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PRİMER SKLEROZAN KOLANJİT

Giriş

Primer sklerozan kolanjit (PSK) safra ağacının kronik fibroinflamatuvar hasar ile zarar görmesi sonucu oluşan ve sıklıkla inflamatuvar bağırsak hastalığı (İBH) ile ilişkili olan kolanjiyopatidir (Resim 1). PSK'lı hastaların çoğunluğunda kolanjiyografide fibrotik safra darlıkları vardır, ancak az bir kısmında ise karaciğer biyopsisinde PSK'nın histolojik özelliklerini gösteren normal kolanjiyografili küçük kanal PSK izlenir, ek olarak küçük bir yüzde de otoimmün hepatit ile örtüşen özelliklere sahiptir (PSK-OİH). PSK otoimmün bir hastalık olarak kabul edilir. PSK'ye özgü Uluslararası Hastalık Sınıflandırma (ICD)-10 tanı kodu "K83.00"tür.

Tanımlar

1960'ların ortalarına kadar yayınlanan makalelerin çoğu vaka raporlarıydı.1970'ler boyunca endoskopik retrograd kolanjiyopankreatografi (ERCP)'nin yaygın olarak uygulanması hastalığın daha fazla tanınmasına yol açtı ve 1980'de ABD, İngiltere ve Norveç'ten üç önemli makale klinik

bir tanım oluşturdu. Daha sonra PSK'nın kolanjiyokarsinom (CCA), kolon neoplazisi ve küçük kanal (small-duct) PSK'nın alt fenotipleri, yüksek immüno globulin G4 (IgG4) seviyelerine sahip PSK ve otoimmün hepatit "overlap sendromu" tanımlamaları yapıldı (1-8). PSK, intrahepatik ve/veya ekstrahepatik safra yollarındaki inflamasyon, fibrozis ve orta ve büyük safra kanallarının daralması ile karakterize, etiyolojisi bilinmeyen, kronik ilerleyici bir hastalıktır ve sıklıkla İBH ile ilişkili olan bir kolanjiopatidir. PSK'lı hastaların çoğunda kolanjiyogramda fibrotik biliyer darlıklar bulunurken, az bir kısmında normal bir kolanjiyogramla karakterize edilen ancak karaciğer biyopsisinde PSK'in histolojik özellikleri bulunan küçük kanal (small-duct) PSK'i vardır. Küçük bir yüzdede otoimmün hepatit ile (PSK-OİH) örtüşen özellikler içerir. PSK hem erkek hem de kadın bireyleri etkiler ve her yaşta ortaya çıkabilir. PSK bir otoimmün hastalık olarak kabul edilir; ancak patofizyolojisi tam olarak anlaşılamamıştır. PSK sıklıkla kolestatik karaciğer hasarı, siroz ve karaciğer yetmezliği ile sonuçlanır ve transplantasyondan sonra hastaların %20-30'unda tekrarlayabilir. PSK ayrıca CCA ve kolorektal kanser (KRK) riskini de önemli ölçüde artırır (8). Şu anda PSK için etkili bir tıbbi tedavi yoktur. Biliyer darlıkları tanımla-

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KAYNAKLAR

- Karlsen TH, Folseraas T, Thorburn D, et al. Primary sclerosing cholangitis - a comprehensive review . *J Hepatol*. 2017 Dec;67(6):1298-1323. doi: 10.1016/j.jhep.2017.07.022. Epub 2017 Aug 10.
- Schrumpf E, Eljio K, Fausa O, et al. Sclerosing cholangitis in ulcerative colitis. *Scand J Gastroenterol* 1980;15:689-697.
- Chapman RW, Arborgh BA, Rhodes JM, et al. Primary sclerosing cholangitis: a review of its clinical features, cholangiography, and hepatic histology. *Gut* 1980;21:870-877.
- Wiesner RH, LaRusso NF. Clinicopathologic features of the syndrome of primary sclerosing cholangitis. *Gastroenterology* 1980;79:200-206.
- Broome U, Lindberg G, Lofberg R. Primary sclerosing cholangitis in ulcerative colitis—a risk factor for the development of dysplasia and DNA aneuploidy? *Gastroenterology* 1992;102:1877-1880.
- Wee A, Ludwig J. Pericholangitis in chronic ulcerative colitis: primary sclerosing cholangitis of the small bile ducts? *Ann Intern Med* 1985;102:581-587.
- Mendes FD, Jorgensen R, Keach J, et al. Elevated serum IgG4 concentration in patients with primary sclerosing cholangitis. *Am J Gastroenterol* 2006;101:2070-2075.
- Lerut J, Demetris AJ, Stieber AC, et al. Intrahepatic bile duct strictures after human orthotopic liver transplantation. Recurrence of primary sclerosing cholangitis or unusual presentation of allograft rejection? *Transpl Int* 1988;1:127-130.
- Bowlus CL, Arrivé L, Bergquist A, et al. AASLD practice guidance on primary sclerosing cholangitis and cholangiocarcinoma. *Hepatology*. 2023 Feb 1;77(2):659-702. doi: 10.1002/hep.32771.
- Mehta TI, Weissman S, Fung BM, et al. Global incidence, prevalence and features of primary sclerosing cholangitis: A systematic review and meta-analysis. *Liver Int* 2021 Oct;41(10):2418-2426. doi: 10.1111/liv.15007.
- Brigida Barberio I, Davide Massimi I, Nora Cazzagon et al. Prevalence of Primary Sclerosing Cholangitis in Patients With Inflammatory Bowel Disease: A Systematic Review and Meta-analysis. *Gastroenterology*. 2021 Dec;161(6):1865-1877. doi: 10.1053/j.gastro.2021.08.032.
- Kirsten Boonstra I, Karel J van Erpecum, Karin M J van Nieuwkerk, et al. Primary sclerosing cholangitis is associated with a distinct phenotype of inflammatory bowel disease. *Inflamm Bowel Dis*. 2012 Dec;18(12):2270-6. doi: 10.1002/ibd.22938
- Folseraas T, Melum E, Rausch P, et al. Extended analysis of a genome-wide association study in primary sclerosing cholangitis detects multiple novel risk loci. *J Hepatol*. 2012;57:366-75.
- Sabino J, Vieira-Silva S, Machiels K, et al. Primary sclerosing cholangitis is characterised by intestinal dysbiosis independent from IBD. *Gut*. 2016;65:1681-9.
- Gupta V, Gupta I, Park J, Mehta TI, Weissman S, Fung BM, et al. Hedgehog signaling demarcates a niche of fibrogenic peribiliary mesenchymal cells. *Gastroenterology*. 2020;159:624-38.e9.
- Ong J, Bath MF, Swift C, Mehta TI, Weissman S, Fung BM, et al. Does colectomy affect the progression of primary sclerosing cholangitis? A systematic review and meta-analysis. *Gastroenterol Hepatol Bed Bench*. 2018;11:277-83.
- Dyson JK, Beuers U, Jones DEJ, et al. Primary sclerosing cholangitis, Seminar; *Lancet* 2018; 391: 2547-59.
- Kris V Kowdley, MD, Primary sclerosing cholangitis in adults: Clinical manifestations and diagnosis, Literature review current through: May 2024, uptodate 2024, Graphic 81306 Version 2.0
- Giambelluca D, Leto C, D'Arpa F, et al. (2019). Beaded bile ducts in primary sclerosing cholangitis. *Abdominal Radiology*. doi:10.1007/s00261-018-1873-9
- Lindor KD, Kowdley KV, Harrison ME, et al. ACG Clinical Guideline: Primary Sclerosing Cholangitis; *Am J Gastroenterol*; 2015 May;110(5):646-59; doi: 10.1038/ajg.2015.112.
- Dave M, Elmunzer BJ, Dwamena BA, et al. Primary sclerosing cholangitis: meta-analysis of diagnostic performance of MR cholangiopancreatography. *Radiology*. 2010;256:387-96.
- Khoshpouri P, Habibabadi RR, Hazhirkarzar B, et al. Imaging features of primary sclerosing cholangitis: from diagnosis to liver transplant follow-up. *Radiographics*. 2019; 39:1938-64.
- Ponsioen CY, Assis DN, Boberg KM, et al. Defining primary sclerosing cholangitis: results from an international Primary Sclerosing Cholangitis Study Group consensus process. *Gastroenterology*. 2021;161:1764-75.e5.
- Loftus EV Jr, Harewood GC, Loftus CG, et al. PSC-IBD: a unique form of inflammatory bowel disease associated with primary sclerosing cholangitis. *Gut*. 2005;54:91-6.
- Krugliak Cleveland N, Rubin DT, Hart J, et al. Patients with ulcerative colitis and primary sclerosing cholangitis frequently have subclinical inflammation in the proximal colon. *Clin Gastroenterol Hepatol*. 2018;16: 68-74.
- Ricciuto A, Fish J, Carman N, et al. Symptoms do not correlate with findings from colonoscopy in children with inflammatory bowel disease and primary sclerosing cholangitis. *Clin Gastroenterol Hepatol*. 2018;16: 1098-105.e1.
- Penna C, Dozois R, Tremaine W, et al. Pouchitis after ileal pouch-anal anastomosis for ulcerative colitis occurs with increased frequency in patients with associated primary sclerosing cholangitis. *Gut*. 1996;38:234-9.
- Wiesner RH, LaRusso NF, Dozois RR, et al. Peristomal varices after proctocolectomy in patients with primary sclerosing cholangitis. *Gastroenterology*. 1986;90:316-22.
- Boonstra K, Weersma RK, van Erpecum KJ, et al. Population-based epidemiology, malignancy risk, and outcome of primary sclerosing cholangitis. *Hepatology*. 2013;58:2045-55.
- Deneau MR, El-Matary W, Valentino PL, et al. The natural history of primary sclerosing cholangitis in 781 children: a multicenter, international collaboration. *Hepatology*. 2017;66:518-27
- Björnsson E, Olsson R, Bergquist A, et al. The natural history of small-duct primary sclerosing cholangitis. *Gastroenterology*. 2008;134:975-80.
- Bakhshi Z, Hilscher MB, Gores GJ, et al. An update on primary sclerosing cholangitis epidemiology, outcomes and quantification of alkaline phosphatase variability in a population-based cohort. *J Gastroenterol*. 2020;55:523-32.

33. Muir AJ, Levy C, Janssen HLA, et al. Simtuzumab for primary sclerosing cholangitis: phase 2 study results with insights on the natural history of the disease. *Hepatology*. 2019;69:684–98.
34. Rudolph G, Gotthardt D, Klötters-Plachky P, et al. Influence of dominant bile duct stenoses and biliary infections on outcome in primary sclerosing cholangitis. *J Hepatol*. 2009;51:149–55.
35. Goldberg DS, Camp A, Martinez-Camacho A, et al. Risk of waitlist mortality in patients with primary sclerosing cholangitis and bacterial cholangitis. *Liver Transpl*. 2013;19:250–8.
36. Dodd GD 3rd, Niedzwiecki GA, Campbell WL, et al. Bile duct calculi in patients with primary sclerosing cholangitis. *Radiology*. 1997;203:443–7.
37. Björnsson E, Lindqvist-Ottosson J, Asztely M, et al. Dominant strictures in patients with primary sclerosing cholangitis. *Am J Gastroenterol*. 2004;99:502–8.
38. Bergquist A, Ekblom A, Olsson R, et al. Hepatic and extrahepatic malignancies in primary sclerosing cholangitis. *J Hepatol*. 2002;36:321–7.
39. Boonstra K, Weersma RK, van Erpecum KJ, et al. Population-based epidemiology, malignancy risk, and outcome of primary sclerosing cholangitis. *Hepatology*. 2013;58:2045–55.
40. Trivedi PJ, Crothers H, Mytton J, et al. Effects of primary sclerosing cholangitis on risks of cancer and death in people with inflammatory bowel disease, based on sex, race, and age. *Gastroenterology*. 2020;159:915–28.
41. Ali AH, Tabibian JH, Nasser-Ghods N, et al. Surveillance for hepatobiliary cancers in patients with primary sclerosing cholangitis. *Hepatology*. 2018;67:2338–51.
42. Zheng HH, Jiang XL. Increased risk of colorectal neoplasia in patients with primary sclerosing cholangitis and inflammatory bowel disease: a meta-analysis of 16 observational studies. *Eur J Gastroenterol Hepatol*. 2016;28:383–90.
43. Sorensen J, Nielsen OH, Andersson M, et al. Inflammatory bowel disease with primary sclerosing cholangitis: a Danish population-based cohort study 1977–2011. *Liver Int*. 2018;38:532–41.
44. Shah SC, Ten Hove JR, Castaneda D, et al. High risk of advanced colorectal neoplasia in patients with primary sclerosing cholangitis associated with inflammatory bowel disease. *Clin Gastroenterol Hepatol*. 2018;16:1106–13.e3.
45. Chapman MH, Thorburn D, Hirschfield GM, et al. British Society of Gastroenterology and UK-PSC guidelines for the diagnosis and management of primary sclerosing cholangitis. *Gut* 2019 Aug;68(8):1356–1378. doi: 10.1136/gutjnl-2018-317993. Epub 2019 Jun 1.
46. Lindor KD, Kowdley KV, Harrison ME, et al. ACG Clinical Guideline: Primary Sclerosing Cholangitis. *Am J Gastroenterol* 2015 May;110(5):646–59; quiz 660. doi: 10.1038/ajg.2015.112. Epub 2015 Apr 14.
47. Chapman R, Fevery J, Kalloo A. Diagnosis and management of primary sclerosing cholangitis. *Hepatology* 2010 Feb;51(2):660–78. doi: 10.1002/hep.23294.
48. Lindström L, Hultcrantz R, Boberg KM, et al. Association between reduced levels of alkaline phosphatase and survival times of patients with primary sclerosing cholangitis. *Clin Gastroenterol Hepatol*. 2013 Jul;11(7):841–6. doi: 10.1016/j.cgh.2012.12.032. Epub 2013 Jan 22.
49. Paumgartner G, Beuers U. Ursodeoxycholic acid in cholestatic liver disease: mechanisms of action and therapeutic use revisited. *Hepatology*. 2002 Sep;36(3):525–31. doi: 10.1053/jhep.2002.36088
50. Shi J, Li z, Zeng X, et al. Ursodeoxycholic acid in primary sclerosing cholangitis: meta-analysis of randomized controlled trials *Hepatol Res* 2009 Sep;39(9):865–73. doi: 10.1111/j.1872-034X.2009.00527.x. Epub 2009 May 7.
51. Poropat G, Giljaca V, Stimac D, et al. Bile acids for primary sclerosing cholangitis; Cochrane Database Syst Rev. 2011 Jan 19; 2011(1):CD003626. doi: 10.1002/14651858.CD003626.pub2.
52. Triantos CK, Koukias NM, Nikolopoulou VN, et al. Meta-analysis: ursodeoxycholic acid for primary sclerosing cholangitis *Aliment Pharmacol Ther* 2011 Oct;34(8):901–10. doi: 10.1111/j.1365-2036.2011.04822.x. Epub 2011 Aug 22.
53. Wunsch E, Trottier J, Milkiewicz M, et al. Prospective evaluation of ursodeoxycholic acid withdrawal in patients with primary sclerosing cholangitis; *Hepatology* 2014 Sep;60(3):931–40. doi: 10.1002/hep.27074. Epub 2014 Jul 30.
54. Tabibian JH, Lindor KD. Ursodeoxycholic acid in primary sclerosing cholangitis: if withdrawal is bad, then administration is good (right?) *Hepatology* 2014 Sep;60(3):785–8. doi: 10.1002/hep.27180. Epub 2014 Jul 28.
55. Fickert P, Hirschfield GM, Denk G, et al. Ursodeoxycholic acid improves cholestasis in primary sclerosing cholangitis; *J Hepatol* 2017 Sep;67(3):549–558. doi: 10.1016/j.jhep.2017.05.009. Epub 2017 May 18.
56. Lindor KD, Kowdley KV, Luketic VAC, et al. High-dose ursodeoxycholic acid for the treatment of primary sclerosing cholangitis. *Hepatology* 2009 Sep;50(3):808–14. doi: 10.1002/hep.23082.
57. Hay JE, Lindor KD, Wiesner RH, et al. The metabolic bone disease of primary sclerosing cholangitis; *Hepatology*. 1991 Aug;14(2):257–61.
58. Kris V Kowdley, MD, Primary sclerosing cholangitis in adults: Management ;uptodate , Literature review current through: May 2024. Topic 661 Version 44.0
59. Stokkeland K, Höijer J, Bottai M, et al. Statin Use Is Associated With Improved Outcomes of Patients With Primary Sclerosing Cholangitis. *Clin Gastroenterol Hepatol* 2019 Aug;17(9):1860–1866.e1. doi: 10.1016/j.cgh.2018.11.002.
60. Schramm C, Schirmacher P, Helmreich-Becker I. Combined therapy with azathioprine, prednisolone, and ursodiol in patients with primary sclerosing cholangitis. A case series; *Ann Intern Med*. 1999 Dec 21;131(12):943–6. doi: 10.7326/0003-4819-131-12-199912210-00006.
61. Björnsson E, Lindqvist-Ottosson J, Asztely M, et al. Dominant strictures in patients with primary sclerosing cholangitis; *Am J Gastroenterol* 2004 Mar;99(3):502–8. doi: 10.1111/j.1572-0241.2004.04106.x
62. Stiehl A, Rudolph G, Klötters-Plachky P, et al. Development of dominant bile duct stenoses in patients with primary sclerosing cholangitis treated with ursodeoxycholic acid: outcome after endoscopic treatment *J Hepatol*. 2002 Feb;36(2):151–6. doi: 10.1016/s0168-8278(01)00251-3.
63. Ponsioen CY, Lam K, van Milligen de Wit AW, et al.

- Four years experience with short term stenting in primary sclerosing cholangitis ; *Am J Gastroenterol* 1999 Sep;94(9):2403-7. doi: 10.1111/j.1572-0241.1999.01364.x.
64. Ponsioen CY, Arnelo U, Bergquist A, et al. No Superiority of Stents vs Balloon Dilatation for Dominant Strictures in Patients With Primary Sclerosing Cholangitis; *Gastroenterology*. 2018 Sep;155(3):752-759.e5. doi: 10.1053/j.gastro.2018.05.034. Epub 2018 May 24.
 65. Njei B, McCarty TR, Varadarajulu S, et al. Systematic review with meta-analysis: endoscopic retrograde cholangiopancreatography-based modalities for the diagnosis of cholangiocarcinoma in primary sclerosing cholangitis; *Aliment Pharmacol Ther*. 2016 Dec;44(11-12):1139-1151. doi: 10.1111/apt.13817. Epub 2016 Oct 3
 66. Bowlus CL, Lim JK, Lindor KD. AGA Clinical Practice Update on Surveillance for Hepatobiliary Cancers in Patients With Primary Sclerosing Cholangitis: Expert Review; *Clin Gastroenterol Hepatol* 2019 Nov;17(12):2416-2422. doi: 10.1016/j.cgh.2019.07.011. Epub 2019 Jul 12.
 67. Cameron JL, Pitt HA, Zinner MJ, et al. Resection of hepatic duct bifurcation and transhepatic stenting for sclerosing cholangitis; *Ann Surg* 1988 May;207(5):614-22. doi: 10.1097/00000658-198805000-00016.
 68. Farges O, Malassagne B, Sebag M, et al. Primary sclerosing cholangitis: liver transplantation or biliary surgery; *Surgery* 1995 Feb;117(2):146-55. doi: 10.1016/s0039-6060(05)80078-9.
 69. Pawlik TM, Olbrecht VA, Pitt HA, et al. Primary sclerosing cholangitis: role of extrahepatic biliary resection; *J Am Coll Surg*. 2008 May;206(5):822-30; discussion 830-2. doi: 10.1016/j.jamcollsurg.2007.12.015. Epub 2008 Mar 4.
 70. Cangemi JR, Wiesner RH, Beaver SJ, et al. Effect of proctocolectomy for chronic ulcerative colitis on the natural history of primary sclerosing cholangitis; *Gastroenterology* 1989 Mar;96(3):790-4.
 71. Graziadei IW, Wiesner RH, Marotta PJ, et al. Long-term results of patients undergoing liver transplantation for primary sclerosing cholangitis; *Hepatology*. 1999 Nov;30(5):1121-7. doi: 10.1002/hep.510300501.
 72. Dickson ER, Murtaugh PA, Wiesner RH, et al. Primary sclerosing cholangitis: refinement and validation of survival models; *Gastroenterology* 1992 Dec;103(6):1893-901. doi: 10.1016/0016-5085(92)91449-e.
 73. Tabibian JH, Bowlus CL. Primary sclerosing cholangitis: A review and update; *Liver Res*. 2017 Dec;1(4):221-230. doi: 10.1016/j.livres.2017.12.002.
 74. IGraziadei IW, Wiesner RH, Batts KP, et al. Recurrence of primary sclerosing cholangitis following liver transplantation; *Hepatology*. 1999 Apr;29(4):1050-6. doi: 10.1002/hep.510290427.
 75. Alabraba E, Nightingale P, Gunson B, et al. A re-evaluation of the risk factors for the recurrence of primary sclerosing cholangitis in liver allografts; *Liver Transpl*. 2009 Mar;15(3):330-40. doi: 10.1002/lt.21679.
 76. Ludwig DR, Anderson MA, Itani M, et al. Secondary sclerosing cholangitis: mimics of primary sclerosing cholangitis. *Abdominal Radiology*, 2023, 48, 151-165. doi: 10.1007/s00261-022-03551-z
 77. Levy C, Bowlus CL. Primary and Secondary Sclerosing Cholangitis. Feldman M (Ed.), Slesinger and Fordtran's Gastrointestinal And Liver Disease, 11th edition içinde. Canada: Elsevier; 2021. p.1077-1095.
 78. Koh YX, Chiow AKH, Chok AY, et al. Recurrent Pyogenic Cholangitis: Disease Characteristics and Patterns of Recurrence. *ISRN Surgery*, 2013; 1-9. doi: 10.1155/2013/536081
 79. UpToDate. *Recurrent Pyogenic Cholangitis*. <https://www.uptodate.com/contents/recurrent-pyogenic-cholangitis>. (05/11/2024 tarihinde erişilmiştir.)
 80. Song TJ, Seo DW, Goh KL. Recurrent Pyogenic Cholangitis. Todd Baron (Ed.), *ERCP: third edition* içinde (469-479). China: Elsevier; 2019.
 81. Deshpande V, Zen Y, Chan JK, et al. Consensus statement on the pathology of IgG4-related disease. *Mod Pathol*, 2012; 25:1181-1192. <https://doi.org/10.1038/modpathol.2012.72>.
 82. Oseini A, Chaiteerakij R, Shire A, et al. Utility of serum immunoglobulin G4 in distinguishing immunoglobulin G4-associated cholangitis from cholangiocarcinoma. *Hepatology*, 2011;54:940-8.
 83. UpToDate. *Clinical manifestations and diagnosis of IgG4-related disease*. <https://www.uptodate.com/contents/clinical-manifestations-and-diagnosis-of-igg4-related-disease> (05/11/2024 tarihinde erişilmiştir.)
 84. Hirano K, Tada M, Sasahira N, et al. Incidence of malignancies in patients with IgG4-related disease. *Intern Med*. 2014; 53 (3): 171-6. doi:10.2169/internalmedicine.53.1342.
 85. UpToDate. *AIDS cholangiopathy*. <https://www.uptodate.com/contents/aids-cholangiopathy> (05/11/2024 tarihinde erişilmiştir.)
 86. Abdalian R, Heathcote EJ. Sclerosing cholangitis: A focus on secondary causes. *Hepatology*. 2006; 44:1063-1074. doi:10.1002/hep.21405.
 87. Faruqui S, Okoli FC, Olsen SK, et al (2021) Cholangiopathy After Severe COVID-19: Clinical Features and Prognostic Implications. *Am J Gastroenterol*. 2021;116:1414-1425. doi:10.14309/ajg.0000000000001264.
 88. Edwards K, Allison M, Ghuman S. Secondary sclerosing cholangitis in critically ill patients: a rare disease precipitated by severe SARS-CoV-2 infection. *BMJ Case Rep*. 2020; 13(11):e237984. doi:10.1136/bcr-2020-237984
 89. Klindt C, Jensen B-E, Brandenburger T, et al. Secondary sclerosing cholangitis as a complication of severe COVID-19: A case report and review of the literature. *Clin Case Rep*. 2021; 9(5):e04068. doi:10.1002/ccr3.4068
 90. UpToDate. *Ischemic hepatitis, hepatic infarction, and ischemic cholangiopathy*. <https://www.uptodate.com/contents/ischemic-hepatitis-hepatic-infarction-and-ischemic-cholangiopathy> (05/11/2024 tarihinde erişilmiştir.)
 91. Buis CI, Hoekstra H, Verdonk RC, et al. (2006) Causes and consequences of ischemic type biliary lesions after liver transplantation. *J Hepatobiliary Pancreat Surg*. 2006;13:517-524. doi:10.1007/s00534-005-1080-2