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NOTA CLÍNICA

Increase in muscle mass secondary to metastasis of an unknown gastric adenocarcinoma

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KEYWORDS
Muscle metastasis;
Gastric adenocarcinoma;
Computed tomography

Abstract
Objective: To present a case of rare manifestation of metastases as multiple muscular masses.
Clinical case: A 52 year old male with gastric ulcer as the only history of interest went to traumatology service referring to progressive pain in the left buttock with associated mass effect when walking.
Results: Imaging tests detected a multiple muscle mass. The biopsies showed signet ring gastric adenocarcinoma metastases.
Conclusion: The insidious presentation of muscular symptoms in the absence of traumatic injury, should be suspected and the possibility of a tumour assessed.

PALABRAS CLAVE
Metástasis musculares;
Adenocarcinoma gástrico;
Tomografía computarizada

Aumento de tamaño muscular secundario a metástasis de adenocarcinoma gástrico no conocido

Resumen
Objetivo: Presentar un caso de manifestación atípica de metástasis en forma de múltiples masas musculares.
Caso clínico: Varón de 52 años con úlcera gástrica como único antecedente de interés que acudió al servicio de traumatología por dolor con la deambulación en el glúteo izquierdo de intensidad progresiva y con efecto de masa asociado.
Resultados: Las pruebas de imagen realizadas detectaron múltiples masas musculares. La biopsia de las mismas dio como resultado metástasis de adenocarcinoma gástrico en anillo de sello.

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Conclusión: La presentación insidiosa de sintomatología muscular, en ausencia de antecedente traumático, debe hacer sospechar y valorar la posibilidad de patología tumoral.

Introduction

The muscles constitute an unusual location for metastasis of haematogenic origin, with an approximate incidence rate of 1%[1]

We report the case of a patient who came into the Traumatology Department reporting difficulty walking and pain in the left gluteal region starting several months previously. The computerized tomography (CT) revealed the existence of multiple intramuscular masses that later turned out to be metastases of a diffuse gastric adenocarcinoma tumour with signet ring cells.

We believe this to be an interesting case to report as reminder of the importance of assessing the possibility of tumour pathology when facing clinical situations presenting with insidious onset of muscle symptoms without a history of trauma.

Case report

We present the case of a 52-year old male patient who presented with the only history of interest being a partial gastrectomy due to gastroduodenal ulcer. He came to the Traumatology Department complaining of gradually increasing pain in the left gluteus on walking with associated mass effect. Likewise, he also presented a constitutional syndrome with moderate asthenia, significant anorexia, and progressive low-level dysphagia, having lost 10 kg in the previous months. He did not report having had bloody stools or any other clinical digestive or urological manifestations.

The simple x-ray of the abdomen showed increased density and volume of the soft tissue of abdomen and lower limbs (image not shown).

Under general anaesthesia and with the patient in lateral decubitus, an incisional biopsy was performed of the lesion observed intra-operatively in the left gluteal muscle; samples were sent to the Microbiology Department for culture and to the Pathology Department for histologic analysis. The result of the culture was negative for fungi and bacteria. The histologic examination of the samples obtained revealed tissue containing abundant myxoid-mucoid material dissecting and engulfing the striated muscle fibres; the matrix was seen to contain isolated groups and rows of signet ring cells (fig. 1A and B). The immunohistochemical report disclosed a complex

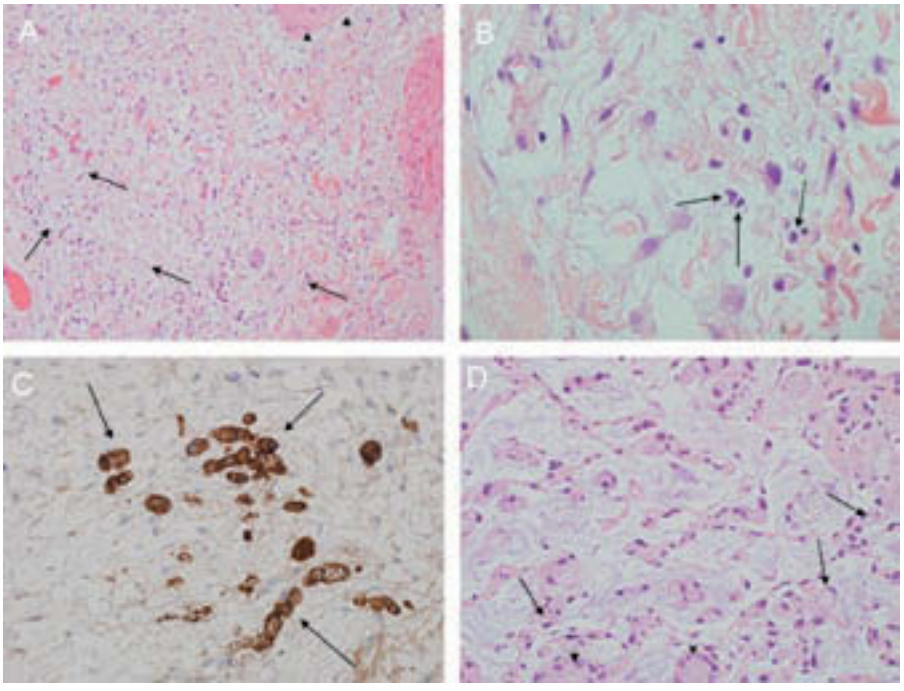

Figure 1 A-C. Biopsy of the gluteus muscle. Between the muscle fibres (arrowheads in A, haematoxylin-eosin ×10) signet ring cells are identified (arrows in A, arrows in B, haematoxylin-eosin ×40), suggestive of metastatic implants. The immunohistochemical study shows a complex epithelial phenotype, with positivity for cytokeratins AE1-AE3 (arrows in C, pankeratins ×40), suggesting possible primary tumour sites to be the stomach, lung, and bladder. The biopsy of the gastric remnant (D, haematoxylin-eosin ×40) reveals signet ring cells (arrows) between the secretion glands (arrowheads), confirming the gastric location of the primary tumour.

epithelial phenotype, which tested positive for keratins (fig. 1C), CEA, and EMA and negative for S-100, desmin, APS, FAD, PLAP, TTF-1, and Ca 19.9. The result was suggestive of muscle infiltration by signet ring cell type adenocarcinoma tissue, indicating the most probable primary tumours as carcinoma of the stomach, lung, and urinary bladder.

In the light of these findings, a CT was performed of the thorax, abdomen, and pelvis which yielded the following as the most salient findings: thickening of the wall of the gastric remnant (fig. 2A) and alteration of multiple muscles consistent with increased size and altered morphology. The involvement of the left *quadratus lumborum*, both iliac psoas, both glutei, the left *obturator internus*, and anterior left rectus muscles was verified. The involvement extended through both thighs, with bilateral involvement of the adductor muscles and the ischiotibial compartment, all of which was more acute on the left side.

The images were suggestive of intramuscular masses without uptake of contrast during the arterial phase of the study (fig. 2B) and with slight peripheral enhancement during the venous phase, as well as poorly delimited hypodensity in the centre (fig. 2C-E).

No ganglia of significant radiological size were detected.

With the diagnosis of neoplasm of unknown origin, the patient was referred to Medical Oncology, where the work-up was completed with a gastroscopy (given the finding of thickening of the gastric wall on the CT), revealing a mass in the gastric remnant that reached the subcardial region with ulcerated areas, sparing the fundus and the afferent loop. Biopsies were taken and four fragments were sent to the pathology service to be studied.

The result of the biopsy of the gastric mucosa was compatible with diffuse gastric adenocarcinoma with signet ring cells (fig. 1D).

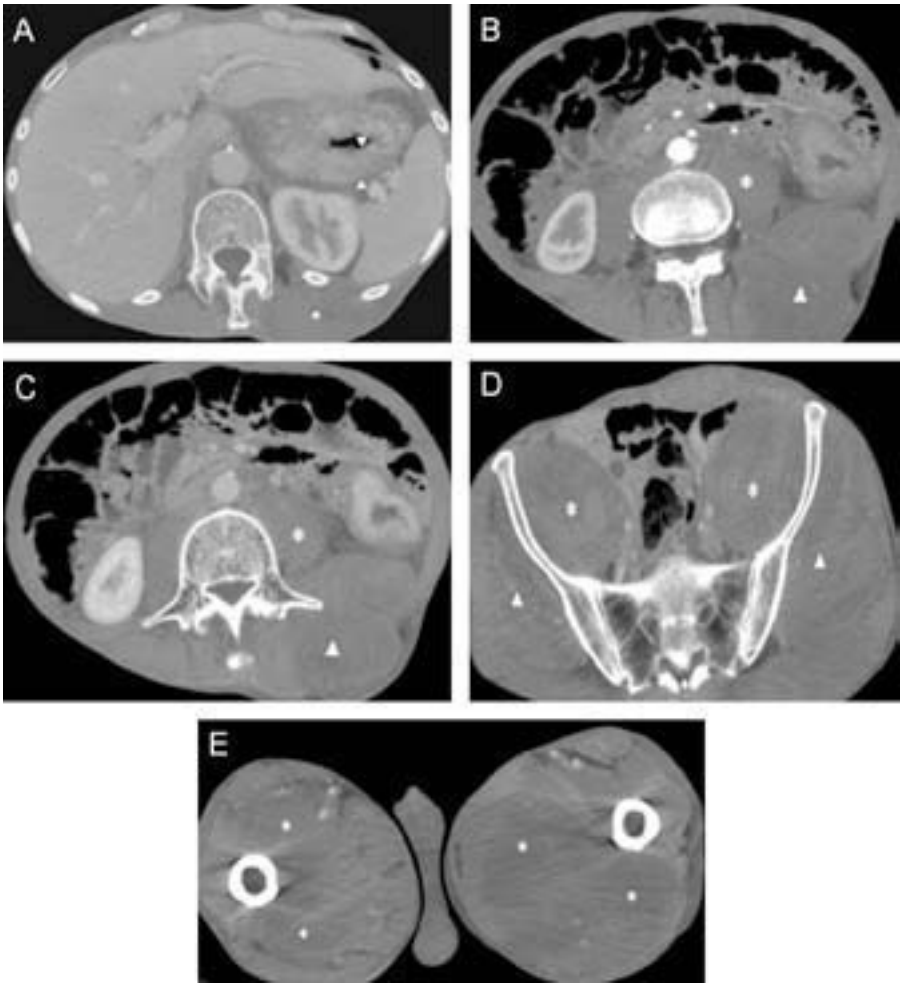

Figure 2 Axial CT images of the abdomen and pelvis with intravenous contrast medium. Thickening of the gastric remnant wall (arrowheads in A) due to a gastric signet ring cell adenocarcinoma, as confirmed by the subsequent surgery and histology study. In the arterial phase (B), the increased muscle size can be seen (the tip of the arrow points to the left *quadratus lumborum* and the asterisk indicates the left psoas muscle) with the absence of uptake of contrast. In the posterior phases of the study, the increased size and the heterogeneity of several muscles can be seen: the left *quadratus lumborum* (tip of the arrow in C), both iliac psoas (asterisks in C and D), glutei (arrowheads in D), left internal and anterior recti, the adductor muscle, and both ischiotibial compartments (asterisks in E). The masses presented peripheral uptake of contrast and central hypodensity in the venous and late phases.

The haemogram, blood tests, and the bone gammagraphy performed to complement the extension study were all normal.

With a definitive diagnosis of stage IV gastric adenocarcinoma (due to the existence of muscle metastases), eight cycles of chemotherapy to be administered tri-weekly were considered.

At the time this manuscript was written, the patient had received two cycles with good tolerance and clinical improvement.

Discussion

Muscle metastases are a very rare pathology, accounting for an estimated 1%of all metastases of haematogenic origin.[1] The frequency of muscle metastases found at autopsy is estimated to be between 0.8 and 16%, depending on the series.[2] Different theories have been developed in an attempt to explain this, including immunological defence induced by the muscular covering in response to the invasion of strange cells, the action of locally produced metabolites (lactic acid), alteration in pH, and even the mechanical destruction of metastatic cells.[3] The alteration of the normal defence mechanisms might facilitate haematogenic implants in muscles, which are highly irrigated by nature.

They tend to affect adult patients, between the ages of 30 and 70, without distinction between sexes.[1,4]

Within their scant frequency, muscle metastases sometimes constitute the first manifestation of a neoplastic process or the only evidence of disseminated disease with respect to stratification. Patients may or may not present with painful, palpable masses on physical examination.

Presentation in a single muscle is the norm (80%)[1] versus the multiple forms (20%); the ilio-psoas muscle is the most commonly affected, followed by the muscles of the extremities and the diaphragm.[3,4]

Muscle metastases may be the only sign of disseminated disease and the most common original tumours are in the genitourinary apparatus, followed by the respiratory and gastrointestinal systems, and, less often, the colon, ovary, cervix, and melanoma.[1]

The definitive diagnosis of muscle metastases is made by biopsy of the affected muscle. In our patient, the decision was made to perform an incisional biopsy given the totally non-specific macroscopic appearance of the lesion located in the left gluteal muscle at the time of the surgical examination, the impossibility of removing the tumour in its entirety given its large size, the lack of knowledge regarding the extension of involvement, and in order to avoid the risk of disseminating a process whose precise nature had not been determined at that time.

The evaluation of immunohistochemical markers pointed toward the location of the primary tumour. The most common histological type of malignant gastric neoplasm is adenocarcinoma (50-60%),[5] followed by squamous cell carcinoma (20-30%). More than 50% of the tumour is comprised of isolated or small groups of cells containing intracytoplasmic mucin. The cells may present several different morphologies, creating nuclei that are in close contact with the cell membranes, the classical signet ring appearance in contrast to the transparent cytoplasm.[5] Signet ring cell carcinomas tend to be infiltrating. The number of malignant cells is relatively small and the desmoplasm might be important. Special stains (PAS, mucicarmine, or alcian blue) or immunohistochemical staining with antibodies against cytokeratins can help detect disperse tumour cells in the stroma.[5]

The remaining gastric tumours correspond histologically to lymphomas, sarcomas, and melanomas.[1,4,5]

Gastric adenocarcinoma tends to metastasize to the liver and nodes. With respect to muscle metastases, they are generally incidental findings[2,6,7] on imaging studies performed in these patients.

Gastric adenocarcinoma can also present as peritoneal carcinomatosis, with peritoneal implants and variable omental involvement ("omental cake") and, more rarely, in the ovary (Krukenberg's tumour).

On the CT, muscle metastases appear as poorly-defined, intramuscular masses that are hypodense, with diffuse homogenous or ring-shaped enhancement following the administration of intravenous contrast and hypo-attenuation in the centre in comparison with cystic degeneration or necrosis components.[8,9] These findings pose the differential diagnosis mainly with abscesses in the cancer patient. There may be oedema surrounding the affected muscle. Likewise, they may present as an enlargement of the muscle involved and diffuse erasure of the adjacent fatty planes with no clear, definable masses.[8,9] They may present calcifications.[9]

Among the various imaging techniques that may be helpful in establishing the diagnosis is magnetic resonance, which reveals iso- or hypointense lesions with the muscle in the T1-weighted sequences and hyperintense in the T2-weighted sequences.[10] Following administration of gadolinium, peripheral uptake is seen, helping to distinguish between areas of necrosis in the centre and areas of solid tumour. It is more sensitive than the CT in detecting perilesional oedema.[10] In any case, the findings obtained are not specific and the differential diagnosis must include haematomas, soft tissue sarcomas, or abscesses.

In conclusion, many muscle metastases are found in patients with known, disseminated oncological disease, but they may be the first manifestation of a neoplastic process. The casual or clinically suspected finding of a muscle mass, whether painful or not, must require that the presence of metastases be ruled out. As there are no specific signs in imaging studies, any muscle mass of unknown origin must be biopsied.

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