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Orbital Metastasis of Pancreatic Cancer Not Detected on MRI at the Time of Clinical Presentation

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Abstract

Background/Aim: The orbit is a rare site for metastasis from pancreatic cancer, and diagnosis can be challenging when early imaging findings are subtle. We report a case of orbital metastasis initially undetectable by magnetic resonance imaging (MRI) but subsequently managed with radiotherapy.

Case Report: A man in his 60s with metastatic pancreatic adenocarcinoma developed right-sided periorbital pain and hypoesthesia during chemotherapy. Initial brain and orbital MRI showed no evidence of metastasis, and symptoms were managed as suspected trigeminal neuralgia. Five months later, the patient developed diplopia; follow-up MRI revealed a soft tissue lesion at the right orbital apex with high signal intensity on fat-suppressed T1-weighted imaging, leading to a diagnosis of orbital metastasis. The patient underwent palliative radiotherapy, resulting in significant alleviation of pain and diplopia.

Conclusion: Orbital metastasis from pancreatic cancer may present with morphological changes undetectable on initial MRI, highlighting the importance of a high index of clinical suspicion and serial imaging follow-up for unexplained neurological symptoms. Palliative radiotherapy is an effective modality for achieving symptomatic relief and improving quality of life in this rare manifestation. Clinicians should consider orbital metastasis when new-onset periorbital symptoms occur in patients with advanced pancreatic cancer.

Keywords: Pancreatic cancer, palliative radiotherapy, orbital metastasis.

Introduction

The orbit is an unusual site for the development of metastatic tumors. Orbital metastases are common in cancers of the breast, prostate, lung, and melanoma (1, 2). The most common sites of metastasis in pancreatic cancer are the liver and lung. Orbital metastasis in pancreatic cancer is very rare, and only limited cases have been reported (3-8). The treatment for orbital metastasis in pancreatic cancer has not been established. We report that radiotherapy successfully alleviated the symptoms in a patient with orbital metastasis of pancreatic cancer.

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Case Report

A man in his 60s presented with right hypochondrial pain. He had no relevant medical or family history. Computed tomography (CT) revealed a mass in the pancreatic body associated with multiple liver metastases. The patient underwent endoscopic ultrasound-guided fine-needle aspiration (EUS-FNA) of the pancreatic mass, and histopathological examination confirmed adenocarcinoma. Systemic chemotherapy with gemcitabine plus nab-paclitaxel was initiated, achieving a partial response. After three cycles, nab-paclitaxel was discontinued due to Grade 3 peripheral neuropathy, and treatment was continued with gemcitabine monotherapy.

Five months after the initiation of chemotherapy, the patient developed right-sided periorbital pain accompanied by sensory loss along the distribution of the trigeminal nerve (specifically the ophthalmic and maxillary divisions). He described a persistent dull pain radiating from the right paranasal region to the temple, along with pulsating pain in the retro-orbital area. Trigeminal neuralgia was initially suspected; however, magnetic resonance imaging (MRI) of the brain showed no signs of trigeminal nerve compression or orbital metastasis. An ophthalmological evaluation, including a fundus examination, yielded normal results. Despite the administration of non-steroidal anti-inflammatory drugs, carbamazepine, and pregabalin, the patient's symptoms did not improve, although oxycodone provided modest relief. Since MRI detected no new metastatic lesions, the treatment response was deemed to be maintained, and gemcitabine monotherapy was continued.

Five months after the onset of the periorbital pain, the patient complained of diplopia on right lateral gaze, and his headache worsened. A follow-up brain MRI revealed an abnormal soft tissue lesion extending from the right inferior orbital fissure to the orbital apex. This lesion exhibited high signal intensity on fat-suppressed T1-weighted imaging (Figure 1A and B). Based on these findings, a diagnosis of orbital metastasis from pancreatic cancer was made.

The patient underwent palliative external beam radiotherapy (39 Gy in 13 fractions) to relieve symptoms. Considering the local disease progression, gemcitabine monotherapy was discontinued. After completion of radiation therapy, no further systemic chemotherapy was administered, and the clinical focus shifted to palliative care.

Radiotherapy resulted in significant palliation of his symptoms. The pain and diplopia subsided two weeks after completing radiotherapy, although they did not disappear completely. The patient continued to receive palliative care but died three months later due to systemic pancreatic cancer progression.

Discussion

In the present case, metastasis to the orbit was observed during the clinical course of chemotherapy for pancreatic cancer. Notably, no neoplastic lesions were detected on the initial head MRI scan at the onset of the patient's periorbital pain. Because morphological changes may be extremely subtle during the early stages of symptom presentation, they may not be detected by initial imaging studies. Therefore, clinicians must maintain a high index of suspicion and perform serial imaging follow-up when patients with advanced pancreatic cancer present with unexplained neurological symptoms. Furthermore, when clinical symptoms point toward orbital involvement, alternative non-invasive modalities should be considered. For instance, anterior segment optical coherence tomography has been reported as a useful tool for evaluating ocular and anterior orbital metastatic lesions, including monitoring response to treatment (9).

Metastatic disease accounts for 1-13% of orbital tumors, and approximately 2-5% of patients with malignant tumors develop orbital metastases during their illness (10). The primary tumors most likely to metastasize to the orbit are breast (53%), prostate (12%), and lung (8%) cancers (1). In pancreatic cancer, the most common sites of metastasis are the liver, lung, and peritoneum; metastasis to the orbit is exceedingly rare, and its true incidence remains unclear. The mechanism of

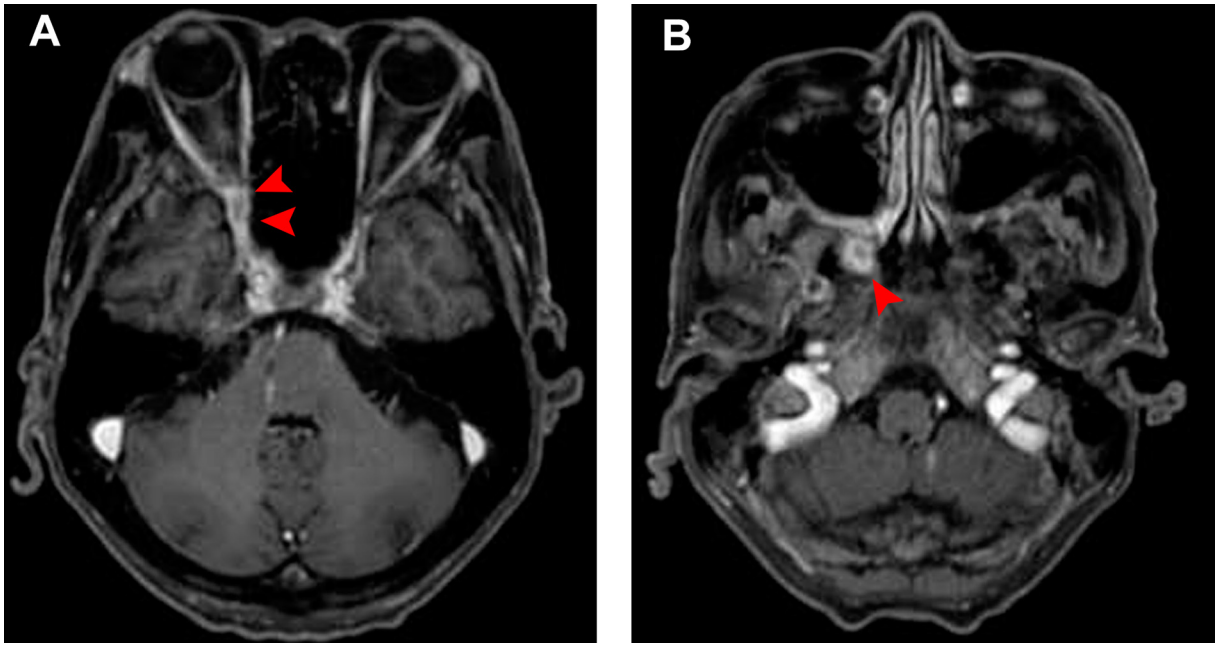

Figure 1. *Fat-suppressed T1-weighted magnetic resonance imaging of the orbit. Abnormal soft tissue lesions showing high signal intensity (red arrows) are observed at the right (A) orbital apex and (B) inferior orbital fissure.*

orbital metastasis is not fully understood, except that it is predominantly hematogenous. In hormone-positive breast cancer, it has been suggested that estrogen produced by periorbital adipose tissue may promote tumor formation (11). Regarding the organotropism of pancreatic cancer, previous studies have shown that exosomes can create a pre-metastatic niche in the liver (12); however, it is currently unknown whether a similar mechanism contributes to orbital involvement.

Radiation therapy was performed to treat the orbital metastasis, and significant symptom relief was achieved. Although no standard of care for orbital metastases has been established, several reports indicate that radiation therapy is an effective modality for relieving symptoms (13-17). One retrospective study of 15 patients with various malignancies reported that radiation therapy provided both symptomatic relief and tumor shrinkage (18). While predicting the survival benefit of radiotherapy remains challenging in metastatic pancreatic cancer due to its limited prognosis (19), local tumor control is crucial for maintaining quality of life. In the current case, the patient's pain and diplopia were successfully alleviated by radiation therapy. To our knowledge, this is the first report specifically describing the efficacy of radiotherapy for providing symptomatic relief in a case of orbital metastasis originating from pancreatic cancer. This suggests that radiotherapy can improve the quality of life for patients with this rare complication.

A definitive pathological diagnosis of the orbital metastasis was not made in the present case. However, we determined that the orbital lesion was a metastasis based on the clinical context of progressive pancreatic cancer and the clear temporal relationship with systemic disease. Furthermore, a biopsy was deferred because the invasive nature of the procedure would have increased the patient's physical burden without altering the palliative treatment strategy.

Conclusion

In summary, orbital metastasis is an exceedingly rare but clinically significant manifestation of pancreatic cancer.

This case demonstrates that metastatic lesions may be undetectable on MRI during the initial stages of symptom presentation, highlighting the necessity of close clinical monitoring and repeat imaging for early diagnosis. Furthermore, our findings suggest that palliative radiotherapy is a highly effective intervention for alleviating debilitating symptoms such as pain and diplopia, thereby improving the quality of life for patients with terminal pancreatic cancer. Clinicians should consider orbital metastasis in the differential diagnosis of new-onset neurological or periorbital symptoms in this patient population.

Conflicts of Interest

All Authors declare no conflicts of interest regarding this study.

Authors' Contributions

Manuscript writing: Ogura T; manuscript checking and discussing: Sunakawa Y.

Artificial Intelligence (AI) Disclosure

During the preparation of this manuscript, a large language model (Gemini, Google LLC) was used strictly for language editing and stylistic improvements. The generative AI was not utilized for the creation, interpretation, or analysis of the clinical case and its discussion. All scientific content was independently authored and verified by the authors, who assume full responsibility for the integrity of the work.

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