Usefulness of digestive ultrasonography in the assessment of ulcerative colitis extent

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RESUMEN

Introducción: el hallazgo de lesiones endoscópicas severas en un paciente con colitis ulcerosa desaconseja la realización de una exploración completa del colon. No obstante el conocimiento de la extensión precisa de la enfermedad tiene gran importancia en las decisiones terapéuticas a tomar y también en el pronóstico de la enfermedad. Por todo ello, la validación de una técnica no invasiva para el estudio de extensión de la colitis ulcerosa cobra gran interés e importancia.

Material y método: se incluyeron el estudio pacientes con diagnóstico previo de colitis ulcerosa o en el debut de la enfermedad y, de forma prospectiva y ciega se evaluó la precisión de la ecografía digestiva en la valoración de la extensión de la colitis ulcerosa. Las exploraciones ecográficas son realizadas todas ellas por el mismo explorador y siempre con anterioridad al estudio endoscópico completo, que se usa como patrón oro. No se empleó la técnica hidrocólica en ningún caso.

Resultados: han sido incluidos en el estudio 20 pacientes, 13 varones (65%) y 7 mujeres (35%), con una edad media de 51,7 años (rango de 24 a 82 años). Los estudios endoscópicos mostraron una afectación severa en 5 casos (25%), moderada en 12 pacientes (60%) y lesiones leves en los 3 casos restantes (15%). El estudio ecográfico del colon fue considerado satisfactorio en 18 casos (90%) y la extensión de la enfermedad establecida en el estudio ecográfico coincide en todos los casos con la determinada por la colonoscopia: 3 pacientes (16,6%) presentaban una proctitis ulcerosa, 9 (50%) una colitis izquierda y 6 (33,3%) una colitis extensa.

Conclusiones: la ecografía digestiva permite el estudio del marco colónico en la mayoría de los pacientes, especialmente si existe actividad inflamatoria, permitiendo establecer con gran precisión la extensión de la colitis ulcerosa, independientemente del grado de actividad de la misma.


ABSTRACT

Introduction: a full examination of the colon should be avoided upon finding severe endoscopic lesions in patients with ulcerative colitis. However, knowledge of the precise extent of disease is quite important for disease prognosis and the making of therapeutic decisions. Therefore, any validation of a non-invasive technique to assess the extent of ulcerative colitis gains a lot of interest and importance.

Material and method: the study included patients that were previously diagnosed of having ulcerative colitis or were beginning to suffer from the disease. A prospective and blind evaluation was carried out to determine the precision of digestive ultrasonography in assessment of ulcerative colitis extent. All ultrasonography was carried out by the same person and was always performed prior to carrying out a full endoscopic study, which is used as the gold standard. The hydrocolonic ultrasonography technique was not used in any of the cases.

Results: a total of 20 patients –13 males (65%) and 7 females (35%), with an average age of 51.7 years (aged between 24-82 years)– were included in the study. Endoscopic studies revealed severe disease in 5 cases (25%), moderate disease in 12 patients (60%), and mild lesions in the 3 remaining cases (15%). A colonic ultrasonogram was considered satisfactory in 18 cases (90%), and the extent of disease as established by ultrasonography was in all cases consistent with that established through colonoscopy: 3 patients (16.6%) had ulcerative proctitis, 9 patients (50%) had left-sided ulcerative colitis, and 6 (33.3%) had extensive colitis.

Conclusions: digestive ultrasonography allows to study the colon in most patients, especially when inflammatory activity is present, and provides a greater accuracy in assessing ulcerative colitis extent, which is independent of its activity level.

Key words: Ulcerative colitis. Diagnosis. Extent. Ultrasonography. Endoscopy.


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INTRODUCTION

A full colonoscopy examination must be avoided upon finding severe endoscopic lesions in patients with ulcerative colitis due to the high risk of complications, especially those of toxic megacolon and perforation (1). On the other hand, when faced with a possible clinical relapse of a known disease, one would certainly want to know the extent of the disease with a view to discarding any progression of said disease. This would mean carrying out a colonoscopy—an invasive technique, which is not always well accepted by the patient.

Knowledge of disease extent and severity could lead to modifications in therapeutic strategies, since in cases with distal involvement a topical treatment would suffice, thereby avoiding the use of systemic drugs, some of which produce important side effects (2-5). Furthermore, knowledge of ulcerative colitis extent is important because it conditions prognostic differences (greater need for admission to hospital and colectomy), and may lead to colorectal cancer and to death in more extensive forms (6-10).

Extent of disease is not fixed, and we can observe not only a progression of disease in its less extensive forms, but also a regression in extensive colitis (11-13).

Ulcerative colitis has been traditionally classified as: a) proctitis whenever only the rectosigmoid is distally affected; b) proctosigmoiditis when the sigma is also affected; c) left-sided ulcerative colitis if the extent is greater but not surpassing the splenic flexure; d) extensive colitis if the colon is affected proximally to the splenic flexure; and e) pancolitis if the colon is affected proximally to the hepatic flexure. However, the prognoses of proctosigmoiditis and left-sided ulcerative colitis have been found to be quite similar, just like in the case of extensive colitis and pancolitis. Therefore, the classification agreed upon in Montreal in 2005 differentiated only 3 groups of patients according to the extent of disease, namely proctitis, left-sided ulcerative colitis, and extensive colitis (14).

As described earlier, the gold standard for the assessment of ulcerative colitis is colonoscopy—a technique that requires preparation of the intestine and sedation of the patient to carry out a full examination, a technique that may not be well tolerated by the patient, and a technique that presents a high risk of complications in patients with a severe and active form of disease (1). Therefore, many radiological and labelled leukocyte scintigraphies have been studied as less invasive techniques to assess the extent of disease, and have obtained varying results. Our study assesses the precision of abdominal ultrasonography, an easily accessible technique that is practically harmless, well tolerated by patients, and that can be carried out “at the patient’s bedside” in inpatients.

MATERIAL AND METHOD

Selection of patients

Patients that were selected either had a prior diagnosis of ulcerative colitis or initial signs at the time of inclusion in the study. However, a prior histological diagnostic confirmation was a must for all patients to be included in the study. Patients considered were those with active signs of disease who were being followed up in the outpatient clinic, and those suffering from initial disease but with an incomplete endoscopic study due to its inherent risks in case of severe disease and also to other reasons (technical difficulties or poor intestinal preparation) in less severe cases.

All patients with the disease who had an endoscopy examination of the colon performed in the 12 months prior to the study were excluded, as the risk for disease progression during this time period is low enough to condition the results of the ultrasonographic study. All patients who did not undergo an endoscopic study of the colon were likewise excluded, since this technique is considered to be the gold standard for the diagnosis of ulcerative colitis extent. Lastly, all patients who did not have a conclusive diagnosis with ulcerative colitis by histological examination were also excluded.

An informed consent was obtained from all patients for performing an ultrasonography and using their clinical data in the study, as ultrasonography was not the exploration for which they had been initially scheduled.

Methodology

A colon ultrasonography was carried out in all patients before the endoscopic examination, which enabled an assessment of the definitive extent of disease. This assured that the ultrasonographer was “unaware” of colonoscopy results. The technique used in all cases was conventional percutaneous abdominal ultrasonography, and no hydrocolonic ultrasonography was used.

As a general rule, an ultrasonographic examination in outpatients was carried out on the same day of the endoscopic examination, and therefore the intestine was prepared using a conventional polyhydroelectrolytic solution. For inpatients an ultrasonogram was done without any prior preparation. Both examinations were carried out during the same hospitalization period, but were never done on the same day. All ultrasonograms were performed by the same explorer using a Toshiba Nemio 10 ultrasonograph fitted with 3.75 Mz convex and 7.5 MHz linear arrays.

The ultrasonographic study began upon locating the rectosigmoid union; thereafter, the entire length of the colon was examined up to the right iliac fossa, in the theoretical cecum area. The study discarded any presence of inflammatory activity when the colon wall was found to
preserve its layered structure and was less than 4-mm thick (Figs. 1 and 2). On the other hand a pathological study was considered (Figs. 3 and 4) when wall thickness was greater than 4 mm, whether or not it was accompanied by an alteration of the layered structure (this is not normal in ulcerative colitis, where inflammation is generally circumscribed to the mucous and submucous layers). Since any mucosal inflammation in ulcerative colitis is generally found to be continuous along the entire length of the colon, any sighting of a “normal” segment proximal to an inflamed segment means that we can safely discard the serial presence of any proximal pathological segments. Therefore, ultrasonography is considered satisfactory when we are able to identify at least one unaffected colon segment next to a proximal segment with pathological ultrasonographic characteristics. In patients with only the rectum involved, bearing in mind that practically...

Fig. 1. Image obtained with a high frequency linear array at the level of the left iliac fossa. A normal sigma can be seen after gradual compression with the transducer at this level, where wall width is around 3-4 mm and the five ultrasonographic layers of the gastrointestinal wall are clearly visible. These are symmetrical on both sides of the hyperechogenic image created by the gas present in the intestinal lumen.

Fig. 2. Image obtained using a high frequency linear array at the level of the left flank, obtained just like in the previous case, which shows a descending colon with a normal sonographic structure and a wall thickness of 2.8 mm below the muscular level.

Fig. 3. Image obtained using a high frequency linear array at the level of the left flank, showing a thickening of the colon wall of 7.2 mm, and a poorly visible layered structure, although some limits at the level of the serosa are quite well defined, as is the unscathed meso. The findings correspond to a moderate left-sided ulcerative colitis from an endoscopic point of view.

Fig. 4. Image obtained using a high frequency linear array at the level of the left flank (right) and left iliac fossa (left) showing thickened sigma and descending colon walls but with a preserved layer structure. The mucous and submucous layers (2nd and 3rd layers) are greatly affected, especially at the sigma level, where wall thickness reaches 9.2 mm. The findings correspond to a moderate-severe left-sided ulcerative colitis from an endoscopic point of view.
all patients with ulcerative colitis have an inflamed rectum and the study included only those patients who were histologically diagnosed with the disease, a proctitis was diagnosed when the colon wall was found to be normal from the rectosigmoid union towards the proximal end.

Variables studied and statistical methods

Descriptive statistics for all demographic, clinical, and lab variables were carried out, with special emphasis on severity scores and extent of disease from an endoscopic point of view. The classification criteria used corresponded with the terms established in the Montreal 2005 agreement (14). Disease extent diagnosis using ultrasonography and coincidence between endoscopic diagnosis and that of ultrasonography were also assessed. This comparison was performed using contingency coefficients that relate endoscopic and ultrasonographic diagnoses. The SPSS 12.0 package for Windows was used for the statistical study.

RESULTS

Twenty patients—13 men (65%) and 7 women (35%), with an average age of 51.7 years (ranging between 24 and 82 years)—were included in the study. An ultrasonogram was carried out in 7 patients (35%) after an incomplete endoscopic study in early disease (5 patients with severe endoscopic activity and 2 patients with incomplete explorations, which was due to deficient colonic preparation). Moreover, 13 patients (65%) presented with clinical relapse of a known disease and were referred from the outpatient clinic in order to discard further extension of colitis. Endoscopic studies revealed severe disease in 5 cases (25%), moderate disease in 12 patients (60%), and mild lesions in 3 of the remaining cases (15%) (Table I). The colon’s ultrasonographic study was considered satisfactory in 18 cases (90%), while images obtained in 2 cases (10%) did not enable a reliable diagnosis of disease extent. One such patient had only the rectum affected (we could visualize no healthy colon), while the other patient a mild left-sided ulcerative colitis. The extent of disease obtained from the satisfactory ultrasonographic images coincided with colonoscopy for all 18 patients: 3 patients (16.6%) presented ulcerative proctitis, 9 patients (50%) had left-sided ulcerative colitis, and 6 patients (33.3%) were afflicted with extensive colitis. Table I shows a summary of these data.

The above data show that a diagnosis of ulcerative colitis extent was accurately deduced by abdominal ultrasonography in 18 of 20 patients, with a 90% technique precision. The contingency coefficient that relates endoscopic and ultrasonographic diagnosis was found to be 0.898 (p = 0.0018). Only 2 patients were studied incorrectly, and therefore inappropriate therapeutic decisions would have been taken in just 1 case (5%) based on ultrasonographic findings (topical treatment would perhaps be insufficient for left-sided ulcerative colitis).

DISCUSSION

Severe endoscopic lesions when found in a patient with ulcerative colitis means that a full colon examination should be avoided because of greater risks such as perforation and toxic megacolon (1). This is the normal practice followed in our department, even though the above opinion is not shared by all authors (15,16). However, during very severe outbreaks of disease activity, and especially when faced with disease onset, knowing the exact extent of the disease can greatly condition therapeutic decisions, namely surgery, immunosuppressants, leukocyte apheresis, etc. (14). Such knowledge can also be valuable in the case of less severe patients treated on an outpatient basis because we can discard any progression of disease using non-invasive techniques, since many patients are reluctant to undergo repeated endoscopic examinations.

Several radiological techniques such as abdominal CT, barium enema, magnetic resonance imaging (MRI), and ultrasonography have been considered useful for a differential diagnosis of Crohn’s disease and ulcerative colitis, as well as for the diagnosis of ulcerative colitis extent, after having obtained promising results (17-21). Isotopic techniques like MRI imaging with gadolinium, labelled
leukocyte scintigraphy, and positron emission tomography (PET) (22-25) have also been assessed. However, some of these imaging techniques require preparation of the intestine, which can be uncomfortable and dangerous while other techniques like scintigraphy and PET are not always available in the majority of hospitals. The only technique from the above list that stands out beyond doubt as being easily accessible, innocuous, low-cost, and with potential repeats for as many times as needed, even “at bedside” in severely afflicted patients, is ultrasonography. However, unlike the study of Crohn’s disease, the use of digestive ultrasonography for assessing ulcerative colitis patients has been poorly studied. Most reports include many patients with Crohn’s disease (a majority), and only a few cases of ulcerative colitis. But none of them have used ultrasonography to assess extent of disease. These studies nevertheless state that ultrasonography is quite sensitive and specific for detecting ulcerative colitis lesions. The accuracy of ultrasonography oscillates between 63 and 95% (21,26-33). This huge variation in results can be explained by the various gold standards used in these studies for evaluating ultrasonographic precision (endoscopy and radiological techniques), the heterogeneity of selected patients, and notable differences in sample sizes. Pascu et al. (34) recently published a study involving 24 patients with ulcerative colitis where ultrasonographic precision for detecting ulcerative colitis lesions in any colon segment was 95% (91-100%, in the several segments), and thus clearly surpassed MRI, which has a precision of 81%. The greatest limitation of ultrasonography is that it does not permit the study of the rectum. Our study did not assess the sensitivity of ultrasonography for diagnosing ulcerative colitis, because we started out with a group of patients with a known disease and our objective was to determine the extent of colitis, something that was unknown prior to ultrasonography. The diagnosis of disease extent, as explained above, is based on the detection of a healthy segment next to the most proximal affected segment. Thus, even though we are unable to study the rectum, we can establish a proctitis diagnosis in a patient with known rectum involvement when able to visualize a normal sigma from an ultrasonographic point of view. As mentioned above, ultrasonographic accuracy has been found to be 90% for disease extent. The two patients in whom the study was unsuccessful were actually outpatients that had been subjected to colon preparation for colonoscopy. We do not think that the presence of feces in the colon can be a reason for a suboptimal study of the colon. In any case, the reduced number of patients does not permit drawing conclusions as to whether the study should be carried out with or without any preparation of the colon. In any case, only one patient, who was incorrectly diagnosed, could have received incorrect therapeutic treatment based on the ultrasonographic study. However, this was a patient who had been suffering from mild left-sided ulcerative colitis, and some studies indicate that topical treatment in the form of enema (this is the only way to approach the splenic flexure) is as effective as an oral treatment for this condition (35). No diagnostic error occurred in severely affected patients, and (therefore) these are precisely the patients who would benefit most from a non-invasive technique when trying to assess disease extent, with a view to deciding on the pertinent therapeutic measures.

To conclude, we believe that our study shows that ultrasonography can be an effective tool to understand the extent of ulcerative colitis, especially in patients in whom full colonoscopy is not advisable. Our study is nevertheless a preliminary study with a limited number of patients, and we would suggest that our findings be confirmed through future, larger studies.

REFERENCES


