CASE REPORT

Just another abdominal pain? Psoas abscess-*like* metastasis in large cell lung cancer with adrenal insufficiency

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SUMMARY

The authors report the case of a 69-year-old man with chronic obstructive pulmonary disease and previous pulmonary tuberculosis, who presented to the emergency department with abdominal and low back pain, anorexia and weight loss, rapidly evolving into shock. An initial CT scan revealed pulmonary condensation with associated cavitation and an iliopsoas mass suggestive of a psoas abscess. He was admitted in an intensive care unit unit; after a careful examination and laboratory assessment, the aetiology was yet undisclosed. MRI showed multiple retroperitoneal lymphadenopathies, bulky nodular adrenal lesions and bilateral iliac lytic lesions. Hypocortisolism was detected and treated with steroids. A CT-guided biopsy to the psoas mass and lytic lesions identified infiltration of non-small lung carcinoma. The patient died within days. Psoas metastases and adrenal insufficiency as initial manifestations of malignancy are rare and can be misdiagnosed, particularly in the absence of a known primary tumour.

BACKGROUND

Large cell lung carcinoma metastasis infiltrating iliopsoas muscle has not yet been described and the associated hypocortisolism is a rare complication of malignancy. Focusing on the initial manifestation of such clinical conditions contributes to the accuracy of future medical practice.

CASE PRESENTATION

A 69-year-old Caucasian man presented to the emergency department with a 3-week history of abdominal pain irradiating to the lumbar region, non-selective anorexia and unquantified weight loss. He denied fever, nausea or vomiting; he admitted to deterioration in the preceding week, as abdominal pain evolved into cramps and diarrhoea —with no associated blood, mucus or pus. He had no other acute systemic symptoms.

His medical history was remarkable for hypertensive and ischaemic cardiopathy, chronic obstructive pulmonary disease (COPD), with tobacco abuse of over 50 smoking pack years, resection of a Warthin's tumour, gastritis, hyperlipidaemia, benign prostatic hypertrophy and pulmonary tuberculosis at the age of 14. He was currently taking omeprazole, aspirin, carvedilol, valsartan and hydrochlorothiazide. He was a married man, and a retired worker in a gas plant; his family and dietary history were irrelevant.

On clinical examination, we found an obese, prostrate, hypotensive (85/40 mm Hg), tachypnoeic, pale and dehydrated patient; he had a diffusely painful depressible abdomen, without palpable masses or decompressive pain. Laboratory data revealed normocytic normochromic anaemia (haemoglobin 9.4 g/dL), with normal white cell counts and platelet count. Acute renal failure was detected, with blood urea nitrogen of 151 mg/dL, creatinine of 4.8 mg/dL, K^+ 5.5 mEq/L and oliguria. C reactive protein was 18.06 mg/dL. Blood gas documented a hypoxemic pattern (pH 7.39, pCO_2 26.5 mm Hg, pO_2 58.9 mm Hg, saturated O_2 88%). Chest X-ray showed non-specific fibrotic changes. A thoracoabdominopelvic CT scan with contrast was performed and revealed a posterior basal pulmonary condensation image with associated cavitation on the left (figure 1); increased volume and heterogeneity of iliopsoas, forming a possible abscess lesion (figure 2); densification of perirenal fascia on the right; and apparently bilateral space-occupying lesions near the adrenal glands.

As the patient became more hypotensive, tachycardic and unresponsive to fluid challenge, with sustained anuria, he was admitted at an intensive care unit (ICU; Unidade de Urgência Médica, Hospital de São José, Lisbon). A septic shock was assumed with unclear origin: possibly a psoas abscess, necrotising pneumonia or diarrhoea?

The patient was stabilised with adrenergic support and an echocardiogram excluded systolic

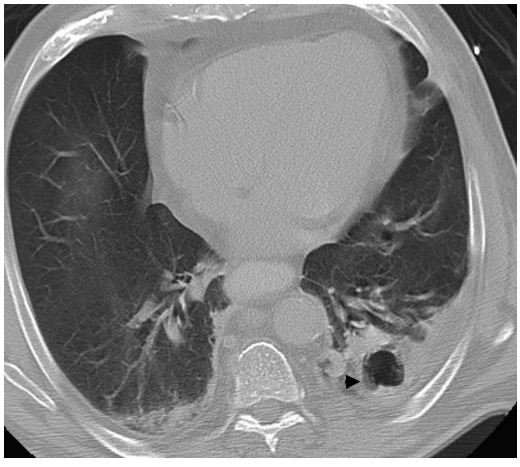

Figure 1 Axial CT image displayed in lung window settings reveals a parenchymatous opacity at the left base with a cavity (arrowhead), resembling a necrotising pneumonia or a necrotic tumour.

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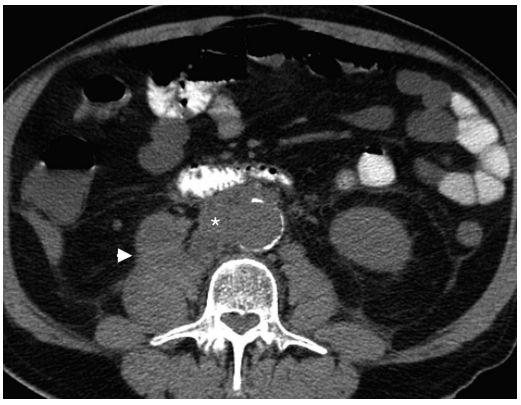

Figure 2 Axial non-enhanced CT image showing a mass-like enlargement of the right psoas muscle (arrowhead) and a soft tissue density mass at the right side of the abdominal aorta, hampering the visualisation of the inferior cava vein (asterisk), which corresponds to lymph node metastases.

dysfunction or intracardiac masses, with normal inferior vena cava collapse and cardiac output of 4 L/min. Renal replacement technique, invasive mechanical ventilation and red blood cell transfusions were required. Bronchoscopy was normal. Alcohol-acid-resistant bacilli research was negative and anti-biotherapy with piperacillin, tazobactam and linezolid was started and maintained for 12 days. Blood, tracheobronchial aspirate and urine cultures were all negative. HIV 1 and 2, *Brucella*, tuberculosis and *Clostridium difficile* serologies were also negative.

Some days later, after significant clinical improvement, an abdominopelvic MRI found bilateral pleural effusion with pulmonary cavitation in the left lower lobe; right psoas abscess (figure 3); multiple retroperitoneal, interaortocava, lateral and retroaortic lymphadenopathy (figure 4); bulky nodular bilateral, possibly secondary, adrenal lesions (figure 5) and bilateral lytic lesions in the iliac wings. Protein electrophoresis was normal; serum and urinary free light chain proteins and immunofixation were negative. Immunoglobulin, angiotensin converting enzyme (ACE), antineutrophil cytoplasmic antibodies (ANCA) and anti-*Saccharomyces cerevisiae* antibodies (ASCA) were negative. Tumour markers carcinoembryonic antigen and cancer antigen (CA) 15.3 were negative; CA 125 was 176.1 U/mL (normal <35 U/mL) and β2-microglobulin was 5.3 mg/dL (normal <0.2 mg/dL). A CT scan-guided biopsy was then performed in the psoas abscess and in the left lytic iliac wing lesion. Another bronchoscopy was also performed. Pathology results took a few days to acquire and meanwhile the patient relapsed on hypotension, abdominal pain and hyponatraemia. Serum cortisol was 1.8 μg/dL (normal 6.7–22.6 μg/dL; in critical ill patients, adrenal insufficiency is considered if cortisol is <1.8 μg/dL), with normal levels of aldosterone, adrenocorticotrophin, calcitonin and calcium. Hypocortisolism in the context of adrenal crises was assumed and the patient was started on steroids (hydrocortisone, intravenous, 100 mg every 8 h). Hypothyroidism was also detected (thyroid-stimulating hormone 9.55 μUI/mL, free T4 0.55 ng/dL) and thyroid ultrasound found multinodular plunging goitre and necrotic bilateral infrahyoid adenopathies.

Pathology results identified non-small cell lung carcinoma on the tracheobronchial aspirate, and psoas lesions and large cell carcinoma infiltration of pulmonary origin on the lytic iliac mass.

The patient became progressively less responsive to diuretic therapy, with sustained oliguria and hypotension, and was increasingly experiencing general pain and discomfort. Analgaesia and comfort measures were optimised. The patient died on day 20 of hospitalisation.

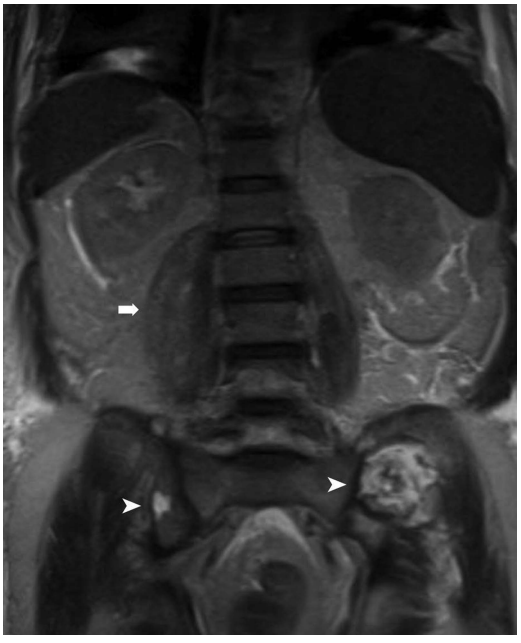

Figure 3 Coronal T2-weighted MRI showing enlargement and heterogeneity of the right psoas muscle (arrow) and bilateral lytic iliac metastases (arrowheads).

DIFFERENTIAL DIAGNOSIS

The clinical presentation on ICU admission, with tachypnoea, tachycardia, refractory hypotension, acute renal failure and CT scan with necrotising pneumonia, was suggestive of septic shock, with psoas abscess, necrotising pneumonia and diarrhoea as possible origins. As will be mentioned below, main possible causes were tuberculosis, HIV infection, cancer, inflammatory bowel disease and sarcoidosis.

Alcohol-acid-resistant bacilli research was negative; negative blood, tracheobronchial aspirate and urine cultures, as well as abscess biopsy, excluded tuberculosis. HIV serologies were negative.

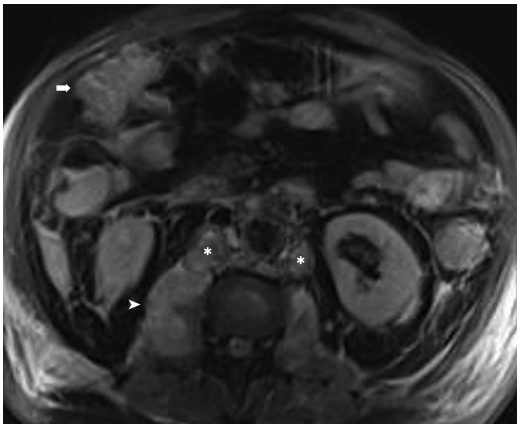

Figure 4 Axial T1-weighted fat-saturated MRI after gadolinium administration reveals an enhanced mass of the right psoas muscle (arrowhead), lomboaortic lymph node metastases (asterisks) and a huge, solid peritoneal implant at the right side of the great omentum (arrow).

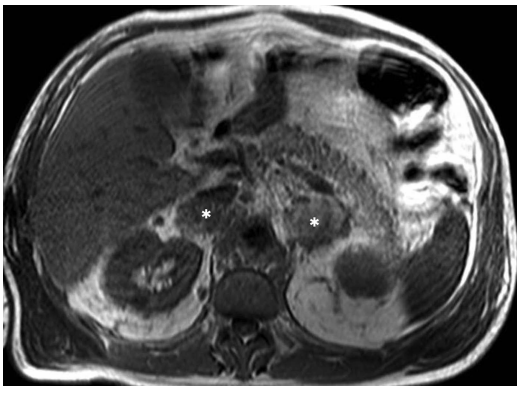

Figure 5 Axial T1-weighted MRI showing bilateral adrenal metastases (asterisks).

Negative ANCA and ASCA antibodies, with spontaneous diarrhoea remission and no bowel involvement detected on thoracoabdominopelvic CT scan, made inflammatory bowel disease unlikely. Colonoscopy was not performed, as the pathology results became available.

Sarcoidosis, although rare, was also considered; normal ACE and a contradictory biopsy result excluded it.

The psoas abscess was then a large cell lung cancer metastasis, confirmed by CT-guided biopsy and tracheobronchial aspirate. Shock occurred in the context of adrenal crisis, due to bilateral adrenal metastases.

TREATMENT

In stage IV of large cell lung cancer, the treatment implies a multidisciplinary approach. Smoking cessation and chemotherapy could be indicated, but patients with poor clinical condition should be submitted only to supportive therapy and care.

Hypocortisolism revealed initial responsiveness to steroids, but finally progressed, as the underlying cause was not resolved.

Hypothyroidism was treated with titrated levels of levothyroxine.

OUTCOME AND FOLLOW-UP

The patient died after 20 days of hospitalisation.

DISCUSSION

Psoas abscess was the diagnosis initially given for the presented case, and it held true. Psoas abscess was first described in 1881, by Mynter[1], as *psoitis*. Its incidence is not known, but it is considered a rare disease. A worldwide literature review revealed an average incidence of 4 cases/year between 1881 and 1990; however, in 1992, the occurrence of psoas abscess was about 12 cases/year.[2 3] This increase is attributed to the improvement of diagnosis achieved with the widespread use of CT scanning. Psoas abscesses can be divided into primary and secondary types. Primary psoas abscesses usually result from haematogenous spread from occult infection or local trauma and occur most frequently in patients with history of injection drug use, AIDS, alcoholism, diabetes, renal failure, haematological malignancy, immunosuppression or malnutrition.[4 5] *Staphylococcus aureus* (about 88%), *Escherichia coli* and *Streptococcus* are the main causative organisms.[5 6] In the secondary type, underlying causative factors are identified and the abscess is usually caused by enteric bacteria such as *E. coli* and *Bacteroides*.[4–6] *Mycobacterium tuberculosis* infection of the spine, Pott's disease, is currently the most frequent cause of secondary psoas abscess in developing countries.[4 7] The commonest associated conditions in secondary type are Crohn's disease, diverticulitis, appendicitis, colorectal cancer, urinary tract infection, vertebral osteomyelitis, mycotic abdominal aortic aneurysm and endocarditis.[4–6] The mortality rate in primary iliopsoas abscess is 2.5%, and in secondary type, about 18.9%.[8]

Symptoms are often non-specific and the classic triad of presentation, fever, back pain and psoas spasm, is present in only 30% of patients.[9] Back pain is the most frequent symptom, with a mean duration of 10.6 days before presentation.[9] As the psoas muscle is innervated by L2-L4, pain can irradiate to hip and thigh. Other symptoms include malaise, weight loss, nausea and anorexia.[4 5] Laboratory investigations, in general, are not specific in diagnosing psoas abscess. Leucocytosis, elevated C reactive protein, anaemia and raised erythrocyte sedimentation rate are frequently reported.[7 10] Blood cultures may be positive, and some reviews refer to positivity in about 50% of patients.[7] Initial radiological investigations may include plain radiographs, which are normally unremarkable, unless underlying discitis or vertebral osteomyelitis have been present for the previous few weeks. Ultrasonography only diagnosis 60% of psoas abscess cases, while CT reaches 80–100% and is considered the 'gold standard'.[5 11] The most common CT feature is usually a focal hypodense lesion within a larger muscle, with low attenuation, but this sign can also be seen in neoplasms and haematomas.[12–14] MRI only has 90% sensitivity and 80% specificity of CT for diagnosing psoas abscess, but is superior to CT at imaging the spinal canal.[4 6] Definitive diagnosis and treatment is achieved with CT-guided percutaneous drainage and culture of product. In this case, imaging studies were unable to distinguish between psoas abscess and neoplasm, and clinical history was compatible with both scenarios. However, it was finally at this point that, in the presented case, diagnose of psoas metastasis was established.

Muscular metastasis as the initial manifestation of malignancy is extremely unusual and may be misdiagnosed in the absence of a known primary tumour.[15] Skeletal muscle metastases are rare, probably due to muscle contraction, abundant blood supply, unfavourable pH, the effect of protease inhibitors and the presence of local tumour suppressors.[16 17] A study conducted by Acinas-Garcia *et al*[18] revealed that carcinomas account for about 64.6% of these metastases, including epidermoid carcinoma, adenocarcinoma and anaplastic carcinoma, followed by lymphoma (17.6%) and leucaemia (14.7%). It also found that the most affected muscles were the diaphragm (67.8%) and the iliopsoas (29.4%). Psoas metastases are most common due to primary neoplasms of renal, lung, pharyngeal, ovarian and colorectal origin, and melanoma.[15] Secondary iliopsoas neoplasms are usually hypodense lesions that can often be subtle on CT, as the density difference between the muscular metastasis and the iliopsoas muscle is often low.

The incidence of skeletal muscle in muscle metastasis of adenocarcinoma of the lung can be as low as 0.8%, but only five cases of infiltration of the psoas muscle by metastatic lung adenocarcinoma have been described.[13 19–21] No large cell lung carcinoma metastasis infiltration on the psoas muscle has previously been reported. Lung cancer metastasis to muscles commonly present with an occult pulmonary finding, as described in our case, consistent with the fact that non-small cell lung carcinoma, arising peripherally, usually presents without pulmonary symptoms. The most frequent presentation of muscle metastasis is pain, with or without swelling, mimicking the back pain and psoas spasm related to a psoas abscess. Diagnosing this condition, even with radiological support, is frequently tricky, as described above, because it can be confused with an abscess or soft tissue tumours, emphasising the value of histological diagnosis.[21] Being that the

primary tumour is usually very small in size, bronchoscopic biopsy and fluorodeoxyglucose scanning are also important in establishing the definite diagnosis. The presence of skeletal muscle metastasis, as generally occurring as a feature of systemic spread, indicates a poor survival.[18]

In the Case presentation section, adrenal insufficiency was described and bilateral adrenal metastases were found on CT scan. Adrenal metastasis are frequently reported, mainly related to lung and breast cancer, having been detected in up to 42% of patients with advanced non-small cell lung cancer.[22 23] Adrenal insufficiency as a presenting manifestation of lung cancer is rare, as over 90% of the adrenal gland must be destroyed for the symptoms to develop.[24] Adrenal insufficiency ranges from 0% to 13% of patients with bilateral metastases, and may be caused by extensive metastatic involvement or haemorrhage induced by metastatic deposits.[22] Secondary adrenal insufficiency may be caused by metastatic involvement of the hypothalamic-pituitary axis. Symptoms are usually non-specific, such as weight loss, tiredness, abdominal pain, diarrhoea, nausea and vomiting, common in patients with cancer, which may mask adrenal insufficiency. Many patients present with hypotension, dehydration, postural hypotension and, in case of adrenal crisis, syncope and shock.[25] Patients with advanced cancer are often under corticoids, which can also mask the symptoms of adrenal insufficiency. Laboratory results frequently reveal hyponatraemia, hyperkalaemia, mild metabolic acidosis, hypoglycaemia, anaemia and lymphocytosis, which are also non-specific. The determination of a low morning serum cortisol level is suggestive for the diagnosis, which can then be confirmed by cosyntropin test.[24] The treatment consists of restoration of intravascular volume and palliative administration of glucocorticoids and mineralocorticoids.

Large cell lung carcinoma accounts for 10–15% of lung cancers.[26] It typically presents with insidious onset of non-specific symptoms, for which the diagnosis is usually established in an advanced stage of the disease. The described patient presented particular risk factors for lung cancer: COPD, tobacco abuse, history of pulmonary tuberculosis and occupational exposure to toxic gases. As the CT scan revealed distant metastases, the cancer was at stage IV, for which survival at 5 years is less than 5%.

This case illustrates how a rare complication of a disease can mimic other serious clinical situations, initially revealed by such a non-specific symptom as abdominal pain. The possibility of metastatic disease should be considered in the differential diagnosis of abdominal or low back pain and the detection of psoas masses requires further investigation in order to exclude malignancy.

Learning points

- Psoas muscle metastases are rare and can mimic other clinical situations, as psoas abscess.
- Psoas metastasis as primary symptom of malignancy is very rare and frequently misdiagnosed.
- Clinical and radiological findings can be insufficient to establish a correct diagnose; a high level of suspicion, along with more extensive diagnostic techniques, such as CT-guided biopsy, may be necessary.
- Non-small cell large cancer is usually detected in an advanced stage of the disease, with metastases causing severe systemic complications.
- Adrenal insufficiency is often underdiagnosed due to the absence of specific clinical features. Patients with bilateral adrenal metastases should be carefully monitored.

Competing interests None declared.

Patient consent Not obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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