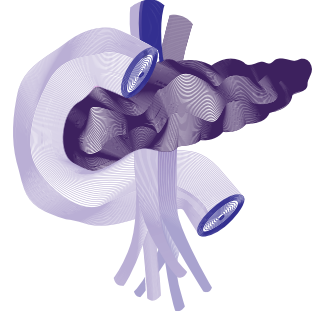


# Bölüm 20

## Malign Pankreas Hastalıklarında Görüntüleme



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### Giriş

Pankreasın malign neoplazileri, birbirlerinden ayırt edilmelerini sağlayan görüntüleme özelliklerine sahip çeşitli histolojik tipler içeren heterojen bir gruptur. Malign tümörlerin %90'ı, duktal adenokarsinom ve nadir asiner hücreli karsinom (%1-2) dahil olmak üzere ekzokrin kökenlidir. Daha az görülen kistik neoplaziler arasında seröz ve müsinöz pankreas tümörleri (her biri %1-2) ve intrapapiller müsinöz neoplaziler (%3-5) bulunur. Pankreasın ayrıca solid psö-dopapiller neoplazileri (%1-%2), nöroendokrin tümörleri (%1-%2) ve pankreatoblastomu (<%1) içeren epitelyal ve mikst diferansiye tümörleri mevcuttur (1). Pankreasa metastaz yapan sekonder tümörler, tedavi kararını etkilediği için küçük ama önemli bir kategori oluşturur. Klinik veriler, pankreas metastazlarının insidansının %2-5 olduğunu göstermektedir (2).

Pankreas görüntüleme yöntemleri içerisinde yer alan ultrasonografi (US), bilgisayarlı tomografi (BT), manyetik rezonans görüntüleme (MRG), pozitron emisyon tomografisi (PET) ve endoskopik ultrasonografi (EUS), fokal lezyonlarının karakterizasyonunda, ilk evrelemede, cerrahi ve terapötik planlamada ve tedavi yanıtının değerlendirilmesinde önemli role sahiptir (3, 4).

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rın pankreatik kanal ile ilişkisini net bir şekilde gösterebildiğinden ayırıcı tanıda oldukça yardımcı bir yöntemdir. PET taramaları okült metastaz hakkında bilgi sağlayabilmektedir. Hızla gelişen, yeni görüntüleme tekniklerinin yaygın olarak kullanılması ile yakın gelecekte pankreas kanseri değerlendirilmesinde radyolojik yöntemlerin mükemmel performans göstermesi beklenmektedir.

## KAYNAKLAR

1. Cancer facts & figures 2015. American Cancer Society website. <http://www.cancer.org/research/cancerfactsstatistics/cancerfactsfigures2015/index>. Accessed March 14, 2022.
2. Ballarin R, Spaggiari M, Cautero N, et al. Pancreatic metastases from renal cell carcinoma: the state of the art *World J Gastroenterol: WJG*. 2011; 17:4747-4756.
3. Miura F, Takada T, Amano H, et al. Diagnosis of pancreatic cancer. *HPB (Oxford)* 2006; 8: 337-342. doi: 10.1080/13651820500540949.
4. Zamboni GA, Kruskal JB, Vollmer CM, et al. Pancreatic adenocarcinoma: value of multidetector CT angiography in preoperative evaluation. *Radiology*. 2007; 245: 770-778. doi: 10.1148/ radiol.2453061795.
5. Vargas R, Nino-Murcia M, Trueblood W, et al. MDCT in Pancreatic adenocarcinoma: prediction of vascular invasion and resectability using a multiphasic technique with curved planar reformations. *AJR*. 2004; 182: 419-425. doi: 10.2214/ajr.182.2.1820419.
6. Sahani DV, Bonaffini PA, Catalano OA, et al. State-of-the-art PET/CT of the pancreas: current role and emerging indications. *Radiographics*. 2012; 32: 1133-1158; discussion 1158-1160. doi: 10.1148/rg.324115143.
7. Dibble EH, Karantanis D, Mercier G, et al. PET/CT of cancer patients: part 1, pancreatic neoplasms. *AJR*. 2012; 199: 952-967. doi: 10.2214/AJR.11.8182.
8. Sandrasegaran K, Lin C, Akisik FM, et al. State-of-the-art pancreatic MRI. *AJR*. 2010; 195: 42-53. doi: 10.2214/AJR.10.4421.
9. Hanbidge AE. Cancer of the pancreas: the best image for early detection-CT, MRI, PET or US? *Can J Gastroenterol*. 2002;16:101-5. doi: 10.1155/2002/184370.
10. Bhat K, Wang F, Ma Q, et al. Advances in biomarker research for pancreatic cancer. *Curr Pharm Des*. 2012; 18: 2439-2451.
11. Rösch T, Lorenz R, Braig C, et al. Endoscopic ultrasound in pancreatic tumor diagnosis. *Gastrointest Endosc*. 1991; 37: 347-352.
12. Kauhanen SP, Komar G, Seppänen MP, et al. A prospective diagnostic accuracy study of 18F-fluorodeoxyglucose positron emission tomography/computed tomography, multidetector row computed tomography, and magnetic resonance imaging in primary diagnosis and staging of pancreatic cancer. *Ann Surg*. 2009; 250: 957-963. doi 10.1097/ SLA.0b013e3181b2fafa.
13. Cameron K, Golan S, Simpson W, et al. Recurrent pancreatic carcinoma and cholangiocarcinoma: 18F-fluorodeoxyglucose positron emission tomography/computed tomography (PET/CT). *Abdom Imaging*. 2011; 36: 463-471. doi: 10.1007/s00261-011-9729-6.
14. Khanna L, Prasad SR, Sunnapwar A, et al. Pancreatic Neuroendocrine Neoplasms: 2020 Update on Pathologic and Imaging Findings and Classification. *Radiographics*. 2020;40:1240-1262. doi: 10.1148/rg.2020200025.

15. Siegel R, Naishadham D, Jemal A. Cancer statistics, 2013. *CA Cancer J Clin.* 2013; 63: 11-30. doi: 10.3322/caac.21166.
16. Jemal A, Siegel R, Ward E, et al. Cancer statistics, 2008. *CA Cancer J Clin.* 2008; 58: 71-96. doi:10.3322/CA.2007.0010.
17. Low G, Panu A, Millo N, et al. Multimodality imaging of neoplastic and nonneoplastic solid lesions of the pancreas. *Radiographics.* 2011;31:993-1015. doi: 10.1148/rg.314105731.
18. de la Santa LG, Retortillo JA, Miguel AC, et al. Radiology of pancreatic neoplasms: An update. *World J Gastrointest Oncol.* 2014;6:330-43. doi: 10.4251/wjgo.v6.i9.330.
19. Low G, Panu A, Millo N, et al. Multimodality imaging of neoplastic and nonneoplastic solid lesions of the pancreas. *Radiographics.* 2011;31:993-1015. doi: 10.1148/rg.314105731.
20. Tamm EP, Bhosale PR, Vikram R, de Almeida Marcal LP, Balachandran A. Imaging of pancreatic ductal adenocarcinoma: State of the art. *World J Radiol.* 2013; 5: 98-105. doi: 10.4329/wjr.v5.i3.98.
21. Lewis RB, Lattin GE Jr, Paal E. Pancreatic endocrine tumors: radiologic-clinicopathologic correlation. *Radiographics.* 2010;30:1445-64. doi: 10.1148/rg.306105523.
22. Rokall AG, Reznek RH. Imaging of neuroendocrine tumours (CT/MR/US). *Best Pract Res Clin Endocrinol Metab.* 2007;21:43-68. doi: 10.1016/j.beem.2007.01.003
23. Jang KM, Kim SH, Lee SJ, et al. The value of gadoxetic acid-enhanced and diffusion-weighted MRI for prediction of grading of pancreatic neuroendocrine tumors. *Acta Radiol.* 2014;55:140-8. doi: 10.1177/0284185113494982.
24. Panagiotidis E, Alshammari A, Michopoulou S, et al. Comparison of the Impact of <sup>68</sup>Ga-DOTATATE and <sup>18</sup>F-FDG PET/CT on Clinical Management in Patients with Neuroendocrine Tumors. *J Nucl Med.* 2017;58:91-96. doi: 10.2967/jnumed.116.178095.
25. Basu S, Adnan A. Well-differentiated grade 3 neuroendocrine tumours and poorly differentiated grade 3 neuroendocrine carcinomas: will dual tracer PET-computed tomography (<sup>68</sup>Ga-DOTATATE and FDG) play a pivotal role in differentiation and guiding management strategies? *Nucl Med Commun.* 2019; 40:1086-1087. doi: 10.1097/MNM.0000000000001072.
26. de Jong K, Nio CY, Hermans JJ et al. High prevalence of pancreatic cysts detected by screening magnetic resonance imaging examinations. *Clin Gastroenterol Hepatol.* 2010; 8:806–811. doi: 10.1016/j.cgh.2010.05.017
27. Brugge WR. Diagnosis and management of cystic lesions of the pancreas. *J Gastrointest Oncol* 2015; 6:375–388. doi: 10.3978/j.issn.2078-6891.2015.057
28. Kalb B, Sarmiento JM, Kooby DA, et al. MR imaging of cystic lesions of the pancreas. *Radiographics.* 2009; 29: 1749-65.
29. Machado NO, Al Qadhi H, Al Wahibi K. Intraductal papillary mucinous neoplasm of pancreas. *North Am J Med Sci.* 2015; 7:160–175. doi: 10.4103/1947-2714.157477
30. Tanaka M (2019) Clinical Management and surgical decision-making of IPMN of the pancreas. *Methods Mol Biol.* <https://pubmed.ncbi.nlm.nih.gov/30378040/>. Accessed 23 Feb 2021
31. Tanaka M, Fernández-del Castillo C, Adsay V et al. International consensus guidelines 2012 for the management of IPMN and MCN of the pancreas. *Pancreatology.* 2012;12:183–197. doi: 10.1016/j.pan.2012.04.004

32. Procacci C, Carbognin G, Biasutti C, et al. Intraductal papillary mucinous tumors of the pancreas: spectrum of CT and MR findings with pathologic correlation. *Eur Radiol.* 2001;11:1939–1951. doi: /10.1007/s003300100823
33. Lim JH, Lee G, Oh YL. Radiologic spectrum of intraductal papillary mucinous tumor of the pancreas. *Radiographics.* 21:323–337; discussion 337–340. doi: 10.1148/radiographics.21.2.g01mr01323.
34. Procacci C, Megibow AJ, Carbognin G, et al. Intraductal papillary mucinous tumor of the pancreas: a pictorial essay. *Radiographics.* 19:1447–1463 doi:10.1148/radiographics.19.6.g99no011447.
35. Tanaka M, Fernández-Del Castillo C, Kamisawa T et al. Revisions of international consensus Fukuoka guidelines for the management of IPMN of the pancreas. *Pancreatology.* 2017;17:738–753. doi:10. 1016/j.pan.2017.07.007.
36. Del Chiaro M, Verbeke C, Salvia R et al. European experts consensus statement on cystic tumours of the pancreas. *Dig Liver Dis.* 2013; 45:703–711. doi:10.1016/j.dld.2013.01.010
37. Horvath KD, Chabot JA. An aggressive resectional approach to cystic neoplasms of the pancreas. *Am J Surg.* 999;178:269–274
38. Choi J-Y, Kim M-J, Lee JY et al. Typical and atypical manifestations of serous cystadenoma of the pancreas: imaging findings with pathologic correlation. *Am J Roentgenol.* 2009;193:136–142. doi:10.2214/AJR.08.1309
39. Buetow PC, Rao P, Thompson LD. From the archives of the AFIP. Mucinous cystic neoplasms of the pancreas: radiologic-pathologic correlation. *Radiographics.* 1998;18:433–449. doi: 10.1148/radiograph ics.18.2.9536488
40. Zamboni G, Scarpa A, Bogina G et al. Mucinous cystic tumors of the pancreas: clinicopathological features, prognosis, and relationship to other mucinous cystic tumors. *Am J Surg Pathol.* 1999; 23:410–422
41. Di Paola V, Manfredi R, Mehrabi S et al. Pancreatic mucinous cystoadenomas and cystoadenocarcinomas: differential diagnosis by means of MRI. *Br J Radiol.* 2016; doi: 10.1259/bjr.20150536
42. Buetow PC, Buck JL, Pantongrag-Brown L, et al. Solid and papillary epithelial neoplasm of the pancreas: imaging-pathologic correlation on 56 cases. *Radiology.* 1996;199:707-11. doi: 10.1148/radiology.199.3.8637992.
43. Yao X, Ji Y, Zeng M, et al. Solid pseudopapillary tumor of the pancreas: cross-sectional imaging and pathologic correlation. *Pancreas.* 2010;39:486-91. doi: 10.1097/MPA.0b013e3181bd6839.
44. Al-Qahtani S, Gudinchet F, Laswed T, et al. Solid pseudopapillary tumor of the pancreas in children: typical radiological findings and pathological correlation. *Clin Imaging.* 2010;34:152-6. doi: 10.1016/j.clinimag.2009.06.024.
45. Anil G, Zhang J, Al Hamar NE, et al. Solid pseudopapillary neoplasm of the pancreas: CT imaging features and radiologic-pathologic correlation. *Diagn Interv Radiol.* 2017 Mar-Apr;23(2):94-99. doi: 10.5152/dir.2016.16104.
46. Zhang X, Ni SJ, Wang XH, et al. Adult pancreatoblastoma: clinical features and Imaging findings. *Sci Rep.* 2020;10:11285. doi: 10.1038/s41598-020-68083-2.
47. Chung EM, Travis MD, Conran RM. Pancreatic tumors in children: radiologic-pathologic correlation. *Radiographics.* 2006;26:1211-38. doi: 10.1148/rg.264065012.

48. Gupta AK, Mitra DK, Berry M, et al. Sonography and CT of pancreatoblastoma in children. *AJR Am J Roentgenol.* 2000;174:1639-41. doi: 10.2214/ajr.174.6.1741639.
49. Ahmed S, Johnson PT, Hruban R, et al. Metastatic disease to the pancreas: pathologic spectrum and CT patterns. *Abdom Imaging* 2013; 38:144–153.
50. Minni F, Casadei R, Perenze B, et al. Pancreatic metastases: observations of three cases and review of the literature. *Pancreatology: Official Journal of the International Association of Pancreatology (IAP)* 2004; 4:509–520.
51. Tempero MA, Malafa MP, Al-Hawary M, et al. Pancreatic Adenocarcinoma, Version 2.2021, NCCN Clinical Practice Guidelines in Oncology. *J Natl Compr Canc Netw.* 2021;19:439-457. doi: 10.6004/jnccn.2021.0017.
52. Tran Cao HS, Balachandran A, Wang H, et al. Radiographic tumor-vein interface as a predictor of intraoperative, pathologic, and oncologic outcomes in resectable and borderline resectable pancreatic cancer. *J Gastrointest Surg.* 2014;18:269-78. doi: 10.1007/s11605-013-2374-3.
53. Lu DS, Reber HA, Krasny RM, et al. Local staging of pancreatic cancer: criteria for unresectability of major vessels as revealed by pancreatic-phase, thin-section helical CT. *Am J Roentgenol.* 1997;168:1439-43. doi: 10.2214/ajr.168.6.9168704.