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Editorial

Cost-effectiveness of abdominal ultrasonography in the diagnosis of colorectal carcinoma

Colorectal cancer (CRC) is a most common neoplasm, and the second leading cause of cancer-related death. CRC was responsible for 11% of cancer-related deaths in males, and for 15% of cancer-related deaths in females according to data for year 2000. Most recent data reported in Spain on death causes in 2002 suggest that CRC was responsible for 12,183 deaths (6,896 males with a mean age of 70 years, and 5,287 women with a mean age of 71 years). In these tumors, mortality data do not reflect the true incidence of this disease, since survival has improved in recent years, particularly in younger individuals. In contrast to other European countries, Spain ranks in an intermediate position in terms of CRC-related incidence and mortality. This risk clearly increases with age, with a notorious rise in incidence from 50 years of age on. Survival following CRC detection and management greatly depends upon tumor stage at the time of diagnosis; hence the importance of early detection and –because of their malignant potential– of the recognition and excision of colorectal adenomas. Thus, polypectomy and then surveillance are the primary cornerstones in the prevention of CRC (1-4).

For primary prevention, fiber-rich diets, physical exercising, and the avoidance of overweight, smoking, and alcohol have been recommended. Low-dose NSAIDs or ASA are still not recommended for the prevention of CRC as of today (1).

CRC develops through well-established stages from lesions in colonic gland crypts to adenomas to cancer. The adenoma-carcinoma sequence is characterized by cumulative mutations in both suppressor genes and oncogenes, which affect the balance between cell proliferation and apoptosis; thus, each mutational event confers tumor cells with a growth advantage entailing a clonal expansion along multiple stages, and ultimately tumor progression (5).

From all the above, CRC screening is warranted: a) this tumor has a high incidence and results in severe morbidity and mortality; b) the premalignant potential of colorectal adenomas is well known; c) the tumor may be detected using highly sensitive endoscopic techniques; and d) early management improves survival. The population with a moderate risk for CRC includes individuals older than 50 years with no additional risk factors (family members with CRC or adenomas, chronic inflammatory bowel disease). Regarding the cost-effectiveness of CRC screening, Pignone et al. (6) performed a systematic review of this problem, and concluded that screening is cost-effective *versus* non-screening. The most cost-effective screening option for each population area or country remains to be established, as well as as its financial impact on healthcare systems (7-9). While no first-choice screening option has been established in our setting thus far, any one of those discussed below is more effective than non-screening.

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Studies reported with this regard suggest that *fecal occult blood* testing decreases CRC-related mortality. Alternatively, a meta-analysis by Scholefield (10) estimates that testing reduces mortality by 16%. The technique's sensitivity is around 35%, and specificity approaches 98%. This technique has no adverse effects, and may therefore be easily accepted by the general population. *Flexible sigmoidoscopy* has a sensitivity of 70 to 80%, but the detection of lesions in the portion amenable to this endocope requires a colonoscopy to the cecum. However, recent studies suggest that complete colonoscopy would not be mandatory for hyperplastic polyps (11). This technique is not riskless, but studies have shown that it helps reduce mortality from CRCs in the rectum-sigma. Complete *colonoscopy* is the "gold standard" for the detection of polyps and tumors within the colon. It additionally allows the excision of potentially malignant adenomas. Its complication rate, while low, is higher than that of the above-mentioned techniques. There is no evidence that CRC screening using an *opaque enema* contributes to a decrease in this tumor's incidence and mortality. Its sensitivity is lower than that of colonoscopy, it will neither detect small-size lesions, nor allow polyp excision. The usefulness of novel techniques for colonic examination –*computerized tomography (CT) colonography and magnetic resonance imaging (MRI) colonography*– has also been assessed for CRC screening. Sensitivity and specificity approach 90 and 80%, respectively. Also, it does not allow polyp excision or biopsy collection. Its sensitivity in the detection of flat polyps is lower than that of colonoscopy. Side effects include patient exposure to radiation during CT colonography, and rarely intestinal perforation (1,10,12-18). *Fecal DNA tests* have been developed in recent years to detect tumor gene mutations in stools; their sensitivity and specificity vary according to test type and the population tested (asymptomatic or with symptoms suggesting a neoplasm); acceptance is good, but the cost of each individual test is high (19-21).

Abdominal ultrasonography is a cheap, convenient technique with no risk for complications. While it has been assessed in the detection of colon tumors, no data on its usefulness for CRC screening are available because of its low sensitivity in the detection of small-size lesions and polyps (22-30). The ability of abdominal ultrasounds to detect colonic lesions has been assessed in a number of studies; indeed, Schmutz (23) studied 453 abdominal echograms, evaluated their ability to detect colonic lesions (not just CRCs), and found a sensitivity of 77% and a specificity of 98%; a study by Price and Metrewelli (22), which assessed a series of cases following the performance of 1,700 abdominal ultrasonograms, detected 35 possible CRCs and concluded that the positive predictive value of ultrasonography for CRC screening was 79%, with a low rate of false positive results. Other studies have assessed ultrasonography in patients with suspected intestinal obstruction; thus, the study by Grunshaw et al. (27) assessed in 60 patients the ability of ultrasonography to diagnose intestinal (ileal or colonic) obstruction, which it did in 98% of patients while correctly diagnosing the cause of obstruction in 80%; a study by Lim et al. (29) had the objective of assessing the ability of ultrasonography to establish both the site and cause of colonic obstruction; in 26 patients with colonic obstruction or suspected colonic obstruction it appropriately established the obstruction site in 85% of patients, and the cause of obstruction in 81%. Studies focusing on CRC screening using ultrasonography offer similar sensitivities and specificities; the study by Rutgeerts et al. (28) in 95 patients obtained a sensitivity of 95.5%, and a very low specificity; similar sensitivity estimates (96%) were obtained by Richardson (25), but specificity was 67% and accuracy in lesion sitting was 91%; Shirahama et al. (28) found that, among 41 echograms meeting ultrasonographic CRC di-

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agnostic criteria, the tumor was confirmed using opaque enema scans or colonoscopy in 37 patients (90%). A study by Loftus et al. (30) compared the diagnostic utility of ultrasonography, CT, and colonoscopy for CRC recognition; these researchers found that the sensitivity and specificity of ultrasounds were very high (100%), but diminished a lot when patients with polyps were included in the study group. As previously discussed, abdominal ultrasonography cannot detect colon polyps; the study by Limberg (26), comparing the usefulness of conventional abdominal ultrasounds *versus* hydrocolonic ultrasonography in 300 patients, reached a diagnosis of CRC in only 9 of 29 patients (sensitivity, 31%) with conventional ultrasounds, whereas hydrocolonic ultrasonography correctly diagnosed 97% of cases; this same study suggests that conventional ultrasonography cannot detect polyps, whereas hydrocolonic ultrasonography can.

The study by Martínez-Ares et al., published in this issue of *Revista Española de Enfermedades Digestivas* (31), shows that the sensitivity of ultrasounds for CRC screening is 79%, but increases to 91% when rectal ampullar lesions are excluded, with a specificity of 92%. These rates are similar to those usually reported in the literature. The authors sustain that a selected group of patients may benefit from abdominal ultrasonography as a first diagnostic step. These would include patients with a low suspicion of CRC and no warning signs, or older, bedridden subjects with inappropriate colon preparation. Thus, for instance, in a study by our group (32) where we retrospectively evaluated colonoscopy indications, among 120 such requests where the only clinical sign was the presence of a "constitutional syndrome" (excluding patients with anemia or other warning symptoms) only 5 CRCs (4.2%) and 19 colorectal adenomas (15.8%) were detected. Chances to detect a CRC are very low in patients with only a constitutional syndrome for clinical manifestation, and no other warning symptoms or anemia.

In conclusion, abdominal ultrasonography in the diagnosis of CRC is a technique with acceptable sensitivity and specificity that lacks complications, is convenient for patients, may be rapidly performed, and requires no previous colon preparation; as a result, it may be useful in selected groups of patients, but further studies are needed to establish its value in the screening of the general population. The selection of a given screening method will depend on available resources, and their acceptance by the examined population. Presently, our recommendation would be fecal occult blood testing every one or two years and/or sigmoidoscopy every 5 years or colonoscopy every 10 years (1).

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