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Anatomical Region of the Colon as an Influencing Factor for Ulcerative Colitis Development

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Objectives: To determine if the anatomical location and extent of ulcerative inflammation influences the primary development of ulcerative colitis by defining the primary starting locations of ulcerative inflammation processes and determining the anatomical extents of ulcerative inflammation with the highest occurrence rates. **Methods:** A total of 152 patients were chosen during a period of two years. The diagnosis of ulcerative colitis was made by correlating clinical, endoscopic and histological features and data was retrospectively analyzed. **Results:** The group with the highest occurrence of ulcerative colitis was females aged 46-55. Out of the locations of terminal ileum cecum, ascending colon, transverse colon, descending colon, sigmoid colon and rectum, the sigmoid colon and rectum had the highest occurrence of inflammation. Out of cases in which one local part of the colon was affected, ascending and descending colon had zero cases, but the cecum, transverse colon, sigmoid colon, and rectum were affected. **Conclusion:** Ulcerative colitis is more commonly located at certain parts where the movements of colonic contents are decelerated, which warrants futher study about using bowel movement supporting medications for prevention and treatment of ulcerative colitis.

Keywords: Colitis, Ulcerative; Rectum; Prevention; Immune Tolerance

Introduction

Ulcerative colitis affects and creates complications in local organ structures and systemic parts of the body [1]. Even though diagnosis for inflammatory bowel disease is carried out using clinical symptoms, endoscopy, and pathophysiological assessment in clinical conditions, the diagnostic approach for diagnosing the disease in its early stages is still a great unanswered problem. Taking tissue samples and assessing the diseased and healthy mucosal parts systematically is a proficient way of eliminating the diagnostic issues of this disease [2].

The fact that ulcerative colitis cases are rising and the prevention of the disease and its complications are still not well understood is the basis and reason for this study [1]. In framework of this study, we aim (1) to identify the most common locations of ulcerative colitis within the colon, specifically to identify the frequently involved parts within the colon and to determine the parts where ulcerative colitis initially begins; and

(2) to detect the cause of the disease based on those findings. The desired end result of determining the common cause of ulcerative colitis is to make it possible to prevent it.

Materials and Methods

A total of 152 patients (female and male), between 16 to 86 years of age were involved in the study. The patients were chosen from Songdo Hospital of Ulaanbaatar, Mongolia in the period from June 1, 2012 to June 1, 2014.

The diagnosis of ulcerative colitis was established by correlation of clinical, endoscopic and histological findings. The PENTAX EPK–p (Japan) endoscope was used. Complete colonoscopy up to the terminal ileum was conducted. The endoscopic diagnosis of ulcerative colitis was ascertained via endoscopic biopsy. Detailed endoscopic findings were analyzed, such as mucosal appearance, extent of disease, and involvement of the cecum, ascending colon, ileum and rectum.

Biopsies from representative areas were processed. Histological parameters assessed included: surface epithelial changes, lamina propria inflammation, lymphoid aggregates and crypt architectural abnormalities, and Goblet cell population classified as with loss of goblet cells, muscularis mucosa, or hypertrophy.

1. Statistics analysis

Ulcerative colitis location and spreading of the morphological changes were studied with a fact-based study model and retrospective data analysis. Statistical analysis was performed by the Chi-Square test using SPSS 17.0 program. A p-value of <0.05 was considered statistically significant.

2. Ethical statement

Ethical approval was obtained from the Ethical Committee of the School of Medicine, Mongolian National University of Medical Sciences. Each patient signed the consent form before being involved in the study.

Results

Age and sex characteristics of the study patients are shown in Table 1. Of 152 participants with ulcerative colitis, 68 (44.7%) were male and 84 (55.3%) were female. The sex ratio of female to male was not significantly different within age groups (p >0.05) except for the age group of 46-55 where females outnumbered males by 1.8:1.0 (p <0.05). With regard to age, most ulcerative colitis cases were found among patients aged between 26 and 55.

Table 1. Ulcerative colitis patients by sex and age groups

Age group (years)	Total		Male		Female		Female: male ratio
	n	%	n	%	n	%	
16-25	8	5.2	4	50.0	4	50.0	1.0:1.0
26-35	33	21.7	16	48.5	17	51.5	1.1:1.0
36-45	36	23.6	18	50.0	18	50.0	1.0:1.0
46-55	39	25.8	14	35.9	25	64.1	1.8:1.0
56-65	16	10.5	7	43.7	9	56.3	1.3:1.0
66-75	14	9.2	6	42.9	8	57.1	1.3:1.0
76-85	6	4.0	3	50.0	3	50.0	1.0:1.0
Total	152	100.0	68	44.7	84	55.3	1.2:1.0

Cases chosen for the assessment of the location and spreading of the colon inflammation were classified as being in the terminal ileum, cecum, ascending colon, transverse colon, descending colon, sigmoid colon or the rectum as shown in Table 2. Division into in sex groups showed no statistical significance for any location.

Table 2. Ulcerative colitis occurrences in colonic parts further classified by sex group

Extent	Total		Male		Female		p-value
	n	%	n	%	n	%	
Terminal ileum	19	12.5	10	14.3	9	11.0	0.539
Cecum	72	47.4	37	52.9	35	42.7	0.211
Ascending colon	46	30.3	25	35.7	21	25.6	0.176
Transverse colon	57	37.5	24	34.3	33	40.2	0.449
Descending colon	76	50.0	34	48.6	42	51.2	0.745
Sigmoid colon	95	62.5	41	58.6	54	65.9	0.355
Rectum	92	60.5	42	60.0	50	61.0	0.902
Total	457		213		244		>0.05

Location of colon inflammation was further classified by age group as shown in Table 3. There were no statistical differences between age groups for colon inflammation location, except for in the ascending colon (p = 0.003).

Table 3. Location of ulcerative colitis by age group

Extent	Cases (%)							p-value
	Age group (years)							
	16-25	26-35	36-45	46-55	56-65	66-75	76-85	
Terminal ileum	5.3	10.5	36.8	31.6	5.3	10.5	0	0.589
Cecum	8.2	20.5	27.4	27.4	4.1	8.2	4.1	0.15
Ascending colon	13.0	30.4	28.3	17.4	0	6.5	4.3	0.003
Transverse colon	10.5	15.8	17.5	24.6	10.5	15.8	5.3	0.078
Descending colon	5.3	28.9	25.0	14.5	9.2	13.2	3.9	0.053
Sigmoid colon	7.4	24.2	25.3	20.0	9.5	9.5	4.2	0.422
Rectum	5.4	23.7	29.0	25.8	7.5	6.5	2.2	0.116

Internationally-accepted terminologies describing the ulcerative colitis extent, including the ICD-10 diagnostic coding system and the Montreal classification for ulcerative colitis and related diseases were not used to classify study cases due to inconvenience of the classification for the cases that occurred in our study. However, the inflammation classifications used are listed in Table 4 with the number of cases.

Table 4. Cases of ulcerative colitis by location (n = 152)

Type of inflammation	n	%
One local part of the colon affected	37	24.3
Distal ulcerative colitis	16	10.6
Proximal ulcerative colitis	9	5.9
Distal ulcerative colits with proximal ulcerative colits	13	8.6
Proctitis	15	10.0
Proctosigmoiditis	11	7.3
Total ulcerative colitis	41	23.3
Subtotal ulcerative colitis	10	6.7
No signs of ulcerative colitis by endoscopy assessment	16	10.9
No signs of ulcerative colitis by endoscopy assessment within total ulcerative colitis	5	3.3
No signs of ulcerative colitis by endoscopy assessment within subtotal ulcerative colitis	2	1.3
Ulcerative colitis with backwash ileitis	11	7.3

The ulcerative colitis extent for all cases is shown in Figure 1. Of all cases, 37 (24.3%) had one section of the colon affected with ulcerative changes. As shown in Figure 2, from this group, 10 (6.6%) cases had ulcerative changes in the cecum part of the colon, 0 cases had ulcerative changes in the ascending colon, 7 (4.6%) cases had ulcerative changes in the transverse colon, 0 cases had ulcerative changes in the descending colon, 5 (3.3%) cases had ulcerative changes in the sigmoid colon and 15 (9.9%) cases had ulcerative changes in the rectum.

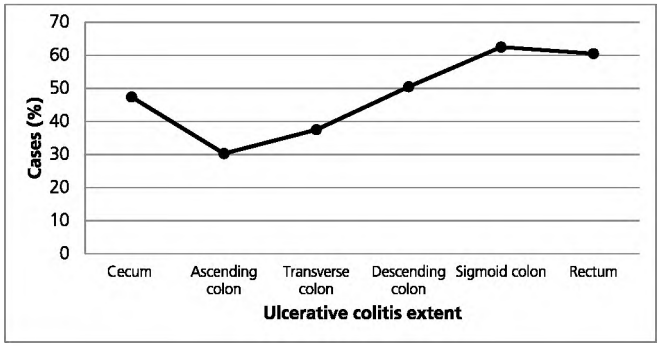

Figure 1. Percentage of total case occurrences shown by location of inflammation.

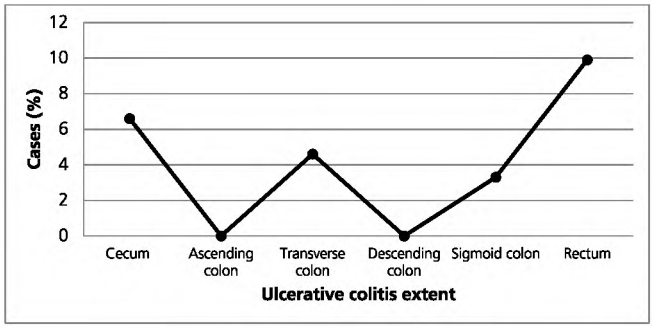

Figure 2. Percentage of cases diagnosed with primary ulcerative colitis in one locale.

Discussion

Ulcerative colitis cases were mostly found among patients between 26 and 56 years of age (n = 108). The sex ratio was almost constant in all age groups. Most cases (n = 39) were found in the age group of 46-55 and females comprised the majority of cases (25, 64.1%) in this group. This finding can be explained by the fact that women of these ages often have a rather inactive lifestyle and thus are prone to this disease. This also agrees with results from a previous study [3].

The location of ulcerative colitis within the colon had no relationship with the patients' sex. Ulcerative colitis cases in the ascending colon showed statistical significance ($p = 0.003$) with age. No other results according to age were signifiicant, but further study of the proximal ulcerative colitis is warranted.

In terms of location, it was seen that ulcerative colitis is more commonly located at the sigmoid colon and rectum. Of the cases that affected a single part of the colon ($n = 37$), most were in the rectum, which agrees with other researchers who claim that ulcerative colitis first originates in the rectum [1, 7]. No cases were in the ascending or descending colon. This can be explained by the fact that the rectum, sigmoid colon, transverse colon and cecum are the parts where the movements of colonic contents are decelerated, but colonic contents do not retain for long in the descending and ascending colon. Our study shows that ulcerative colitis first develops and is most commonly found in certain parts where the movements of colonic contents are decelerated.

Other studies have explained that in these areas the partial immune tolerance is lost, which then induces a partial autoimmune reaction, developing within the general immune response and leading to ulcerative colitis [4-6]. Researchers also have stated that people who consume oleic acid and fiber on a regular basis, people who smoke and also people who have a rather active lifestyle are rarely affected by ulcerative colitis [8, 9]. Some of these actions support regular bowel movements and thus prevent colonic contents from being retained for a longer period. In such cases, colonic contents do not inflame the mucosa for a long duration of time and ulcerative colitis will not develop.

The limitation of this study was the reliance on retrospective study methods. However, our study has laid the groundwork for the future possibility to further assess the process of bowel movements and fecal excretion processes during ulcerative colitis and to evaluate the treatment results of using bowel movement supporting medications when ulcerative colitis is at a stage of S0 or S1. Future study goals include (1) correlation with clinical and survey study methods, (2) study of histology of healthy unaffected areas in the colon from the patients as reference points and to gain further understanding of the ulcerative colitis pathogenesis, and (3) determine with academic proof if deceleration of contents in the colon causes ulcerative colitis and thus find new ways to prevent ulcerative colitis in early stages.

Conflict of Interest

The authors state no conflict of interest.

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