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Use of a ferromagnetic marker for the intraoperative detection of interpectoral lymph node metastasis of colorectal cancer☆

Uso de marcador ferromagnético para la detección intraoperatoria de metástasis ganglionar interpectoral de cáncer colorrectal

Colorectal cancer (CRC) is the most frequently diagnosed malignant tumor in Spain in both sexes, while it is the second most frequent in women, after breast cancer, and the third in men, after prostate and lung cancer.[1]

More than one-third of patients will present distant metastasis. The most frequent locations are the liver and lungs,[2] although metastases may occasionally present in less common locations.

Techniques for locating non-palpable tumors in breast cancer have been recently developed, including radioactive techniques like ^{125}I seeds and the more recent non-radioactive paramagnetic iron oxide seeds. However, the use of these techniques for the localization and subsequent excision of non-palpable lesions is not exclusive to breast cancer, and their use has also been described for non-palpable lesions of other tumors.[3]

The objective of this article is to present a new technique for locating CRC lymph node metastasis using interpectoral magnetic markers.

The patient is a 68-year-old man who had undergone surgery 8 years earlier for left CRC, stage IIB, which was treated with left hemicolectomy and adjuvant chemotherapy. Four years later, he presented liver recurrence, and segmentectomy of segment VI was performed. In subsequent check-ups, an interpectoral lymph node metastasis was diagnosed on the right side. Given that it was a solitary lesion, we decided to resect it, and the use of a marking method was proposed due to its size (<1 cm) and anatomical location. We inserted a magnetic seed in the lymph node, which was done percutaneously under ultrasound guidance prior to surgery (Fig. 1). The procedure began with a 3 cm right axillary incision through which the Sentimag®/Sienna+® probe was inserted. The lesion was detected between the pectoralis major and minor (Fig. 2) and was resected. The histological study confirmed the CRC lymph node metastasis. The patient is disease free after 5 months of follow-up.

Due to the advances made in detection techniques, tumors and recurrences are being diagnosed earlier. In many cases, the lesions are small or non-palpable, making it difficult to locate them in the surgical field.[4] In recent years, new techniques have been developed for the localization of these tumors, such as ferromagnetic markers. The use of these techniques originated in non-palpable breast lesions. Historically, surgeons relied on non-invasive, but imprecise techniques, such as marking the skin with ink. Later, due to the increase in non-palpable lesions, wires were used as a localization technique. However, wire localization has some limitations: patients must carry the metal wire until the procedure, which may move, and involvement of the margins has been reported between 14% and 47%.[5]

In recent years, alternatives to wire localization have been developed for non-palpable breast tumors, such as radiophar-

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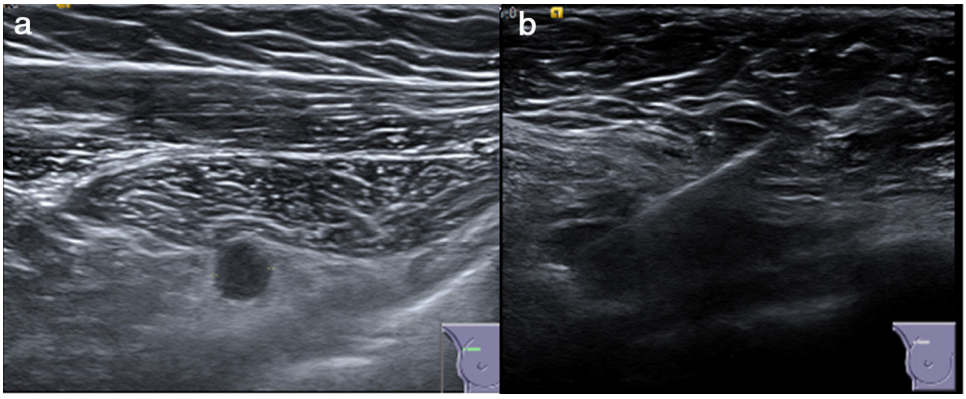

Fig. 1 – Image of interpectoral lymphadenopathy on ultrasound (a); Image of the ultrasound-guided placement of the magnetic seed (b).

Fig. 2 – Image of the surgical procedure using the Sentigag®/Sienna+® probe to locate the lesion.

maceutical marking (^{125}I seeds, albumin labeled with Tc^{99}) for intraoperative gamma camera localization of the lesion,[6] and more recently, the use of non-radioactive ferromagnetic seeds as markers in radio-guided surgery.[7] These markers are composed of superparamagnetic iron oxide particles (SPIO) that are detected intraoperatively by the Sentimag®/Sienna+® probe used by the surgeon in the operating room. Numerous advantages have been reported about the use of ferromagnetic seeds compared to radioactive markers or wire localization. First of all, they can be used in hospitals that do not have nuclear medicine services, requiring fewer legal requirements than radioactive materials.[8] Second, less margin involvement has been described compared to marking with a wire, allowing for more precise and smaller excisions, and reducing the number of reoperations. Another advantage is that they can be placed in the lesion weeks or even months before surgery, enabling patients to undergo neoadjuvant treatments with chemotherapy, if necessary, before surgery. Lastly, less healthy tissue must be removed because the lesion is accessed through more appropriate routes.[9] In a retrospective study of 188 patients with 213 breast lesions, 100% localization of the lesions was reported at the time of excision, and 96.7% of the markers were placed within a radius of 1 cm from the lesion.[10]

Although it is true that magnetic markers were originally developed for non-palpable breast cancer lesions, their use as a locator is being contemplated in other lesions, both malignant and benign.[3] In the case we report, the patient had a CRC lymph node metastasis smaller than 1 cm, and its deep location could have been an impediment for intraoperative identification. The use of the seed placed prior to surgery under ultrasound guidance facilitated excision and optimized surgical time as well as the approach, locating the lesion easily.

The use of magnetic seeds opens a wide range of possibilities beyond breast cancer lesions, which should be explored for the benefit of the patient and the improvement of the surgical technique of the surgeon.

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Ampulloma in a patient with a history of Roux-en-Y gastrojejunal bypass☆

Ampuloma en paciente con antecedente de *bypass* gastroyeyunal en Y de Roux

Patients who have undergone bariatric surgery and later present diseases of the hepatobiliary area are difficult to diagnose and treat due to their anatomical and pathophysiological alterations.

We present the case of a 57-year-old woman who underwent laparoscopic Roux-en-Y gastric bypass (RYGB) for morbid obesity 12 years ago, with a 150 cm Roux limb and a 60 cm biliopancreatic limb (BPL). Her BMI at that time was 31.95 kg/m^2. She came to the emergency room due to pruritus that had progressed for a week. On physical examination, she presented a non-painful palpable gallbladder, suggestive of the Courvoisier-Terrier sign. Lab work showed predominantly direct hyperbilirubinemia (total bilirubin 6.83 mg/dL and direct bilirubin 4.91 mg/dL), elevated cholestasis enzymes and Ca 19.9 tumor marker 117.6 U/mL.

Abdominal computed tomography (CT) scan (Fig. 1a) revealed a hydropic gallbladder and dilation of the intrahepatic bile duct and common bile duct (23 mm), with a sudden change in caliber at the papilla of Vater, with homogeneous increase in soft tissue.

Magnetic resonance cholangiopancreatography (MRCP) (Fig. 1b) revealed a markedly dilated bile duct with an abrupt change in caliber in the distal/pre-papillary common bile duct, coinciding with the presence of a nodular lesion measuring 17 mm that was isointense on T1 and T2-weighted sequences, showing restriction in diffusion sequences, and which was slightly enhanced after the administration of intravenous contrast (Fig. 1c and d), as well as a lymphadenopathy in the bifurcation of the celiac trunk. The differential diagnosis included ampullary carcinoma, impacted lithiasis, biliary cast, pancreatic head cancer, or papillitis.

The case was discussed in the multidisciplinary committee, at which time we decided to drain the bile duct by means of percutaneous transhepatic cholangiography (PTHC), and biopsies were taken. The PTHC detected a large dilation of the intra- and extrahepatic bile duct with obstruction at the papilla; past the obstruction, an 8 F internal–external biliary drain tube was placed, and the bile discharge was clean. A biopsy was taken, which was not conclusive as the sample consisted of fibromuscular tissue and glands without cytoarchitectural atypia.

The patient evolved favorably, with improved pruritus and jaundice, as well as lower bilirubin levels on follow-up studies. We decided to try double-balloon enteroscopy for another biopsy,

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