Gastric neuroendocrine carcinoma (NEC) is a rare disease; the clinicopathological features are unclear, and there is no consensus on the optimal treatment strategy. A case of gastric NEC with cavernous sinus metastasis is reported. A 64-year-old woman with rheumatoid arthritis was treated with immunomodulator drugs and a biologic drug in our hospital. Computed tomography (CT) showed thickening of the gastric wall and swelling of multiple lymph nodes. Esophagogastroduodenoscopy revealed a gastric polypoid tumor, and histopathological examination of a biopsy specimen suggested NEC. 18F-fluorodeoxyglucose (FDG)-positron emission tomography (PET)/CT suggested gastric malignancy and multiple bone and lymph node metastases. Chemotherapy was planned, but both of her lower legs became paralyzed. Spinal magnetic resonance imaging (MRI) showed vertebral metastases to the thoracic spinal cord. Posterior vertebral decompression was performed. One month after the operation, carboplatin plus etoposide (CE) was started according to the regimen for extensive small cell lung cancer in poor-risk patients. During the 2 cycles of CE she complained of double vision and ptosis. Brain MRI showed a metastatic tumor of the cavernous sinus. Double vision and ptosis improved with local radiation therapy (45 Gy) and CE. However, she died of disease progression 5 months after diagnosis. This case suggests that gastric NEC is an aggressive and rapidly progressive tumor that is resistant to chemotherapy, and that it may be necessary to watch for multiple organ metastases.