The role of ultrasonography in the diagnosis of ulcerative colitis

Ülserative kolitisin tanısında ultrasonografinin rolü

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ÖZET: *Ülseratif kolitte abdominal ultrasonografinin rolünü araştırmak amacıyla 57 ülseratif kolitli hastada (26'sı aktif, 31'i inaktif) abdominal ultrasonografi yaparak kolonoskopi bulguları ile karşılaştırıldı. Hastalardan 30'u kadın, 27'si erkekti. Ortalama yaş 39 yıldı (16-68 yıl). Ortalama hastalık süresi 45,9 aydı (1-240 ay). Ultrasonografik olarak maksimum duvar kalınlığı, haustrasyon kaybı ve lokalizasyon araştırıldı.*

Ultrasonografinin duvar kalınlığını saptamadaki sensivitesi %88, spesifitesi %77, haustrasyon kaybını göstermede ise bu oranlar sırasıyla %85 ve %39 bulundu. Genel tanısal doğruluk oranları ise sırasıyla %83 ve %60'tı. Aktif hastalardaki lokalizasyon %88,5 oranında doğru olarak gösterildi.

Sonuç olarak, ultrasonografinin ülseratif kolitteki duyarlılığı yüksek, ancak spesifitesi düşüktür. Bu yöntemin alternatif bir tanı yöntemi olmadığı, ancak tanıya yardımcı olabileceği kanısına varıldı.

Anahtar kelimeler: **Ülserative kolitis, kolon ultrasound çalışmaları, kolon sonografisi**

SUMMARY: *In order to assess the role of transabdominal ultrasonography in ulcerative colitis, 57 patients with ulcerative colitis (26 active, 31 inactive) were examined by transabdominal ultrasonsography and compared with colonoscopy. Thirty of the patients were female and 27 were male. The average age was 39 years (range:16-68). The average duration was 45,9 months (range:1-240). Maximum wall thickness, haustration loss and localization were investigated. Ultrasonography was found to be 88% sensitive and 77% specific in terms of detecting wall thickness; and 85% sensitive and 39% specific in terms of detecting haustration loss. The overall diagnostic accuracies respectively were 83% and 60%, respectively. The localization was detected correctly in 88,5% of patients with active ulcerative colitis*

In conclusion, ultrasonography was found to be highly sensitive but less specific in ulcerative colitis. We think that it should not be used as an alternative diagnostic tool but could assist in diagnosis.

Key words: **Ulcerative colitis, colon ultrasound studies, colonic sonography**

BARIUM contrast studies and endoscopy with biopsy have been used as the traditional methods for the diagnosis of Crohn's disease and ulcerative colitis. These conventional studies can only evaluate the superficial changes of the bowel mucosa. On the other hand, ultrasound is a useful and non invasive diagnostic method that enables us to obtain information about the transmural changes of the bowel (1).

Abdominal ultrasound can be helpful in the differential diagnosis of inflammatory bowel disease and other bowel pathologies. Recognition of different ultrasonographic patterns may also determine the type of inflammatory bowel diseases (2,4). In addition, transabdominal ultrasound is commonly used to diagnose complications such as other visceral abnormalities, masses, intraabdominal abscesses and uretheral obstruction produced by inflamed bowel segments (5). Ultrasound has also been proposed for the evaluation of disease activity.

The purpose of this study is to analyze and to discuss our experience with ultrasound scanning in the assessment of disease activity and localization in a group of patients with ulcerative colitis.

MATERIALS AND METHODS

57 patients with histologically verified ulcerative colitis (30 female, 27 male) were referred for abdominal examination. Median age of patients was 39 years (range:16-68). Mean disease duration was 45,9 months (range:1-240). The localization of disease was determined by barium enema stud-

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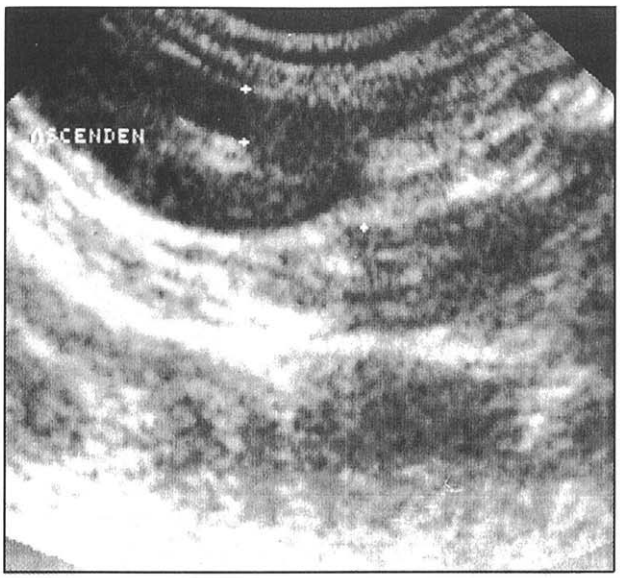

Figure 1. *Longitudinal section of an inflamed bowel w=Thickened intestinal wall, l=Narrowed intestinal lumen*

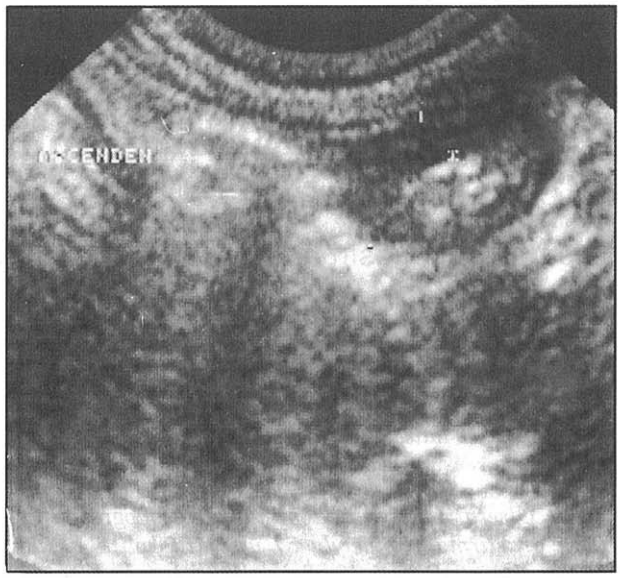

Figure 2. *Transversal section of an inflamed bowel segment. w=Thickened intestinal wall, l=Narrowed intestinal lumen*

ies and/or endoscopy. Disease activity was assessed by clinical, laboratory and endoscopic findings. In the same period, ultrasound examinations were performed. All examinations were conducted by the same operator who received no prior information about the patients. The ultrasound apparatus employed was a curved array scanner with a 3,5 MHz (SAL 77A, Toshiba, JAPAN). No special preperations were required. In every patients, the abdomen was systematically scanned in both longitudinal and transverse sections. An intestinal wall thickness of 4 mm or more was considered pathological. In addition to thickness, loss of haustration was determined and the extent of disease was estimated. The ultrasonographic findings were compared with those from barium contrast studies and/or colonoscopic studies to determine the role of ultrasonography in the assessment of disease activity and localization.

RESULTS

According to endoscopic and clinical findings, 26 patients had active, 31 had inactive disease. The bowel wall thickness of 4 mm or more was observed in 23 of 26 patients in active group. Among the 31 patients with inactive disease, wall thickness was detected in 7 patients (Fig 1,2). Based on these results the sensitivity for determining disease activity by ultrasonographic wall thickness was 88% and the specificity was 77% in ulcerative colitis. When haustration loss was considered, ultrasonography was found to be 85% sensitive and 39% specific in assessing disease activity (Table 1). The localization was detected accurately in 88,5% for active patients.

DISCUSSION

Transabdominal ultrasound is commonly used to diagnose complications in patients with inflammatory bowel disease. Ultrasound has been shown capable of demonstrating abnormality in Crohn´s disease, was first described in 1979 by Holt and Samuel (6).

The characteristic ultrasonographic appearance of the normal bowel shows five layers. These layers have been assigned to anatomical structures.

Table 1. *Sensivity and specificity of ultrasonography in assessing disease activity.*

Lesion	True(+)	True(-)	False(+)	False(+)	Sensitivity	Specificity	ODA*
Wall thickness (>4mm)	23	24	7	3	88	77	82
Haustration loss	22	12	19	4	85	39	60

* Overall diagnostic accuracies

Layers 1 and 2 correspond to the mucosa, layer 3 corresponds to the submucosa, layer 4 to the muscularis propria, and layers 5 to the serosa and subserous fatty tissue. Layer 1,3,5 are echogenic, the other layers are hypoechoic (1,7,8). In ulcerative colitis, the inflammatory infiltrate is in the mucosa and upper submucosa unless there is extensive disease with ulceration. Even though the inflammation is limited to the mucosa and upper submucosa, the bowel wall may be thickened in ulcerative colitis because of submucosal oedema (9,10). Many studies don´t support that thickness measurement distinguish between the causes of colitis (9-11). The bowel wall thickening seen in the ultrasonographic image in pseudomembraneous, ischemic or infections colitis can mimic the changes observed in Crohn´s disease or especially in ulcerative colitis. In these infective colitis there is typically acute superficial inflammation and ulceration of the mucosa which may form a ë´slough´´ (3,12,13). Recent reports in the nomenclature have shown that numerous intestinal pathologies can be demonstrated by ultrasound (14,15).

Our study shows that the thickening of the bowel wall in the ultrasonic B-scan can be used for the detection of the disease activity and localization. Wall thickness had a strong relationship with disease activity. Furthermore follow-up of the same patients at different times showed that a decrease of wall thickness occurred with the reduction of disease activity. The probability of true-positivity in thickened wall appearance depends on the activity of the disease. The correct diagnosis of localization is especially likely to be missed when ulcerative colitis is inactive. The extent and severity of ulcerative colitis may be made from clinical, endoscopic, histologic and contrast radiologic studies. However, ultrasonography should be preferred because it is less invasive and can be done at any time without preparation. Ultrasound is a quick, non-invasive method capable of detecting activity and localization in measurement of bowel wall thickening in ulcerative colitis. It can be used to reduce the frequency of repeat colonoscopy or barium studies in patients already diagnosed as ulcerative colitis.

In conclusion, abdominal ultrasonography provide useful clues in the assessment of ulcerative colitis. Although it can not replace contrast radiology and endoscopy, it may be of use in reducing the number of diagnostic studies in these patients.

REFERENCES

1. Kimmey MB, Martin RW, Haggit RC, et al. Histologic correlates of gastrointestinal ultrasound images. Gastoenterology 1989; 96:433-441.
2. Dubbins PA. Ultrasound demonstration of bowel wall thickness in inflammatory bowel disease. Clinical Radiology 1984; 35:227-231.
3. Khaw KT, Yoeman LJ, Saverymuttu SH, et al. Ultrasonographic patterns in inflammatory bowel disease. Clinical Radiology 1991; 43:171-175.
4. Fleischer A, Muhletalar C, James E. Detection of bowel lesions during abdominal and pelvic sonography. JAMA 1980; 244:2096-99.
5. Fleischer A, Muhletalar C, James E. Sonographic patterns arising from normal and abnormal bowel. Radiol Clin North Am 1980;18:145-160.
6. Hat S, Samuel E. Gray scala ultrasound in Crohn´s disease. Gut 1979; 20:590-595.
7. Wang KY, Kimmey MB, Hyberg DA, et al. Colorectal neoplasm: Accurancy of US in demonstrating the depth of invasion. Radiology 1987; 165:827-829.
8. Aibe T, Fuji T, Okita K, et al. A fundomental study of normal layer structure of the gastrointestinal wall visualized by endoscopic ultrasonography. Scand J Gastroenterol 1986; 21:6-11.
9. Rasmussen SN, Riis P. Rectal wall measured by ultrasound in chronic inflammatory disease of the colon. Scand J Gastroenterol 1985; 20:109-114.
10. Worricek H, Lutz H, Heyder N, Matek W. Ultrasound findings in Crohn's disease and ulcerative colitis: a prospective study. J Clin Ultrasound 1987; 15:153-163.
11. Micheal B, Kimmey MD,Keith Y, et al. Diagnosis of inflammatory bowel disease with ultrasound.An in vitro study. Invest Radiol 1990; 25:1085-90.
12. Bolondi L, Ferrentino M, Trevisoni F, et al. Sonographic appearance of pseudomembranous colitis. J Ultrasound Med 1985; 4:489-492.
13. Puyleart JB, Vermeyden RJ, Vander Werf SDJ, et al. Incıdence and sonographic diagnosis of bacterial ileocolitis masqueradings as appendicitis. Lancet 1989; 2: 89-91.
14. Karayalçın S, Dökmeci A,Örmeci N, et al. İnce ve kalın barsak tümörlerinde transabdominal ultrasonografinin değeri. Ankara Tıp Mecmuası 1988;41:327-340.
15. Bozkurt T, Richter F, Lux G. Ultrasonography as a primary diagnostic tool in patients with inflammatory disease and tumors of the small intestine and large bowel. J Clin Ultrasound 1994; 22;85-91.