of the patient’s comorbidity.

Acute diverticulitis – Up to 10 years prospective follow-up

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Introduction: Acute diverticulitis (AD) is the most common complication of diverticular disease and affects 10–25% of patients. Data regarding the natural history AD is lacking.

Our aim was to prospectively assess the occurrence of recurrent attacks, surgeries and accompanying symptoms in hospitalized patients admitted with AD between 2000–2006.

Methods: Patients were followed during hospitalization and up to 10 years after discharge. Data regarding operations and complications was collected. Special attention was admitted to the natural history in patients < 45 years old as compared to older patients.

Results: A total of 261 patients were hospitalized for AD between 2000–2006.

There was a striking male predominance in the young age group with a male: female ratio of 4:1. The older age group showed a female predominance with a female: male ratio of 1.9:1 ($P < 0.0001$).

Patients' complications and operations during hospitalization and follow up period are shown on tables 1 and 2, respectively.

Table 1

Age (yrs)	< 45 n = 30 (%)	> 45 n = 231 (%)	P value
Peri-diverticular air on CT	7 (23)	16 (7)	0.008
Abdominal abscess	3 (10)	4 (2)	0.042
Free perforation	1 (4)	7 (3)	NS
Death	0 (0)	2 (1)	NS
Total complication rate	11 (37)	29 (12.5)	0.001

Table 2

Age (yrs)	< 45 n = 26 (%)	> 45 n = 197 (%)	P value
Operations following discharge	11 (42.3)	36 (18.3)	0.01
Recurrent diverticulitis (not operated)	6 (23)	42 (21.3)	1.00
Abdominal pain	2 (7.7)	22 (11)	0.841
No further symptoms	7 (27)	97 (49)	0.053

The average time from index hospitalization to sigmoidectomy was 18.17 ± 23.35 months (range 1–120 months).

The odds ratio for sigmoidectomy after complicated acute diverticulitis is 4.9 (CI = 2.4–7.3, $P < 0.001$). The rate of elective operations was similar among the 2 age groups.

Discussion/Conclusion: Younger patients with AD have statistically significant more complications during hospitalization and undergo more sigmoidectomies after discharge. Complicated AD at index hospitalization is a risk factor for sigmoidectomy.

Clinical characteristics of acute diverticulitis with abscess in Japan

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Introduction: About 10–25% of patients with diverticulosis will develop diverticular disease, such as diverticulitis, in their life. Although the majority of patients are treated conservatively, 20–30% of them undergo emergency surgery. Therefore, it is important to know the clinical characteristics of the disease. However, little is known about the epidemiology of the disease in Japan. The aim of this study was to clarify the clinical characteristics of Japanese patients with diverticulitis with and without an abscess.

Methods: The study subjects were 282 patients with acute diverticulitis (166 men, 116 women; mean age 48.5 years) who were diagnosed by ultrasonography at our hospital between January 1995 and June 2010. We investigated their clinical characteristics.

Results: Diverticulitis was detected mainly in the middle aged (30–50 years old for both men and women). Although diverticulitis frequently developed in the right-sided colon (right side: 80.7%), the ratio of diverticulitis in the left-sided colon was significantly higher in elderly patients (>70 years) than in younger patients (<40 years old) (12.1% in younger patients vs. 38.3% in elderly patients, $p < 0.05$). Out of the 283 patients with diverticulitis, 37 (13.1%) developed an abscess. Patients with an abscess were significantly older, stayed in hospital longer and had significantly more left-sided diverticulitis than those without.

Discussion/Conclusion: The diverticulitis of the colon is frequently encountered in the right-sided colon in the middle aged. However, abscesses developed more often in left-sided diverticulitis in Japan.

Incidence and risk factors of recurrence in patients with acute diverticulitis in Japan

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Introduction: The natural history of acute diverticulitis after conservative treatments remains unclear. The aim of this study was to investigate recurrence rates, complications and risk factors for the recurrence of this disease.

Methods: Seventy three patients (36 men, 37 women; mean age 52.5 years old) were enrolled. The subjects were diagnosed as having acute diverticulitis and were being treated conservatively. These patients were followed up on at our hospital between January 1997 and June 2010. Demographic data, recurrence rates, complications and subsequent surgeries were investigated.

Results: Out of all the subjects, there were 57 with uncomplicated and 16 with complicated diverticulitis. The mean follow-up was 2.2 (range 0.5–3.9) years. The incidence of recurrence was 27.4%. Of the 57 patients with uncomplicated conservatively managed diverticulitis, 44 (77.2%) had no episodes of recurrence, 3 (5.3%) patients had one episode of recurrence, whereas 10 (17.5%) had two or more episodes. After an initial attack of uncomplicated diverticulitis, 7.1% developed a complicated disease. Complicated diseases recurred in 37%, compared with a recurrence rate of 22.8% in those with uncomplicated diverticulitis ($p = 0.39$). The subjects were divided into 2 groups: patients with recurrent diverticulitis ($n = 20$) and those without ($n = 53$). There were no significant differences in clinical characteristics, except for abdominal symptoms between the 2 groups. The risk factor associated with recurrence was persistent abdominal pain after treatment for acute diverticulitis.

Discussion/Conclusion: The recurrence rate is high in Japan as well as in Western countries and persistent abdominal pain predicts recurrent diverticulitis.

Left-sided colonic diverticulosis is associated with the higher risk of large bowel adenomas

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Introduction: The problem of the colonic diverticulosis, one of the most common diseases of the large bowel, as a risk factor for colonic adenomas and adenocarcinomas is not fully clarified. Published results of the studies regarding this problem are contradictory. Our study was aimed to evaluate the relation between colonic diverticulosis and colonic adenomas.

Methods: Studied group consisted of 3011 consecutive patients (1776 women, 1235 men, age 17–100 years, mean age 52.50 ± 16.36) who had endoscopic examination of the large bowel in Endoscopic Unit of Department of Gastroenterology and Hepatology, Wrocław Medical University. Retrospective analysis encompassed: age, gender, presence and location of diverticula, presence and location of polyps and tumors, pathological character of polyps and tumors.

Results: Diverticula were found in 425 patients (14.11%). Polyps and colorectal cancer were found in 582 patients (19.32%) and 109 (3.62%), respectively. Adenomas were found in 65 (15.3%) of patients with diverticulosis and 190 (7.3%) patients without diverticulosis (OR = 2.28). Left-sided adenomas were found in 44 (10.35%) patient with left-sided diverticula and in patient 127 (4.9%) without diverticulosis (OR = 2.4). Colorectal cancer was present in 2.82% (n = 12) of patients with diverticulosis and in 3.79% (n = 98) of patients without diverticulosis. Presence of adenomas regarding presence of diverticula was statistically significant (Chi-square analysis; $p < 0.001$). Presence of colorectal cancer regarding presence of diverticula was not statistically significant ($p = 0.219$).

Discussion/Conclusion: Patients with left-sided colonic diverticulosis were shown to have the higher risk of large bowel adenomas when compared to patients without diverticulosis. Basing on our findings presence of diverticulosis should be included in the colonic adenomas risk stratification.

Acute colonic diverticulitis: Predictors for early discharge

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Introduction: Treatment of acute diverticulitis generally involves hospitalization, however, there are not accepted criteria to guide the need for in patient management. Aim of our study was to find variables predictive of longer hospital stay in patients with acute diverticulitis and to identify specific groups of patients who can be managed as outpatients.

Methods: Clinical charts of patients with a diagnosis of colonic diverticulitis, admitted in our Institute between January 2007–December 2010, and treated conservatively, were reviewed. One hundred and nine patients were identified: 55 males (50.5%) mean age 61.2 (range 27–94). The following variables were analyzed: sex, age, morbidities (coronary artery disease, diabetes, hypertension, peripheral vasculopathy, immunosuppressive therapy, history of neoplasm, previous episode of acute diverticulitis, clinical examination at presentation, US and CT imaging (Hinchey classification) WBC and CRP count at admission, in order to find a correlation with duration of hospital stay. Moreover, clinical features of patients with a hospital stay lesser than 3 days were studied to identify patients who might be possibly treated as outpatients

Results: Mean hospital stay was 6.5 days (range 2–25). Sixteen patients (15%) had hospital stay lower than 3 days. Patients with white blood cell count higher than $13,000 \times 10^9/L$ and CT Hinchey stage ≥ 3 had a significantly longer hospital stay (7.1 vs. 5.7 days, $p = 0.03$ and 10.5 vs. 5.9 days, $p < 0.0009$, respectively). At univariate analysis an association between hospital stay ≥ 3 days and the following features: Hinchey classification ≥ 2 at CT-scan, US imaging with abscess or intraperitoneal liquid, coronary artery disease, and diabetes was found. After multivariate analysis, only diabetes (odds ratio [OR]: 14.35, 95% CI: 1.1–186.8) was considered an independent risk factor for hospital stay ≥ 3 days.

Discussion/Conclusion: Hinchey stage ≥ 2 , white blood cell count $> 13,000 \times 10^9/L$ and diabetes are associated with hospital stay longer than 3 days. In patients without these variables hospital treatment may not be required.

Glucocorticoid-induced TNF receptor (GITR) expression: Molecular link between steroid intake and complicated types of sigmoid diverticulitis?

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Introduction: Immunosuppression and especially intake of steroids have been identified as risk factors for complicated types of sigmoid diverticulitis. The underlying molecular mechanisms have not been elucidated as yet.

Methods: Glucocorticoid-induced TNF receptor (GITR) and matrix metalloproteinase-9 (MMP-9) were analyzed on protein (IHC/IF) and mRNA level (RT-PCR) in surgical specimen with complicated and uncomplicated diverticulitis (n = 101). Immunofluorescence (IF) double staining and regression analysis was performed for both markers. GITR expression was correlated with clinical data. Usefulness of GITR expression as diagnostic test was investigated.

Results: High GITR expression ($x \geq 41\%$) within stromal cells of the lamina propria was significantly associated with complicated sigmoid diverticulitis ($p < 0.001$) and steroid use ($p < 0.001$) of the patients. MMP-9 expression correlated with GITR expression ($R^2 = 0.7268$, $p < 0.0001$, $r = 0.85$) as demonstrated with IF double staining experiments. Neither laboratory tests (CRP/WBC), nor clinical parameters (body temperature) allowed accurate distinction of complicated and uncomplicated diverticulitis.

Discussion/Conclusion: Our results of GITR expression in inflammatory cells of histopathological specimen suggest that it might be the molecular link between steroid use and complicated forms of acute sigmoid diverticulitis. Increased MMP-9 expression by GITR signaling might explain the well-known changes in the colonic wall of perforated and phlegmonous diverticulitis. Analysis of soluble GITR (sGITR) might be a promising strategy for future research.

Allergic predisposition, histamine and histamine receptor expression (H1R, H2R) are associated with complicated courses of sigmoid diverticulitis

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Introduction: We aimed to evaluate our hypothesis that allergic predisposition and expression of histamine receptors contribute to complicated courses of sigmoid diverticulitis.

Methods: Expression of histamine and histamine receptors (H1R, H2R) were analyzed on protein-level (IHC/IF) as well as mRNA-level (RT-PCR) in surgical specimen of patients (n = 101) having undergone resection for sigmoid diverticulitis. Patients were grouped according to histopathologic findings as group A (n = 57) “severe inflammation” resembling complicated diverticulitis and group B (n = 44) “mild inflammation”, resembling chronically-recurrent diverticulitis.

Results: The mean number of comorbid diseases per patient was 1.76 ± 1.25 . Thirty-nine of 101 patients (38.6%) exhibited allergic predisposition (grass poll, food, drug, pets, etc.). Comorbid diseases were significantly associated with severe inflammation/complicated diverticulitis ($p = 0.027$). Complicated sigmoid diverticulitis was significantly associated with high H1R and H2R expression, in comparison to uncomplicated types ($p = 0.0304$). Furthermore, an association of complicated diverticulitis with allergic preconditions was found (OR = 3.2; 95% confidence interval: 1.3271–7.8239, $p = 0.0097$). IF double-labelling experiments showed a strong correlation of increased histamine expression on H1R as well as H2R expressing intestinal enterocytes (histamine/H1R, $\rho = 0.841$, $p < 0.0001$ and histamine/H2R, $\rho = 0.806$, $p < 0.0001$). The results of increased H1R and H2R expression in complicated sigmoid diverticulitis were confirmed on mRNA-level (RT-PCR, $p = 0.009$).

Discussion/Conclusion: Our findings suggest that allergic predisposition is another important risk factor for complicated courses of acute sigmoid diverticulitis and linked with histamine receptor expression. Supportive therapies with antihistaminic drugs might also become an option. Allergic predisposition might be worth considering (similar to immunosuppression and steroid intake) when indicating surgery for sigmoid diverticulitis.

Peculiarity of the infectious diseases with concurrent intestinal diverticulosis

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Intestinal diverticulosis is frequently asymptomatic and is identified accidentally, as a result of the concomitant disease manifestation. Here we describe the case from our clinical practice interesting due to the myriad of clinical manifestation and its severity. 58 year old female patient was admitted to the hospital with the transient abdominal pain, mostly in epigastrium and fever; disease started 7 months prior with temporary remissions and relapses accompanied by the intestinal dysfunction, fever, severe bloating, acute, needle-stick like, diffuse abdominal pain. Additionally, patient developed respiratory insufficiency and bilateral pleuropneumonia (verified by CXR). Abdominal CT revealed mesenteric lymph node hyperplasia and multiple diverticulosis of the large intestine. TB was suspected and combination of isoniazid, rifampin and pyrazinamide was initiated, but polyserositis and anasarca was observed. After our consultation pleural and pouch of Douglas biopsy was carried out. Bacteriology revealed anaerobic fusobacterial growth. CBC findings: anemia, high ESR and WBC with left shift. Amebiasis serology was positive.

Patient was referred to our center with the diagnoses of intestinal amebiasis and anaerobic sepsis. Patient was discharged fully recovered after the relevant etiologic (antibacterial and anti-amebiasis) treatment. In a year and then in 2 years of full remission periods patient developed episodes of relapse treated successfully both times.

Thus, intestinal amebiasis with the concurrent large intestinal diverticulosis may have a severe course with poly-organic involvement and may get complicated by anaerobic sepsis. 2 episodes of relapse after the full recovery are associated with the chronic diverticulosis of the large intestine.

The role and importance of small bowel follow-through for diverticular disease diagnostics

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Introduction: The aim of our research was to focus practical doctor's attention on the small bowel x-ray examination, which is the excellent method for diagnosis of diverticular disease.

The small bowel diverticula are rare, generally asymptomatic. It is very important to diagnose this disease timely because diverticula are often associated with complications such as bleeding, perforation, obstruction, malabsorption, diverticulitis and volvulus.

The small bowel follow-through is a useful imaging test for diverticulosis. During past years the small bowel follow-through was replaced to a lesser degree by abdominal CT and MR enterography and capsule endoscopy. Establishment of modern digital x-ray systems has made the small bowel follow-through possible to receive the maximum information with a very low dose exposure.

Methods: There were discovered 32 cases of the small bowel diverticula in our department (from August 2009–February 2011) by the small bowel follow-through method.

Results: Among investigation patients 18 were men and 14 women. The average age was 62. Twenty patients suffered with duodenal diverticula, 4 of them presented from multiple diverticula. Two patients suffered from duodenal and jejunal diverticula. Ten patients had jejunal diverticula, 2 of them multiple. We had no cases of ileac diverticula.

Most of the patients with duodenal diverticula had nonspecific epigastric pain or bloating sensation, but some cases were asymptomatic. Patients with multiply jejunal diverticula had abdominal pain, chronic diarrhea and weight loss.

Discussion/Conclusion: As above mentioned symptoms or signs aren't pathognomic for small bowel diverticulosis and part of cases were asymptomatic the small bowel follow-through examination method began more important and particular as a non-invasive, cheap and informative test for timely diagnosing of the small bowel diverticulosis.

The diagnostic yield of colonoscopy following an acute diverticulitis – A single-center experience

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Introduction: The clinical diagnosis of an acute diverticulitis is currently confirmed by an abdominal computerized tomography (CT). The common practice has been to perform colonoscopy shortly after the acute event to exclude other possible diagnoses, mainly colon cancer. The aim of the study was to evaluate the yield of an early colonoscopy and to investigate the correlation between imaging results and colonoscopy outcomes in patients with acute diverticulitis.

Methods: This is a retrospective single center chart review study. Medical records of 220 patients hospitalized for acute diverticulitis between 01/06/2002 through 01/09/2009 were reviewed. The diagnosis of acute diverticulitis was made by clinical criteria and characteristic CT findings. 15 patients with questionable CT and 5 patients presenting with hematochezia were excluded, leaving 200 patients for further evaluation. The mean age was 61.8 ± 14.3 years (61% females). Clinical parameters, laboratory results, imaging, endoscopic and histo-pathological reports and long-term patients' outcome were retrieved and analyzed.

Results: Fourteen patients (7%) had complicated diverticulitis diagnosed by abscess or micro-perforation per CT. One hundred patients (age 61.8 ± 13.3 years, 54.1% females), underwent early (4–6 weeks) colonoscopy following hospital discharge. There were no significant differences in patients' characteristics between those with or without colonoscopy. No colonic malignancy was detected. However in 32 patients (32%) at least one polyp was found. Of these only one was determined as an advanced adenomatous polyp. In none of the colonoscopy group a new or different diagnosis was made and the survival rate was similar between the groups (4 ± 1.9 vs. 4.2 ± 2.1 years, $p = 0.62$).

Discussion/Conclusion: Our results suggest that colonoscopy did not affect the management of acute diverticulitis patients and did not alter their outcome. The current practice of a routine colonoscopy following acute diverticulitis diagnosed by typical clinical symptoms and computed tomography (CT) needs to be re-evaluated.

Pain cortical processing in symptomatic diverticular disease: A functional magnetic resonance imaging study

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Introduction: 30% of patients with diverticular disease (DD) suffer recurrent episodes of short lived abdominal pain [1]. Painful DD patients demonstrate visceral hypersensitivity on barostat examination. Visceral hypersensitivity is not well understood in DD and can be caused by (a) altered peripheral nerves (b) hyper-excitability of ascending spinal nerves or (c) dysregulation of descending inhibitory fibres [2]. Alteration in cutaneous sensitivities in regions sharing viscerosomatic convergence with the effected organ, have been demonstrated in other painful gastrointestinal conditions [3, 4]. However, brain imaging assessment of pain pathways in DD has not previously been undertaken. We aim to assess functional magnetic resonance imaging (fMRI) of thermal pain delivered to the dorsal surface of the left foot and hand using a Peltier thermode in a group of symptomatic DD patients.

Methods: 12 right-handed (7 female, median age 60 y, range 41–67 y), symptomatic DD patients underwent sensitivity testing using a Medoc Peltier device and visual analogue scales to determine their individual pain threshold to thermal stimulation of the back of the left foot and hand. fMRI was carried out using two pseudo-randomized paradigms delivering painful stimuli in a 3T MRI scanner. fMRI statistical parametric mapping was performed in SPM8 with data sets processed individually to evaluate activation patterns to the painful stimuli. A random effects (RFX) group analysis was then performed, corrected for family-wise error ($P < 0.05$).

Results: The mean individual temperature used was (mean \pm SD) $46 \pm 1^\circ$ C for both the hand and the foot painful stimulation. The mean corresponding VAS pain scores were 6.3 ± 2.2 and 6.3 ± 2.3 respectively (with 0 being no pain and 10 being severe pain). Random effects group data showed significant activation in several cortical areas including bilateral anterior insula, bilateral mid-insula, anterior cingulate cortex and right somatosensory cortex for both foot and hand areas.

Discussion/Conclusion: The brain areas activated by thermal painful stimulation were in good agreement with the expected cortical response to pain [5]. The fMRI assessment of cortical activation to painful stimuli in symptomatic DD patients is novel. Such data will allow us to determine differences in cortical and sub-cortical pain processing between symptomatic DD and contrasting diseases such as asymptomatic DD and IBS. This will ultimately improve understanding of dysfunction of peripheral or central pain mechanism in DD.

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Colonic diverticulitis in the elderly

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Introduction: The most common complication of diverticulosis is diverticulitis, whose frequency is given at about 20%. Diverticulosis in patients over 80 years may be as high as 60%.

Methods: This study reports on the management of acute diverticulitis with reference to the severity and outcome of the disease with respect to age. 112 patients were treated for the acute left colonic diverticulitis. Patients were divided in two groups: those older than 64 (group 1: 78 patients) and those aged 64 years or less (group 2: 34 patients). The diagnosis was confirmed by CT, barium enema or by endoscopy in some cases.

Results: Patients in group 1 had successful conservative treatment in 61.5%, while 38.5% needed emergency surgery. In both groups antibiotic therapy (rifaximin, metronidazole, piperacillin, and cefotaxim) was administrated. The recurrence rate was 23.07% in elderly patients and 26.4% in group 2. The type of surgical procedure and incidence of peritonitis in emergency patients was similar in the two groups. The mortality rate was similar in patients with conservative therapy (in both groups), but it was higher in elderly patients who underwent emergency surgery (36.4% vs. 2.9%).

Discussion/Conclusion: Medical treatment of diverticulitis consisted of bowel rest, intravenous fluids, antibiotics or surgery. Diverticulitis in elderly patients doesn't have a particularly aggressive course, except the cases that developed peritonitis. The mortality may be higher in the last group related also to the associated diseases at this age (cardiovascular and respiratory pathology).

The clinical significance of breath test to diagnose of the small intestine bacterial overgrowth in patients with diverticular disease of the colon

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Introduction: Estimation of clinical effectiveness breath test (BT) to diagnose of the small intestine bacterial overgrowth (SIBO) by patients with diverticular disease (DD) of the colon with the purpose to optimize the course of basic antibiotic therapy.

Methods: 38 patients with DD of the colon: men – 16, women – 22. Disease activity was assessed raised after X-ray and endoscopic examination. Level of SIBO was assessed with hydrogen breath testing (HBT) with the help of the device Gastro plus (Bedfont Scientific Ltd., UK). The partial pressure of hydrogen (PPT) has been defined in the basal conditions, further each 30 minutes during 3 hours after intake lactulose. Graphico-mathematical analysis was done, the results were compared with clinical symptoms (diarrhoea, constipation, alternating diarrhoea and constipation, pain and gaseousness), bacteriological examination of excrements.

Results: When the patients underwent BT 31 (82.6%) showed the presence of a SIBO. In 29 (76.3%) patients was registered with a typical peak rate of partial pressure of hydrogen to 60 minutes of research. After a course of basic therapy (oral mesalazine 2 g/day and dietary fiber supplementation (at least 20 g/day)) the level SIBO to reduce the severity of PPT in 60 minutes of research. After a course of basic therapy the level of SIBO was an average of 3.5 patients rate.

Discussion/Conclusion: At patients with DD in activity of disease recorded markers SIBO which recommends the use of repeated courses bacterial eradication of the small intestine.

A case of diverticular perforation in a 71 year old female patient: A microscopic illustration of cellular events

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Introduction: Perforation of diverticulum is usually followed by tremendous, life-threatening consequences for the patient. This report presents a case of a 71-year old woman, who suffered from acute abdominal pain, fever and weakness due to diffuse peritonitis.

Methods: An 11 cm long specimen of sigmoid was carefully sectioned and sampled to produce 3 micrometer thick microscopic slides for routine histopathological examination.

Results: Many intestinal outpouchings spread from intestinal mucosa and penetrated through intestinal muscularis propria. There was a prominent, thick dark grey to brownish effusion on partially distorted surface of neighbouring visceral peritoneum. The corresponding microscopic findings confirmed a diagnosis of diverticulosis and partially exacerbated chronic diverticulitis of sigmoid. A pronounced suppuration was encountered in proximity of one of diverticuli with involvement of adjacent serosal surface of intestinal wall. Dense neutrofilic infiltrate engulfed tissue necrotic debris around partially disrupted, diverticular wall. Focal intramural haemorrhages with pools of mucin and fibrin were present outside the broken wall of diverticulum. There was no giant cell reaction to extracellular intramural pools of mucin.

Discussion/Conclusion: If covered by dense fibrinous and purulent effusion, the site of intestinal perforation can be easily overlooked on post-operative macroscopic evaluation. Light microscopy provides evidences of intestinal rupture. The acute reaction was too rapid to give a time for development of giant cell reaction to intramural pools of mucin. Microscopic evaluation is a very educative illustration for inflammatory cellular events that underlie clinical symptoms to explain and support clinical diagnosis of diverticular perforation.

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