

The Value of 18-FDG PET/CT Imaging in a Patient with Atypical Metastatic Colorectal Cancer – Case Report: 18-FDG PET/CT in Colorectal Cancer

Hodnota zobrazenia 18-FDG PET/CT u pacientov s atypickým metastatickým karcinómom – kazuistika: 18-FDG PET/CT pri kolorektálnych karcinómoch

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Summary

Backgrounds: Cancer metastasis to skeletal muscle is very rare. Lung cancer, renal cell carcinoma and malignant melanoma have been reported as the most frequent primary tumours. Diagnosis of muscle metastasis from other primary cancer sites is more than problematic. **Case:** In this paper we report a case of metastasis of colorectal cancer in a 44-year-old man who underwent left-sided hemicolectomy due to the tumour mass in his left colic flexure followed by liver metastasectomy and cryocautery of the non-resectable metastasis in the VII segment. Subsequently, the patient was treated with two lines of chemotherapy. However, shortly after initiation of the second chemotherapy line he started to suffer from unbearable pain in the lumbosacral region. Neither a whole spinal cord MRI nor abdominal CT scan and scintigraphy explained the origin of the pain. Finally, PET/CT examination clarified the origin of the pain and showed massive hypermetabolic metastatic lesions in the muscles, further confirmed by autopsy. **Conclusion:** Thus, among the different imaging techniques, FDG PET/CT enables the detection of metabolically highly active tumour cells, undetectable by other conventional imaging means.

Key words

colorectal cancer – muscle metastasis – FDG-PET/CT examination

Súhrn

Východiská: Metastázovanie do kostrových svalov je veľmi vzácné. Najčastejšie referovanými primárnymi nádormi bývajú pľúcny karcinóm, nádor obličky a malígný melanóm. Je viac ako problematické stanoviť diagnózu svalovej metastázy z iného primárneho nádoru. **Prípad:** V našej kazuistike popisujeme prípad 44-ročného muža s metastatickým kolorektálnym karcinómom, ktorý podstúpil lavostrannú hemikolektómiu pre nádor lienálnej flexúry s následnou metastazektómiou pečenejových ložísk a kryodestrukciou neresekovateľnej metastázy v VII. segmente. V ďalšom období bol pacient liečený dvoma líniami chemoterapie. Krátko po zahájení druhej línie chemoterapie však začal trpieť neznesiteľnou bolesťou v lumbosakrálnej oblasti. Ani MR vyšetrenie, ani abdominálne CT vyšetrenie ako aj scintigrafia skeletu neobjasnili pôvod bolesti. Až zrealizované PET/CT vyšetrenie preukázalo masívne hypermetabolické metastatické ložiská vo svaloch, čo potvrdili aj pitevné nálezy. **Záver:** Prípad dokumentuje, že spomedzi rôznych zobrazovacích techník FDG PET/CT ponúka zachytenie vysoko metabolicky aktívnych nádorových lézií, ktoré sa konvenčnými vyšetreniami detekovať nedali.

Kľúčové slová

kolorektálny karcinóm – metastázovanie do svalu – 18-FDG PET/CT vyšetrenie

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Autoři deklarují, že v souvislosti s předmětem studie nemají žádné komerční zájmy.

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Backgrounds

Cancer metastasis to the skeletal muscle is very rare. While only 8 cases were reported till 2000, now, due to rapid improvements in the field of modern imaging techniques the clinicians are confronted with increasing amount of atypical metastatic sites in cancer patients in general. The most frequent primary tumours reported are lung cancer, renal cell carcinoma and malignant melanoma [1]. Usually, metastases of adenocarcinoma to the skeletal muscle form painfull mass of different sizes predominantly localised in lower extremity [2–3]. Diagnosis of muscle disturbance from other primary cancer sites is more problematic. Several imaging techniques like CT alone, MRI and PET/CT can be employed to detect recurrence of cancer disease. Rapoport and colleagues compared specificity and sensitivity of each paricular technique in liver metastases and extrahepatic colorectal cancer. The most important conclusion from this study was, that PET/CT can detect more patients with extrahepatic tumour than CT alone [4].

Case

A 44-year-old man suffered from change of constipation and diarrhoea was examined by colonoscopy. He also noticed blood in his stool. The colonoscopy proved the finding of the tumour mass in left colic flexure. CT scan showed synchronously metastatic disease in his liver, spe-

cifically of the VI and VII segments. In July 2005 hemicolectomy on the left side followed by liver metastasectomy of segments VI, II, III and cryocautery of the metastases in VII segment was performed.

Histopathologically, the resected colorectal carcinoma confirmed the ulcerative, moderately to poorly differentiated adenocarcinoma of the large bowel (G 2–3). The tumour had an invasive growth pattern, invading intramurally all the layers of the large bowel, focally with incipient signs of invading the pericolic fat tissue. In some parts were caught foci of extracellular mucus as well as signs of intracellular mucus production with the formation of sigiloid elements and foci of endolymphatic embolisation too. Foci of perineural spreading of the tumour masses were seen. Fifteen lymph nodes were examined; 13 out of them were positive for metastases of the adenocarcinoma, in one case a perinodal spreading was presented as well; pT3N3M1.

Between 10/2005 and 7/2006 the patient received „mFOL“ as first-line chemotherapy with Bevacizumab regimen (Irinotecan 100 mg/m², 5FU 450 mg/m² and CaLV weekly on D1,8,15,22, one week pause, Bevacizumab 5 mg/kg on D1,15). Because of the disease progression, again only in the liver, the patient underwent second cryocautery of three metastases in segments V, VII and VIII. From 10/2006 Irinotecan with Cetuximab as a second line of chemotherapy was ad-

ministered (Irinotecan 100 mg/m² on D1,8,15,22, one week pause, Cetuximab 400 mg/m² initially, 250 mg/m² in subsequent weeks). In the following months the patient was suffering from severe pain in the lumbosacral region with irradiation along the spinal cord into the gluteal muscles bilaterally. Neither a whole spinal cord MRI nor abdominal CT scan (both recommended by the neurologist) explained the origin of the pain. However, disease progression in the liver was proved. Scintigraphy of the skeleton was negative. An increasing tendency for unbearable pain resulted in continual high dose opiate derivatives application. Disease progression was supposed in lumbosacral region, however crucial origin of the pain was still unclear. The lumbar puncture was not performed due to severe pain. The paraneoplastic myopathy was also considered in differential diagnosis.

Finally, PET/CT examination showed massive hypermetabolic metastatic lesions in the muscles; the largest lesion was in the deconfigured left psoas major muscle (Fig. 1A, thick arrow) with many smaller lesions in the other psoas and iliopsoas muscles, and a smaller metastatic lesion on the jejunum wall (Fig. 1A, thin arrow), in the muscles of the pelvis, in the gluteal muscles, and in the adductor magnum (Fig. 1B, thin arrows), in the muscles of the thorax and abdominal wall, in the muscles of the

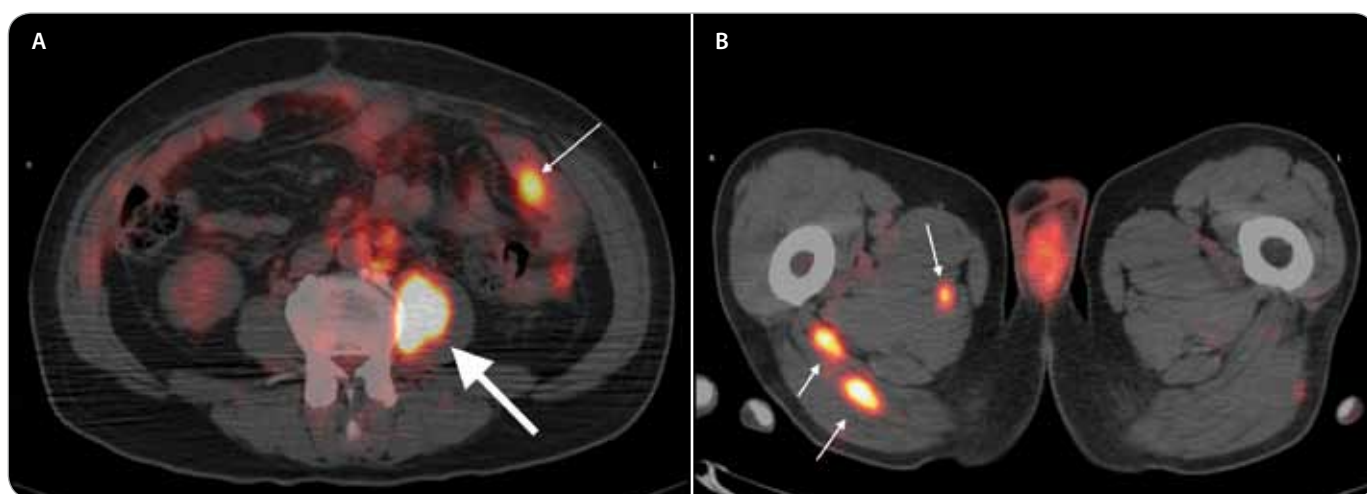


Fig. 1. Axial fused 18-FDG PET/CT image. A – Hypermetabolic metastatic lesion in the psoas major muscle (thick arrow) and a smaller metastatic lesion on the jejunum wall (thin arrow). B – Two hypermetabolic metastatic lesions in the gluteus maximus muscle and in the adductor magnus muscle (thin arrows).

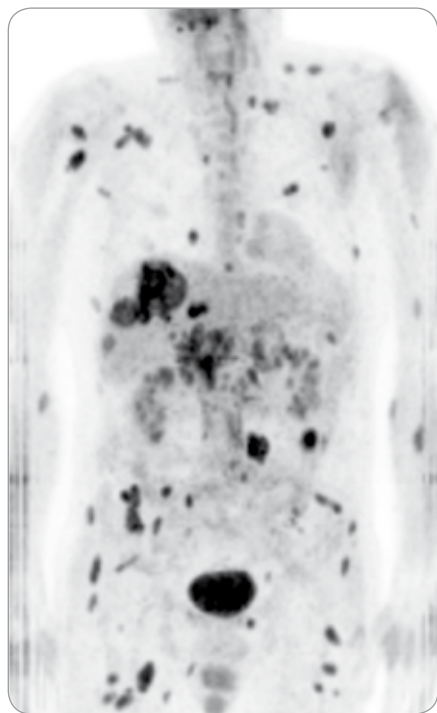


Fig. 2. Maximum intensity projection (MIP) image of the 18-FDG PET study.

upper and lower extremities, which elucidated the cause of pain. In addition, hypermetabolic metastatic lymphadenopathy in different regions, multiple metastatic lesions in the liver, other multiple intraabdominal lesions and two intrapulmonary metastases as well as two metastatic lesions in the brain – in the left hemisphere of the cerebellum and in the area of the right meatus acusti-

cus internus were detected (Fig. 2). Palliative external beam radiotherapy on the cranium was applied. In March 2007 the patient died of disease progression. The autopsy confirmed the presence of metastases in all localities, as shown previously on PET/CT.

Histopathological analysis showed metastasis of adenocarcinoma to the psoas major muscle with adenostructures (black thick arrow) infiltrating the muscle fibers (white arrows) and endolymphatic spreading of the tumor cells (black thin arrow) (Fig. 3A) and infiltration of the adenostructures (black thick arrow) into the muscle (white arrow) and perineural spreading (black thin arrow) (Fig. 3B).

Conclusion

Despite the fact, that metastasis of carcinoma to the skeletal muscle is a rare event, it should be taken into consideration by the clinicians especially in the case of unexplainable pain occurrence. Based on the literature data, the size of the painful mass ranged from 2 to 12 cm [2]. The skeletal muscle metastases occurred either as a solitary mass without any other clinically detectable metastases or as part of disseminated disease similar as in our case. The metastatic lesions can be treated with wide excision or radiotherapy or with combination of both.

Overall, there is not universal and specific imaging technique for skeletal muscle metastasis. However MR imaging with in-

travenous gadolinium enhancement is useful to evaluate the vascularity of the tumour which is helpful for the planning of further biopsy [2]. The authors believe that the extensive peritumoral enhancement associated with central necrosis in patients with painful soft tissue mass is one of the characteristic features of the skeletal muscle metastasis.

18-FDG PET is a molecular imaging technique enabling non-invasive in vivo visualisation of glucose metabolism. This „functional“ diagnostic modality has proven to be invaluable for the detection, staging and restaging of many malignancies. The increased sensitivity of PET in comparison to with CT or MRI can be attributed to the ability of PET to detect changes in metabolic activity that precede the morphological abnormalities. Fused 18-FDG PET/CT significantly improves the anatomic localisation of abnormal FDG activity, which is paramount for the surgical evaluation [5]. However, sensitivity of FDG PET varies with the size of the lesion and its anatomic location and specificity depends on histology of the primary tumor, where well-differentiated tumours may exhibit very low or even absent FDG uptake. On the other hand relatively high FDG activity may be observed at the sites of inflammation or granulation tissue, that can be indistinguishable from malignant disease [6]. The reported sensitivity and specificity of FDG PET for the detection of recurrent disease have been es-

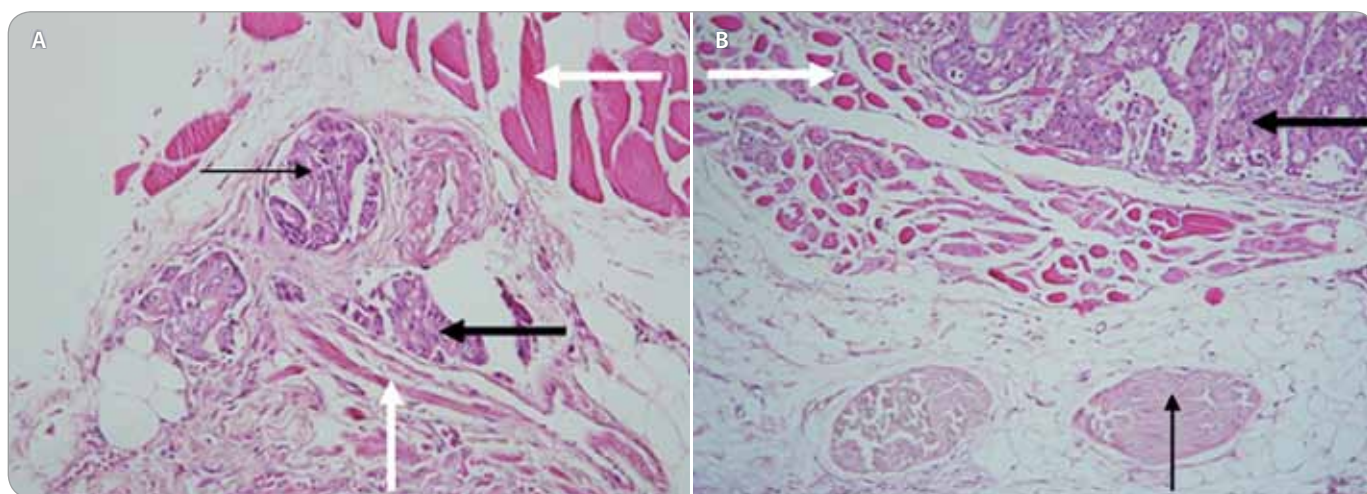


Fig. 3. Metastasis of adenocarcinoma to the psoas major muscle (HE). A – Adenostructures (black thick arrow) infiltrating the muscle fibers (white arrows) and endolymphatic spreading of the tumor cells (black thin arrow). B – Infiltration of the adenostructures (black thick arrow) into the muscle (white arrow) and perineural spreading (black thin arrow).

estimated at 97% (95% CI 95–99%) and 76% (95% CI 64–88%) respectively, with a change at clinical management in 29% of patients [7]. The FDG PET scan identifies recurrence in two out of three cases of patients with occult metastatic disease with increased tumour markers (CEA) and negative conventional imaging [8].

This manuscript documents the occurrence of metastasis of the colorectal cancer at atypical muscle location. We can speculate that this atypical biological behaviour could be connected with the application of targeted biological molecules, such as Bevacizumab. Consistent with increasing frequency of administration of targeted therapy we should be prepared to handle various unusual clinical pictures.

Among the different imaging techniques, 18-FDG PET/CT allows detection of high metabolic active tumour cells, undetectable by means of other conventional imaging. Consistent with previous literature data 18-FDG PET/CT represents a valuable source of additional information about extrahepatic lesions with an impact on clinical management of the patient. In light of these facts we feel that our case report offers multiple questions and speculations useful for daily practice with cancer patients in the presence and for the future.

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