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Neurological symptoms of leptomeningeal carcinomatosis as the primary manifestation of an adenocarcinoma of the nasal cavity and sinus: a case report and literature review

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Abstract. *Neurological symptoms of leptomeningeal carcinomatosis as the primary manifestation of an adenocarcinoma of the nasal cavity and sinus: a case report and literature review*. Carcinomas of the nose and paranasal sinuses are rare solid head and neck tumours. With an incidence of 1-1.5 / 100,000 per year, they account for only 3% of all malignancies in the head and neck region. Sinonasal carcinomas are often adenocarcinomas. Hardwood dust is one possible triggering agent, although the latency period may extend to decades. Central nervous system complications arising from solid tumours of the head can be explained in terms of the close anatomical relationship between the two areas. However, leptomeningeal spread is rare. To our knowledge, this is the first report demonstrating cranial nerve deficits due to a leptomeningeal carcinomatosis as the primary manifestation of an adenocarcinoma of the paranasal sinus and the nasal cavity.

Introduction

Leptomeningeal carcinomatosis is a rare, usually late-onset, serious and frequently fatal complication due to the dissemination of tumour cells in the meninges. The meningeal spread of adenocarcinomas has often been described in the literature but mostly for bronchial and breast cancers, cancers of the genito-urinary and gastro-intestinal tracts, melanoma, lymphoma and leukaemia. Leptomeningeal carcinomatosa in the context of head and neck cancer is rare.[1-4]

Case report

An apparently healthy, well-fed, 70-year-old male presented in our department complaining of dysphonia and dysphagia, with an increase in coughing after eating. He had suffered from these symptoms for 2 weeks but otherwise had no further complaints. He had no B symptoms (fever, drenching night sweats or weight loss), recurrent epistaxis, impaired sense of smell or cephalgia. The patient reported having been employed for many years in the woodworking industry.

Clinical findings

Neurological and ENT examinations were performed. The neurological findings showed a gaze-evoked nystagmus to the left, a lack of gag reflex, and deviation of the soft palate and the uvula to the left. The trigeminal and facial reflexes were checked: there was prolonged stimulation latency on the left side, suggesting a lesion in the origin area of the right vagal nerve. In addition, an abducens nerve affection was seen on the right, and the patient reported acraly and segmentally radiating lumbar pain syndrome.

The ENT medical examination identified a large, obstructive mass in the upper nasal passage on the right side. In the oropharynx, deviation of the uvula to the left was observed during phonation. Upon examination of the larynx and hypopharynx with a 90° magnifying endoscope, an intermediate vocal fold arrest on the right and a small postdeglutitive aspiration with intact cough reflex due to vagal

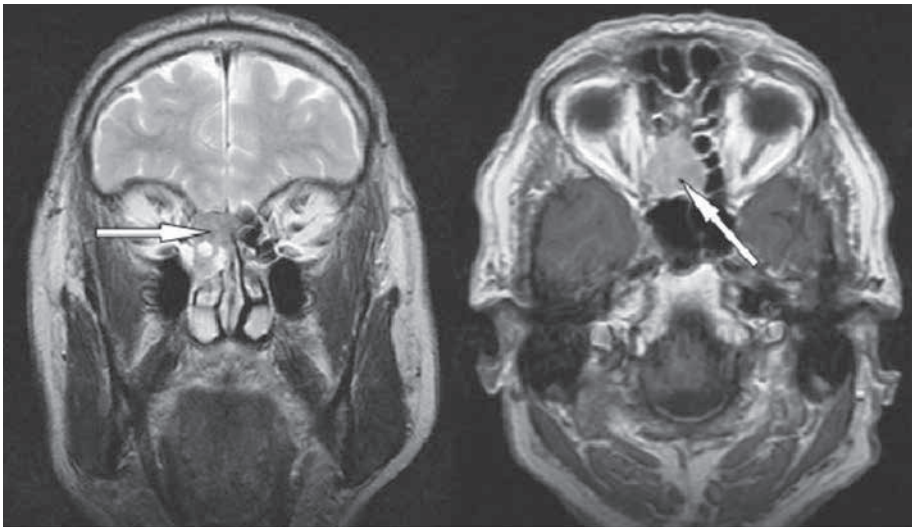

Figure 1
Presentation of a tumourous mass in the right posterior ethmoid (arrow) with destruction of the bone boundary (MRI, coronal and axial view).

nerve pareses were observed. There were no palpable abnormal cervical nodes.

Diagnostics

Magnetic resonance tomography with gadolinium administration (MRT) was performed first to further clarify the neurological symptoms and the endonasal lesion. It showed a mass in the posterior ethmoid region on the right side with destruction of the nasal septum and the bony skull base, and with delicate meninges. Intracranial findings were normal (Figure 1).

Further diagnostics included an endoscopy, taking histological samples from the suspicious findings in the ethmoid region and paraseptal area on the right side. The histological examination showed a poorly differentiated adenocarcinoma (intestinal type). For the further planning of treatment, the case was presented to our interdisciplinary tumour board.

Therapy and Progress

Unfortunately, the patient developed an intracerebral haemorrhage with a ventricle rupture (Fisher IV). We transferred the patient to the ICU. A tracheostomy was performed because of the increased pharyngeal dysphagia. Nevertheless, the patient developed bronchopulmonary pneumonia due to aspiration and died. The autopsy findings were as follows: ossified, tumourous cribriform plate infiltrated with the poorly differentiated adenocarcinoma (intestinal type) described above: macroscopically inconspicuous pia mater; histological evidence of leptomeningeal carcinomatosa and tumour infiltration of N. oculomotorius dexter (Figure 2) and the optic nerve. There were no lymph node or distant metastases, and no further malignancies were detected. The autopsy led to the tumour classification pT4b pN0 pM0, G3 (UICC 7th edition, 2010). Right-sided heart failure caused by bronchopulmonary pneumonia due to aspiration was established as the cause of death.

Discussion

Leptomeningeal carcinomatosis is a rare, usually late-onset, serious and frequently fatal complication due to the dissemination of tumour cells in the meninges with a median survival rate that is typically in the range of 2 to 3 months. Tumour cell metastasis can be haematogenous, lymphatic, "per continuitatem" or perineural in nature. Furthermore, the transport of tumour cells via cerebrospinal fluid is possible.[1-10]

The meningeal spread of adenocarcinomas has often been described in the literature but mostly for bronchial and breast cancers, cancers of the genitourinary and gastrointestinal tract, melanoma, lymphoma and leukaemia. The consistent improvement

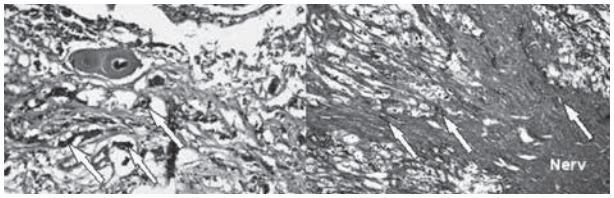

Figure 2
Leptomeningeal carcinomatosis, dissociated infiltration of the carcinoma within the pia mater (arrows on the left) and diffuse carcinomatous infiltration (arrows on the right) of cranial nerves (in this case the N. oculomotorius dexter).

of treatment options for adenocarcinomas and the resulting improvement in the survival rate mean that an increase in leptomeningeal spread has been observed in recent years. Leptomeningeal carcinomatosa in the context of head and neck cancer is rare.[3,4,6,7]

Diagnosing a leptomeningeal carcinomatosis with neurological deficits as the first manifestation of cancer is a particular challenge that occurs in 5% to 10% of patients with leptomeningeal spread.[3] To our knowledge, this is the first report of cranial nerve deficits due to a leptomeningeal carcinomatosis as the primary manifestation of an adenocarcinoma of the paranasal sinus and the nasal cavity. In almost all cases of adenocarcinoma of the paranasal sinus and the nasal cavity, other tumour-associated symptoms – such as nasal obstruction, olfactory dysfunction, recurrent epistaxis or sinonasal complaints – appear because of the anatomical location. Typical symptoms of leptomeningeal carcinomatosis are cranial nerve deficits, encephalopathies and radiculopathy as well as cephalgia, sometimes accompanied by nausea and vomiting.[3,4,7]

The presence of malignant cells in cerebrospinal fluid constitutes proof of leptomeningeal carcinomatosis. Raised protein levels and a decrease in the glucose level in the cerebrospinal fluid compared to serum glucose levels may also suggest leptomeningeal spread. However, the literature states that tumour cells are present in the first lumbar puncture in about 70% of cases.[3,4,7] The cranial MRI (cMRI) is available as a further diagnostic device, attaining a sensitivity of over 70% when used with the contrast enhancer gadolinium (Gd) in the area of the leptomeningeal spread.[3,4]

There are several treatment options, depending on the primary cancer. In the case of leptomeningeal carcinomatosa, curative treatment remains elusive and is rather palliative in nature.[11] It can involve focal radiation (mainly intensity-modulated radiation therapy (IMRT)) to symptomatic sites, systemic chemotherapy with agents that cross the blood-brain barrier, or intrathecal delivery of chemotherapy. If patients develop signs of hydrocephalus such as headaches, vertigo, nausea, and vomiting, treatment with dexamethasone, and sometimes surgical intervention, are indicated. A ventriculoperitoneal shunt can provide relief.[1,3,4,6,11] The outcome of leptomeningeal carcinomatosis in head and neck cancer is conspicuously poor and treatment is mainly supportive here.[3,4] Symptom management can greatly improve quality of life.

Conclusion

Central nervous system complications arising from solid tumours of the head can be explained in terms of the close anatomical relationship between the two areas. However, leptomeningeal spread is rare. In patients with head and neck cancer and "unusual" neurological symptoms, cranial nerve deficits or spinal nerve root symptoms, leptomeningeal carcinomatosis must be considered as a differential diagnosis. Diagnosis will be conclusive when malignant cells are found in the cerebrospinal fluid; an MRI does not always provide sufficient evidence. To our knowledge, this is the first report of cranial nerve deficits resulting from a leptomeningeal carcinomatosis as the primary manifestation of an adenocarcinoma of the paranasal sinus and the nasal cavity.

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