Neuroendocrine tumors (NETs) at rectum.

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Learning objectives

To demonstrate the radiological features of a rectal NETs and discuss its clinical peculiarities.

Background

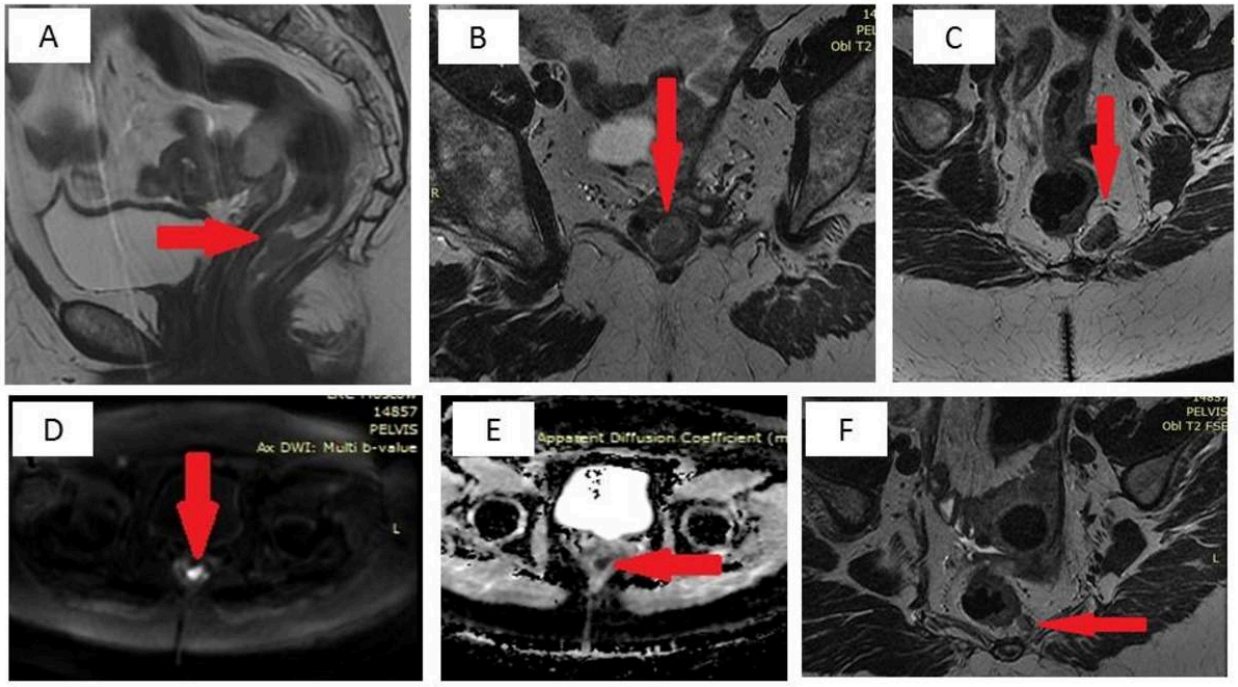
NETs are a heterogeneous group of rare tumors with different and complex clinical behavior, originating from peptidergic neurons and neuroendocrine cells. The incidence of gastroenteropancreatic NETs has increased continuously worldwide over the last decades. The rectum has become the most common location for gastroenteropancreatic NETs (1).

Aaccording to the WHO classification (2010), the three types of NETs were defined based on differentiation, proliferation and mitotic activity: G1 - highly differentiated tumors with low mitotic activity (Ki-67<2%), G2 - well differentiated intermediate grade (Ki-67 - 2-20%), G3 -poorly differentiated high grade (Ki-67 - 20-100%). G3 is a very aggressive tumor.

Findings and procedure details

MRI images of more than 400 patients with rectal tumors were analysed, 7 of them had NETs. NETs had no imaging differences from adenocarcinomas. Signal intensity of the tumor, accumulation of contrast medium, restriction of diffusion were the same like in adenocarcinomas.

Case 1. A 74-years-old woman. MRI examination of pelvic found localized tumor in low rectum without extending beyond the intestinal wall (T2 stage) and tumor satellites in mesorectal fat, CRM+ by satellites (Pic. 1).



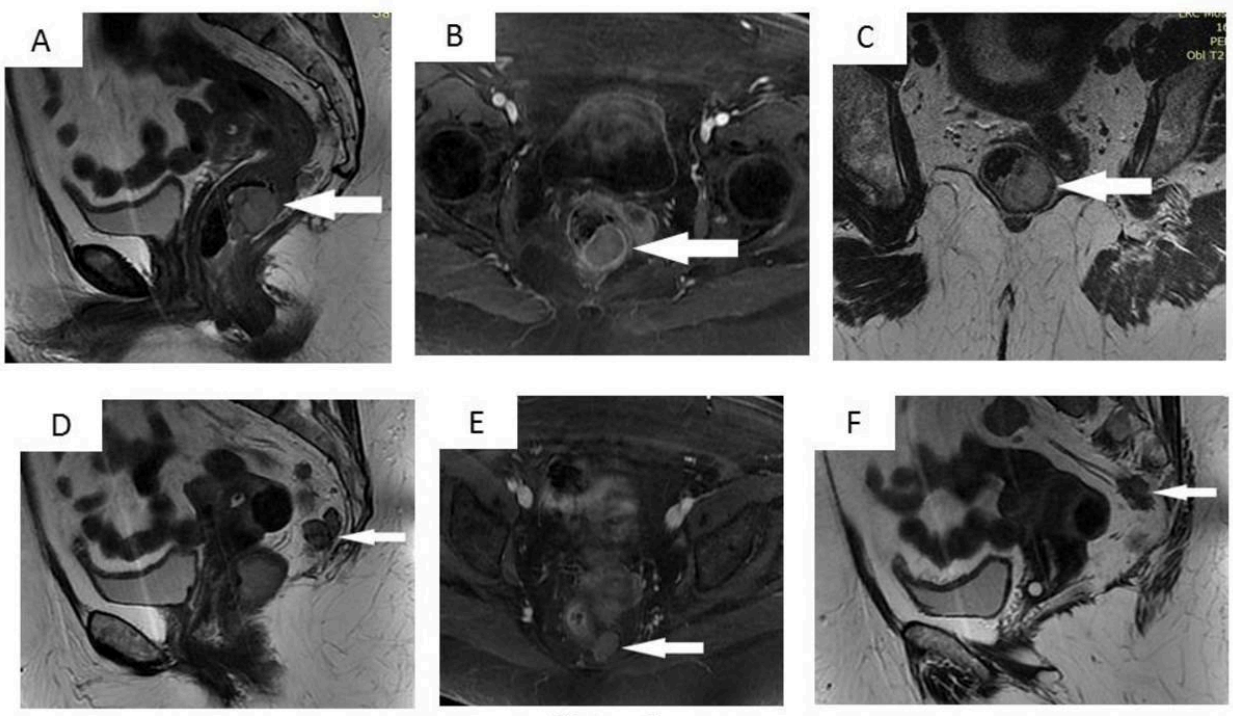
Picture 1. A 74-year-old woman with neuroendocrine tumor (G3, Ki-67 80%). A, B - T2-weighted MRI showed a mass (red arrow) in the low left rectal wall with high signal intensity on DWI and restriction diffuse on ADC map (D, E).
C, F– satellite in mesorectal fat with involved mesorectal fascia (<1mm).

Fig. 1

References: Federal Center of Treatment and Rehabilitation, Lomonosov Moscow State University, 125367 Ivankovskoye shosse, 3 - Moscow/RU

The tumor had no distinctive features and looked like a typical adenocarcinoma. The biopsy result was neuroendocrine tumor (G3), immunohistochemistry examination results - Ki-67 80-90%.

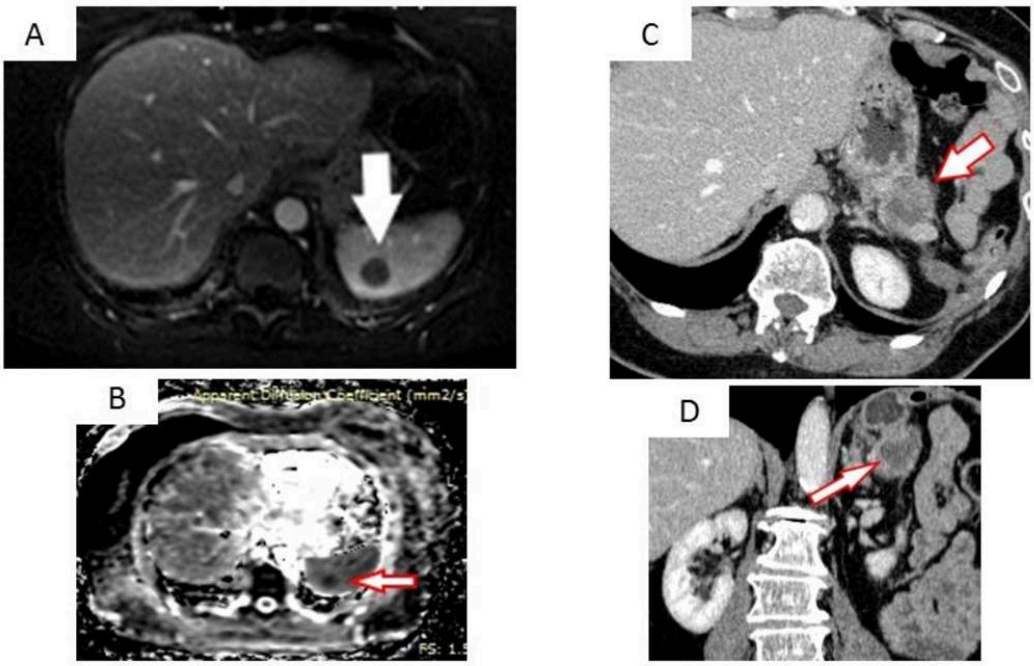
A follow-up examination after chemoradiotherapy (etoposide + carboplatin) detect that tumor and satellites have grown (Pic. 3).



Picture 3.
A 74-year-old woman with neuroendocrine tumor (G3, Ki-67 80%). MRI after 3 courses of chemotherapy shows an increase in tumor size (A, C) and tumor satellites size (D, F) in the mesorectal fascia. Tumor mass accumulates a contrast agent.

Fig. 2
References: Federal Center of Treatment and Rehabilitation, Lomonosov Moscow State University, 125367 Ivankovskoye shosse, 3 - Moscow/RU
The control examination after another course of chemotherapy (cacpecitabine) partial tumor response was noted and exterpation of rectum was done.

Following examination revealed secondary changes: one focus in the spleen, foci in the lungs and then the defeat of the pancreas (Pic. 4).



Picture 4.

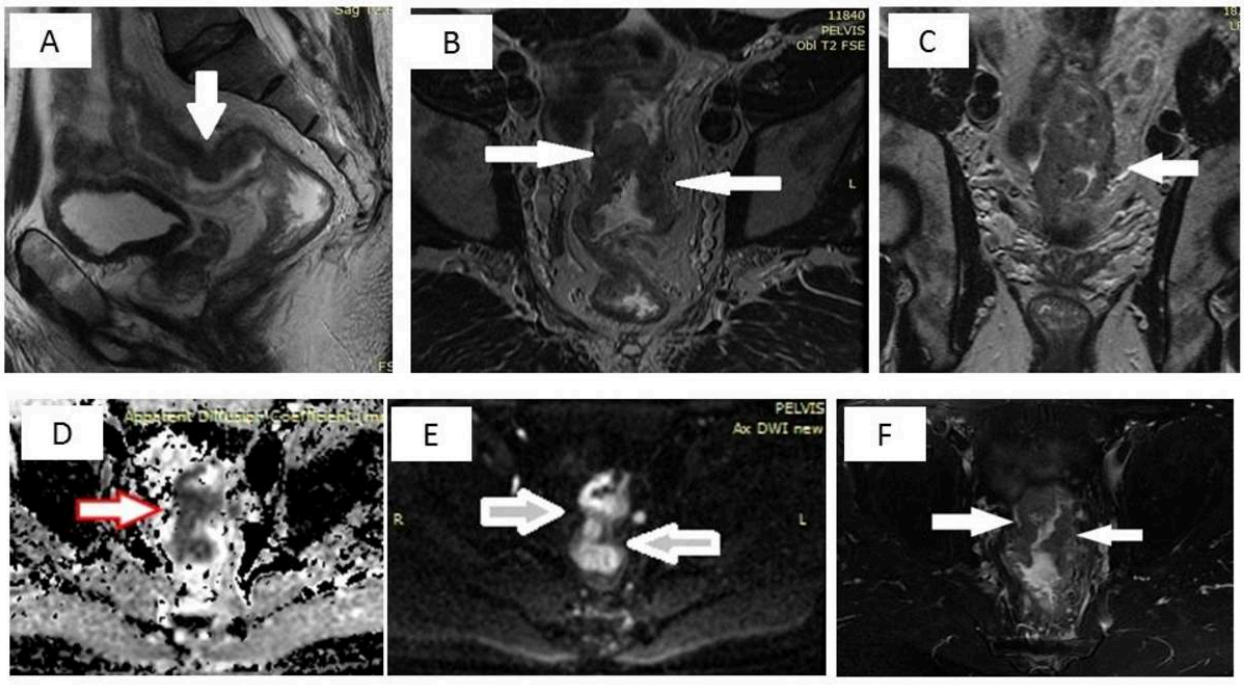
A, B. Hypovascular formation of the spleen - metastasis of a neuroendocrine tumor (histologically verified)

C, D. Condition after spleen removal. Hypovascular formation of the pancreas - metastasis of a neuroendocrine tumor.

Fig. 4

References: Federal Center of Treatment and Rehabilitation, Lomonosov Moscow State University, 125367 Ivankovskoye shosse, 3 - Moscow/RU

Another tipical case - 56-years old -men with T3-tumor in to rectosigmoid department (Pic. 2).



Picture 2. A 56-year-old- men with mixed adenoneuroendocrine tumor (>90% neuroendocrine cells), G3 (Ki-67 60%).
Tumor mass in rectosigmoid location with high signal intensity on DWI and restriction diffuse on ADC map (D, E), extending
through the external muscularis into the surrounding fat (C).

Fig. 3

References: Federal Center of Treatment and Rehabilitation, Lomonosov Moscow State University, 125367 Ivankovskoye shosse, 3 - Moscow/RU
The biopsy result was mixed adenoneuroendocrine tumor (>90% neuroendocrine cells), immunohistochemistry examination results - Ki-67 60%.

In all the neuroendocrine tumors identified by us, regardless of the degree of differentiation and mitotic activity, no specific tumor characteristics were observed on MRI. The only way to cure a neuroendocrine tumor was a biopsy.

Images for this section:

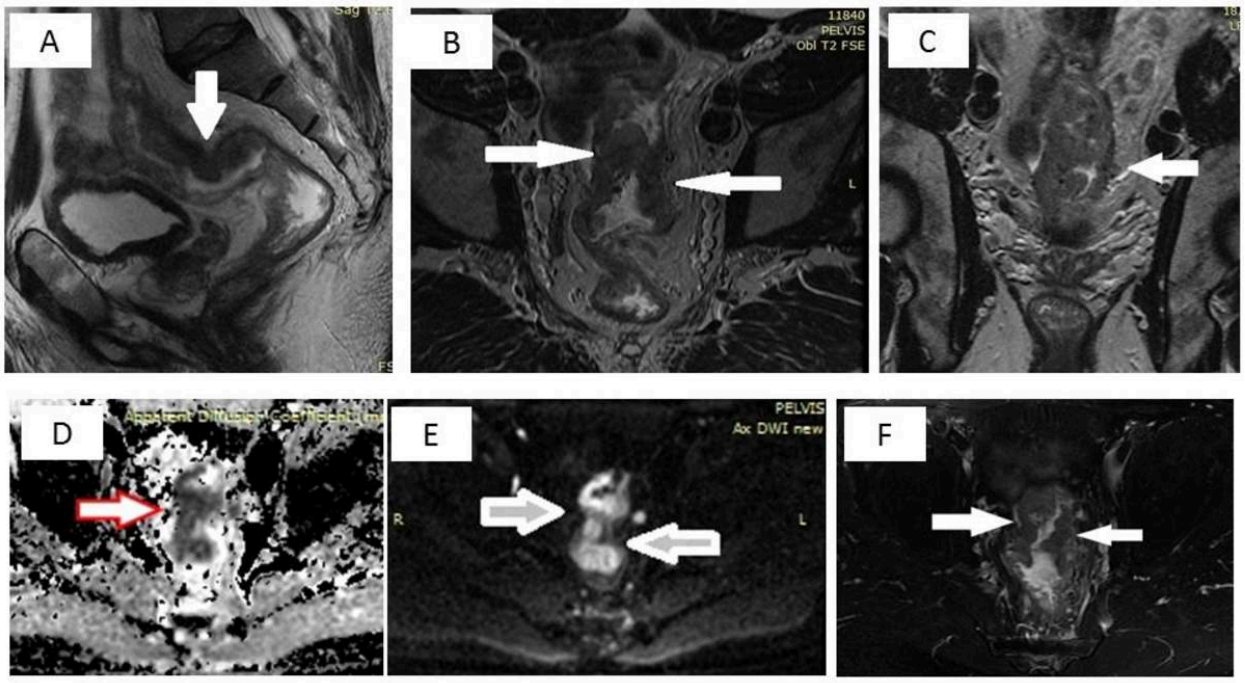


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Fig. 3

Conclusion

Rectal NETs with a high mitotic index (G3) are very aggressive tumors that do not have distinctive features from adenocarcinomas on MRI.

References

1. Fang C, Wang W, Zhang Y. at all. Clinicopathologic characteristics and prognosis of gastroenteropancreatic neuroendocrine neoplasms: a multicenter study in South China. Chin J Cancer. 2017 Jun 21;36(1):51. doi: 10.1186/s40880-017-0218-3.2. Cives M, Strosberg JR.Gastroenteropancreatic Neuroendocrine Tumors. CA Cancer J Clin. 2018 Nov;68(6):471-487. doi: 10.3322/caac.21493. Epub 2018 Oct 8. 3.Coriat R, Walter T, Terris B, Couvelard A, Ruszniewski P. Gastroenteropancreatic Well-Differentiated Grade 3 Neuroendocrine Tumors: Review and Position Statement. Oncologist. 2016 Oct;21(10):1191-1199. Epub 2016 Jul 8.