Unexpected destinies: unusual sites of colorectal cancer metastases

Luciana Sánchez, Marcos Dellamea, Lorena Moreno, Carlos Osorio, Rodrigo González Toranzo, Mariano Sosa.

Abstract

Colorectal carcinoma is one of the most common malignant neoplasms and the second leading cause of death in both female and male patients. The liver and lungs are common sites of metastases; however, it occasionally metastasizes in atypical sites making diagnosis difficult.

Due to the high frequency of colorectal carcinoma, even infrequent metastatic sites are common findings in daily practice, so the radiologist must be aware of these possibilities to make the correct diagnosis.

This paper presents the characteristics of secondary lesions in the cervix, penis, scrotum, abdominal wall, retroperitoneal and thoracic nodes, and pulmonary lymphatic involvement.

They can be disseminated through lymphatic, hematogenous or contiguous spread, and the presence of these...
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Introduction
Colorectal carcinoma is one of the most common malignant neoplasms and the second leading cause of death in both female and male patients (1).

The primary lesion is mainly located in the ascending and transverse colon in 40% of cases, followed by the descending colon and sigma in 30% of cases and the rectum in the remaining 30% (1).

The histological variant is adenocarcinoma, which constitutes from 80 to 90% of the cases (1).

Dissemination can occur through hematogenous, lymphatic, or contiguous spread, depending on the location of the primary lesion, as well as the site of the metastasis.

The most frequent sites of metastasis are the liver, the lungs, and the adrenal glands, in a decreasing order of affection (2) (Figure 1).

However, there are other unusual sites of metastasis that, even though they are rare compared to the sites mentioned above, the high prevalence of colorectal cancer makes them frequent findings in daily radiology practice.

Uterine metastasis
It is one of the rare sites of colorectal carcinoma metastasis. The most frequent affected site is the cervix and the most frequent dissemination occurs through direct spread, followed by lymphatic and hematogenous spread. The rareness of the metastases to the cervix is attributed to the great amount of fibrous content, which is an unfavorable medium for tumoral growth, relative poor vascularization and distant lymphatic drainage from the pelvis to the uterus. This finding is associated with a disseminated disease at the moment of the diagnosis, thus representing a bad prognosis. By contiguity, the alteration is more frequently seen in the body (Figure 2). Multimodal therapy is required, including chemotherapy (3, 4).

Penile metastasis
It usually derives from neoplasm in genitourinary organs, although in rare occasions they derive from the colon, especially from cancer at the level of the sigmoid colon, even though it is an organ with significant vascularization. The prognosis and the survival rate are bad, since it implies an advanced stage of the disease and requires aggressive treatment. Its dissemination remains controversial. It was suggested that it occurs through venous or lymphatic retrograde spread, direct spread, implantation secondary to instrumentation, or arterial spread. In 60% of the cases, the lesions appear as multiple masses that are rigid, palpable, infiltrative, and —occasionally— ulcerated having a density of soft tissues with poor vascularization in CT. It can cause priapism due to infiltration of cavernous bodies or occlusion of venous drainage (5) (Figure 3).
Scrotal metastasis

It is also a rare presentation of colorectal metastasis. These lesions originate synchronically or immediately after the disseminated colorectal carcinoma. The dissemination occurs most probably through direct extension, followed by lymphatic or hematogenous spread. Unfortunately, these patients present a highly-disseminated disease at the moment of the diagnosis, with a bad prognosis. Some anti-neoplasm therapies have demonstrated a reduction and even disappearance of some of these lesions (6) (Figure 4).

Prostatic metastasis

Prostatic metastasis deriving from colorectal carcinoma is infrequent, even more so from non-contiguous lesions, since the most frequent dissemination is through direct extension. Both symptoms and findings are unspecific, although patients generally present a history of known primary neoplasm of the colon. Some authors recommend prostatic evaluation by transrectal ultrasound in patients with urological symptoms after surgical resection of the colon (7) (Figure 5).

Bladder metastasis

As well as prostatic metastasis, secondary involvement of the bladder in patients with colon cancer occurs through direct extension of the lesion, although there are isolated cases of vesical metastasis in patients with lesions in the distant colon. When dissemination occurs through direct extension, there is a possibility that the content of the colon spreads to the vesical lumen through a fistula with consequent fecaluria. Tomographic findings can show diffuse irregular vesical parietal thickening, which is more evident in excretory phase (7) (Figure 6).
Figure 2. Uterine metastasis. Metastatic involvement of the body of the uterus due to adenocarcinoma of intestinal origin by contiguous spread, with presence of colonic content at the level of the uterine cavity probably due to fistula (A and B) (arrows). Ultrasound shows a solid hypoechogetic expansive lesion that compromises the cervix (C) (asterisk).

Figure 3. Penile metastasis. Diffuse infiltration of the penis due to adenocarcinoma of intestinal origin in patient with primary tumor in the sigmoid colon (arrows).

Figure 4. Scrotal ultrasound. Presence of vascularized solid nodule attached to the internal margin of the scrotal sac (arrow) in a patient with metastatic colorectal carcinoma. Presence of hydrocele as well (asterisk).
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Figure 5. Prostatic metastasis.
Diffuse infiltration of the prostatic gland in patient with colon adenocarcinoma (A and B) (arrows).

Figure 6. Bladder metastasis.
Diffuse infiltration of vesical walls (arrow) in patient with colon adenocarcinoma.

Peritoneal pseudomyxoma
Peritoneal pseudomyxoma is a rare disease characterized by abundant mucinous and gel-like intra-peritoneal material associated with intraperitoneal adenocarcinoma. Although the primary origin is more frequent in mucinous adenocarcinoma of ovaries, followed by appendicular mucocele, some mucinous colorectal neoplasia can be produced by peritoneal infiltration. Aggressive surgical treatment associated with a resection of the primary tumor is the most appropriate indication, although these patients generally present recurrence in the short term, requiring new interventions (8) (Figure 7).

Abdominal wall metastasis
The presence of metastasis in the abdominal wall deriving from a colorectal carcinoma is an extremely rare finding, except when it is found around the navel. Cutaneous metastases located at the level of the navel receive the name of Sister Mary Joseph nodule. The dissemination occurs through direct or lymphatic spread and generally derives from malignant neoplasia of the abdomen and pelvis. Generally, this finding is associated with a bad prognosis. The characteristic finding is a palpable hypoechochogenic nodule in ultrasound or of soft tissue density in CT, at the level of the subcutaneous tissue in the umbilical region (9) (Figure 8).

Bone metastasis
Bone metastasis deriving from a colorectal primary neoplasm is also rare and it is generally a late manifestation of the disease.

Bone lesions secondary to colorectal cancer can present diverse patterns, including lytic lesions, expansive lesions with soft tissue components, pseudosarcomatous lesions or soft tissues lesions with ossification signs. The detection of masses deriving from soft tissues associated with cortical destruction and periosteal reaction (pseudosarcomatous lesions) lead to the diagnosis of primary lesion to the bone instead of a diagnosis of metastatic lesion. However, bone
metastasis deriving from colon cancer can appear with lesions of such characteristics (10) (Figure 9).

Carcinomatous lymphangitis
Even though metastatic pulmonary involvement is frequent in patients with colorectal carcinoma, the presence of carcinomatous lymphangitis is not. This involvement is produced by lymphatic spread generally associated with pre-existent metastatic areas. Findings in high-resolution CT are multinodular thickening of interlobular septa and fissures (11) (Figure 10).

Adenopathies
Lymph node metastasis is a topic of discussion regarding colon cancer staging. Lymph nodes count and location determine the staging and subsequent prognosis of these patients. There are several theories about how dissemination occurs: One suggests that the presence of metastatic adenopathies precedes an indirect dissemination and proposes a lymphatic spread; the other one suggests a dissemination to distant lymph nodes without evidence of regional lymph nodes produced through lymphatic spread (skip metastasis) or through re-metastasis from other metastatic sites, such as liver and lungs. The presence of adenopathies generally requires chemotherapy treatment associated to surgical resection of the primary lesion.

Mediastinal lymphadenopathy
The presence of mediastinal lymph nodes in patients with metastatic disease to the liver or lung is not frequent and it is produced through a re-metastatic mechanism as previously described. However, metastatic involvement of mediastinal lymph nodes without involvement of other organs is extremely rare, with isolated cases reported. In this case, the dissemination is not clear, although a lymphatic drainage para-aortic spread is suggested as skip metastasis (12) (Figure 11).

Retroperitoneal adenopathies
Colorectal carcinoma occasionally appears with retroperitoneal adenopathies. The dissemination proposed is through mesocolic lymph nodes, with prior involvement of mesenteric lymph nodes, or through direct lymphatic dissemination from the rectum (12) (Figure 12).

Pancreatic metastasis
The presence of pancreatic metastasis represents from 1 to 3% of the cases of pancreatic neoplasia. Colon carcinoma is the most frequent third primary origin. Occasionally, the pancreatic lesion precedes the diagnosis of primary neoplasia. Some studies suggest a benefit from surgical resection with respect to an isolated lesion, although the prognosis and survival rate is not well-known due to the small amount of lesions in daily practice. Radiological findings are unspecific and are indistinguishable frequently from a pancreatic adenocarcinoma, presented as an expansive hypovascular lesion of poorly-defined edges (13) (Figure 13).

Figure 7. Peritoneal pseudomyxoma.
Intermediate density ascites in peritoneal recesses and partially compresses of anatomical structures, with peritoneal thickening (asterisk), related to pseudomyxoma secondary to adenocarcinoma.
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**Figure 8. Abdominal wall metastasis.**
A hypoechogenic subcutaneous nodule is seen with irregular edges and vascularization in color Doppler at the level of the abdominal wall in a patient with disseminated colon adenocarcinoma (arrow).

**Figure 9. Bone metastasis.**
Axial CT of the pelvis in two patients with colon adenocarcinoma. Presence of osteolytic lesions with significant component of soft tissue and a pseudosarcomatous aspect of the sacrum (A) and the right iliac bone (B) (arrows).

**Figure 10. Carcinomatous lymphangitis.**
Micronodular thickening of interlobular septa in a young patient with disseminated colon carcinoma (arrow).
Conclusion
It is necessary to know the atypical forms and sites of presentation of colorectal cancer metastases in order to make a correct staging of this neoplasm and for the indication of adequate treatment for each stage of the disease.
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Bibliography


