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Rare Case of Pancreatic Cancer with Metastasis to the Skull Vault

Inas El Kacemi*, Awatif Hazzaf, Mehdi Hakkou, Mohammed Y. Oudrhiri, Adyl Melhaoui, Yasser Arkha

Department of Neurosurgery, Specialty Hospital, Faculty of Medicine and Pharmacy, Mohammed V University, Rabat, Morocco
Email: *inas.nch@gmail.com, mohhemohhe@hotmail.com, dr.hakkou@yahoo.fr, yassaad.oudrhiri@gmail.com, adyl.melhaoui@gmail.com, yassernch@hotmail.com

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Abstract

Introduction: Pancreatic cancer metastasizing to the skull vault is extremely rare, representing less than 0.1% of metastatic sites from pancreatic adenocarcinoma, with a poor prognosis. The present paper aims to describe a rare pathology and the work carried out for the patient's care. **Case report:** We report the case of a 71-year-old male patient. He presented with a subcutaneous swelling located in the right frontal-parietal scalp region, which had rapidly progressed over two months. The mass was painless, non-inflammatory, and associated with severe asthenia confining the patient to bed, a marked deterioration in general condition, unquantified weight loss, and intermittent abdominal pain radiating to the back. A biopsy was performed. The study protocol with immunohistochemistry reported positivity for CK7 (diffuse), CK19 (diffuse), and CK20 (focal and heterogeneous), compatible with pancreatic adenocarcinoma. **Conclusions:** A rare case of skull vault metastases secondary to primary pancreatic adenocarcinoma was presented. The lesion was discovered before the primary cancer was diagnosed. This case report to the existing literature may provide additional guidance to clinicians managing patients with similar presentations.

Keywords

Skull Vault, Metastases, Pancreatic Adenocarcinoma, Systematic Review

1. Introduction

Pancreatic adenocarcinoma metastasizes in more than 70% of cases at diagnosis, most commonly to liver 65%, peritoneum 40% and lung 25% [1].

The cranial vault metastases are rare and highly diverse. According to the liter-

ature, the frequency of cranial vault metastases is less than 0.1% [2]. They may be discovered incidentally or revealed by local signs, most commonly painful or painless cranial deformities [3].

Histological analysis of tumors located in the cranial vault shows that some are more frequently found in women than in men [4]. In adults, the origin is quite varied, with metastases from breast and lung cancers being the most common [5]. The pancreatic origins are exceptional, with three cases reported in the literature [4] [6] [7]. Clinically, these tumors generally present with non-specific symptoms, although certain signs and symptoms (such as inflammation or pain) may provide some diagnostic clues.

Neuroradiological evaluation, essential for their management, now necessarily includes CT scanning; diagnosis remains histological, with immunohistochemistry. Treatment is generally surgical combined with chemotherapy and radiotherapy, with a poor prognosis [2] [4].

A 71-year-old man, presented with painless parietal scalp swelling that developed within two months. To the best of our knowledge, this is the second case involving the skull secondary to a tail pancreatic adenocarcinoma, and also the second case where skull metastasis was the first evidence of a pancreatic adenocarcinoma.

2. Case Presentation

We report the case of a 71-year-old male patient, followed since 2015 for benign prostatic hyperplasia and known to have high blood pressure under treatment. He presented with a subcutaneous swelling located in the right fronto-parietal scalp region (**Figure 1**), which had rapidly progressed over two months. The mass was painless, non-inflammatory, and associated with severe asthenia confining the patient to bed, a marked deterioration in general condition, unquantified weight loss, and intermittent abdominal pain radiating to the back. All of these symptoms evolved without neurological deficits, seizures, or fever.

Figure 1. A subcutaneous swelling located in the right frontal scalp region.

Brain MRI revealed an advanced bone lesion in the right hemispheric region, breaking through the outer cortical layer and containing necrotic areas (Figure 2). A surgical biopsy was performed under local anesthesia, allowing partial excision of a strictly extradural tumor (Figure 3). Histopathological examination concluded it was a bone metastasis from a moderately differentiated adenocarcinoma. Immunohistochemistry confirmed the pancreatic origin (Figure 4). Thoraco-abdomino-pelvic CT scan showed a pancreatic tail tumor (Figure 5) with hepatic and pulmonary metastases. During hospitalization, the patient developed respiratory distress, which led to his death.

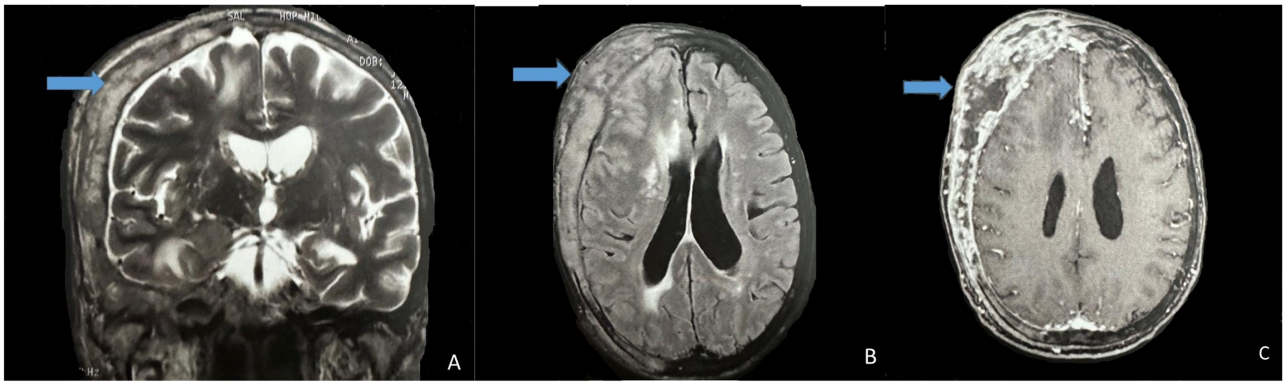

Figure 2. Coronal T2-weighted spin echo (A), axial Flair-weighted spin echo images (B) and postcontrast axial images (C) demonstrating destructive lesion of the diploic mass, leptomeningeal thickening and contrast enhancement, and extension of the lesion to subcutaneous tissue.

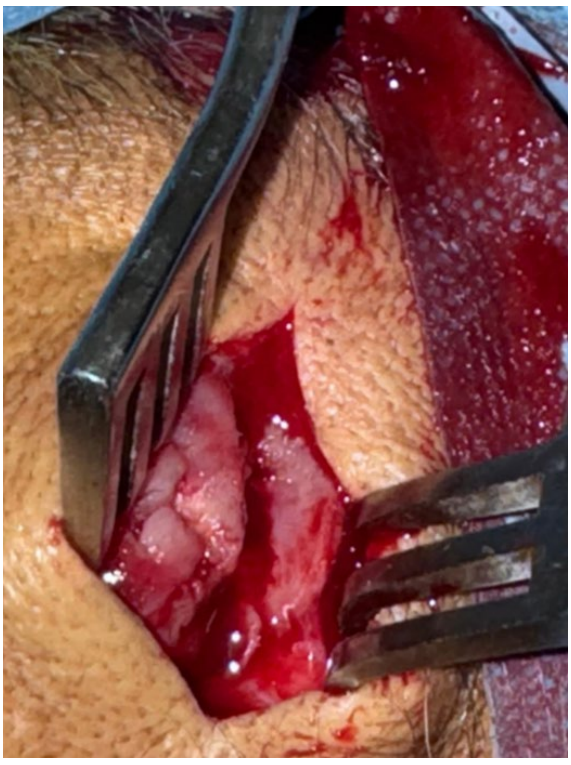

Figure 3. Perioperative image showing a subcutaneous extradural tumor.

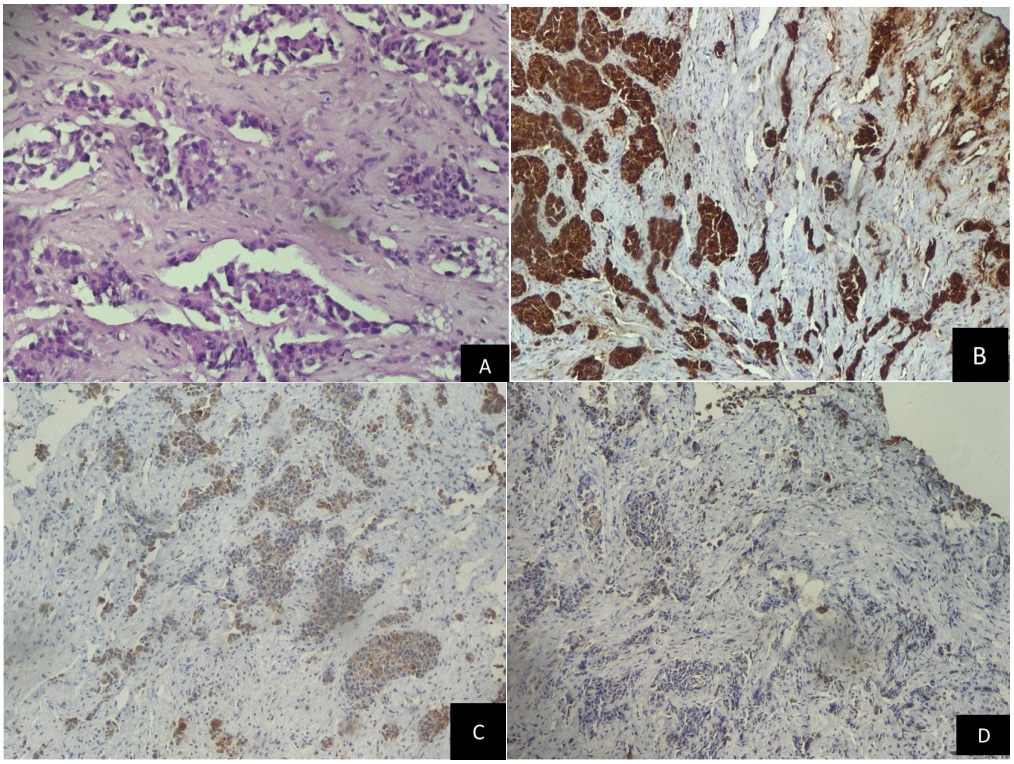

Figure 4. Atypical epithelial cells forming gland in the fibrous tissue, HE 200× (A), Cytokeratin 7 positive tumor cells. Immunohistochemistry, 200× (B), Cytokeratin 19 positive tumor cells. Immunohistochemistry, 200× (C), Cytokeratin 20 heterogeneous and focal staining, 200× (D).

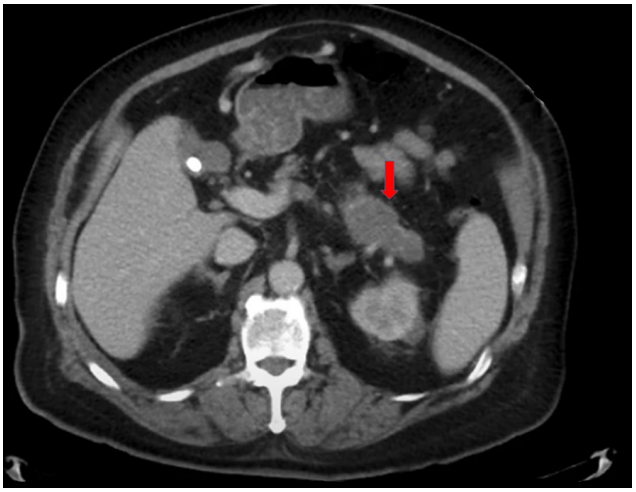

Figure 5. Thoraco-abdomino-pelvic CT scan showing a pancreatic tail tumor.

3. Discussion

Bone metastases from pancreatic tumors are rare, representing less than 5% of all metastases [2]. Among these, only three cases of skull vault metastases have been reported in the literature (less than 1%) [4] [8].

Metastatic tumors of pancreatic origin are an extremely rare manifestation of an already aggressive cancer. Their presence always indicates disseminated disease

(Stage IV). Although the pancreas is an uncommon source of cranial metastases, they can occasionally be discovered before the primary cancer is diagnosed [3].

The average age at diagnosis is 63 years. Aydin *et al*. (2005) and Jeon *et al*. (2004) reported cases at 65 years [2] [7], while Hopf *et al*. (2009) reported a case at 54 years [6]. Our patient was 71 years old.

Clinically, skull vault metastases most often present as a palpable, hard, fixed, and generally painless scalp mass, as observed in all reported cases [5]. These masses may rapidly enlarge, are rarely painful, and can be associated with headaches. If the brain parenchyma is compressed, focal neurological signs may appear. In our case, the clinical presentation was mainly a painless right-sided skull mass, along with intermittent abdominal pain and general deterioration.

Cerebral CT can reveal an osteolytic or mixed lesion of the skull vault. MRI is the imaging modality of choice as it better characterizes the lesion, assesses extension to the brain, meninges, and subcutaneous tissues, and detects other cerebral metastases [3].

Surgical biopsy or excision is essential to confirm the histological diagnosis. In this case, the rationale for the surgical biopsy was primarily to obtain histological diagnosis and confirm the metastatic nature of the lesion, particularly in the context of a palliative care strategy aimed at guiding further management decisions. Histopathological examination typically shows neoplastic epithelial cells of pancreatic origin (most often ductal adenocarcinoma) [9].

Immunohistochemistry is crucial. Pancreatic metastatic cells commonly express markers such as CK7, CK19, and CDX2. Elevated CA 19-9 levels and the absence of markers like TTF-1 (lung) or ER (breast) help exclude other primary origins [10].

In our patient's case, the surgical specimen revealed bone tissue infiltrated by a carcinomatous proliferation consisting of trabeculae of cells with marked cytonuclear atypia. Immunohistochemical analysis showed diffuse positivity for anti-CK19 and CK7 antibodies, focal heterogeneous staining for CK20, weak and focal positivity for CDX2, and absence of staining for TTF-1.

Thoraco-abdomino-pelvic CT was performed for staging and identification of the primary tumor. In previously reported cases, the pancreatic tumor was located in the ampulla of Vater [6], whereas in our case and that reported by Aydin *et al*. (2005), it was located in the pancreatic tail [2].

Treatment is generally palliative, aiming to control symptoms, prevent complications, and improve quality of life. It is multidisciplinary [6].

Surgery may be considered if the lesion is solitary, accessible, and if the patient's condition allows it, in order to obtain a histological diagnosis and relieve brain compression. Aydin *et al*. (2005) performed a needle biopsy followed by radiotherapy with good tumor control at 4 months [10]. Jeon *et al*. (2004) performed excision of the infiltrated bone with cranioplasty, followed by radiotherapy, with good control at 3 months [7].

Chemotherapy remains the cornerstone of treatment to manage all lesions [11].

The prognosis is very poor, with a median survival of approximately only 5 months [11].

4. Conclusion

Skull metastasis from pancreatic cancer is rare and associated with a fatal outcome. However, based on the data presented in this review, patient-specific and treatment-related factors that may prolong survival. Further studies are needed to elucidate multimodal therapy and survival to suggest a more personalized decision-making process. Data regarding the role of other factors in the overall disease progression are also necessary. In particular, future research should investigate the molecular mechanisms, such as genetic mutations or signaling pathways, that contribute to the rare occurrence of non-metastatic pancreatic cancer to highlight their potential role and should be investigated in larger, multicenter studies.

Authors' Contributions

I. E. K.: Conceptualization, writing draft, reviewing and editing, visualization, supervision, validation, methodology; **A. H.**: Writing, review & editing; **Y. M. O.:** Review & editing; **M. H.:** Writing & editing; **M. A.:** Writing & editing; **Y. A.:** Supervision, validation, & review.

Submission Statement

This manuscript is original and has not been submitted.

Conflicts of Interest

The authors report no conflicts of interest.

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