

Bölüm 2

ENDOMETRİOZİS ETKENİ OLARAK MOLEKÜLER BİYOLOJİ VE GENETİK POLİMORFİZM

Ayşe Zehra ÖZDEMİR³

Endometriozis endometrium gland ve stromasının rahim dışında bulunması olarak tanımlanmaktadır. Genelde kronik pelvik ağrı, dismenore, disparoni ve infertiliteye neden olmaktadır. Benign, inflamatuvar bir hastalıktır ve östrojen bağımlıdır. Tanıda altın standart laparoskopi ve histopatolojik tanıdır.

Hastalığın prevalansı değişmektedir. Çünkü hastaların bir kısmı asemptomatik olabilir. Ayrıca çalışılan popülasyona göre hastalık sıklığı değişmektedir. Asemptomatik tubal ligasyon nedeniyle laparoskopi yapılan hastalarda %1-7 arasında sıklık görülmüştür (1). Cerrahi yapılan hastalarda ise endometriozis nedeniyle cerrahi yapılan hastaların %57 sinde ,pelvik ağrı nedeniyle cerrahi olan hastaların %21' inde ve pelvik ağrı ya da endometriozis ön tanısı olmadan cerrahi yapılan hastaların %8'inde endometriozis mevcuttur (2). Semptomatik hastalarda sıklığı daha fazladır, pelvik ağrı olan adolesanlarda sıklık %70 iken (3),infertil hastalarda %50 (4) sıklıkta görülmektedir.

Hastalığın cerrahi olarak evrelemesi American Society for Reproductive Medicine evreleme sistemine (5) göre yapılmaktadır.

Evre 1: Hastalık izole implantlarla sınırlıdır. Adezyon yoktur.

Evre2: 5 cm altında süperfisyel implantlar vardır. Adezyon yoktur.

Evre 3: Multipl süperfisyel ve derin implantlar vardır. Peritubal ve periovaryen adezyonlar vardır.

Evre 4: Multipl süperfisyel ve derin implantlar vardır. Büyük ovaryen endometriomalar vardır. Film ve dens yapışıklıklar mevcuttur.

³ Dr. Öğretim Üyesi Ayşe Zehra ÖZDEMİR Ondokuz Mayıs Üniversitesi Kadın Hastalıkları ve Doğum Anabilim Dalı aysezehra.ozdemir@hotmail.com

Gen polimorfizmi toplumdan topluma farklılık göstermektedir. Bu nedenle çalışmalara aynı ırksal özellikteki hastaların alınması gerekmektedir.

Yine son zamanlarda yapılan bir çalışmada endometriozis dokularında somatik mutasyon varlığına bakılmıştır. %26 oranında mutasyon saptanmıştır. Bunlar da genellikle kanserle ilişkili mutasyonlardır(48).

Sonuç olarak endometriozis kalıtsal olan ama komplike bir hastalıktır. 8 gen bölgesi tanımlanmıştır ve ileri evre hastalarda daha çok mutasyona rastlanmıştır. Konunun daha net ortaya konabilmesi için daha fazla çalışmaya ihtiyaç duyulmaktadır.

KAYNAKLAR

1. Mahmood TA, Templeton A. Prevalence and genesis of endometriosis. Hum Reprod 1991; 6:544.
2. Mowers EL, Lim CS, Skinner B, et al. Prevalence of Endometriosis During Abdominal or Laparoscopic Hysterectomy for Chronic Pelvic Pain. Obstet Gynecol 2016; 127:1045.
3. Goldstein DP, deCholnoky C, Emans SJ, et al. Laparoscopy in the diagnosis and management of pelvic pain in adolescents. J Reprod Med 1980; 24:251.
4. Eskenazi B, Warner ML. Epidemiology of endometriosis. Obstet Gynecol Clin North Am 1997; 24:235.
5. Revised American Society for Reproductive Medicine classification of endometriosis: 1996. Fertil Steril 1997; 67:817.
6. Giudice LC. Clinical practice. Endometriosis. N Engl J Med 2010; 362:2389.
7. Koninckx PR, Barlow D, Kennedy S. Implantation versus infiltration: the Sampson versus the endometriotic disease theory. Gynecol Obstet Invest. 1999;47 Suppl 1:3-9; discussion 9-10.
8. Koninckx PR, Ussia A, Adamyan L, et al. Pathogenesis of endometriosis: the genetic/epigenetic theory. Fertil Steril. 2019 Feb;111(2):327-340.
9. Simpson JL, Elias S, Malinak LR, et al. Heritable aspects of endometriosis. I. Genetic studies. Am J Obstet Gynecol. 1980;137:327-331.
10. Kennedy S, Mardon H, Barlow D. Familial endometriosis. J. Assist. Reprod. Genet. 12(1), 32-34 (1995)
11. Moen MH, Magnus P. The familial risk of endometriosis. Acta Obstet Gynecol Scand. 1993;72:560-564.
12. Hadfield RM, Mardon HJ, Barlow DH, et al. Endometriosis in monozygotic twins. Fertil Steril. 1997;68:941-942.
13. Treloar SA, O'Connor DT, O'Connor VM, et al. Genetic influences on endometriosis in an Australian twin sample. Fertil Steril. 1999;71: 701-710.
14. Stefansson H, Geirsson RT, Steinhorsdottir V et al. 2002 Genetic factors contribute to the risk of developing endometriosis. Human Reproduction 17, 555-559.
15. Saha R, Pettersson HJ, Svedberg P, et al. Heritability of endometriosis. Fertil Steril. 2015 Oct;104(4):947-952.
16. Christofolini DM, Mafra FA, Catto MC, Bianco B, Barbosa CP. New candidate genes associated to endometriosis. Gynecol Endocrinol. 2019 Jan;35(1):62-65. doi: 10.1080/09513590.2018.1499090
17. Lee GH, Kim SH, Choi YM, et al. Estrogen receptor beta gene p1730 G/A polymorphism in women with endometriosis. Fertil Steril. 2007;88:785-788.

18. Wang Z, Yoshida S, Negoro K, et al. Polymorphisms in the estrogen receptor beta gene but not estrogen receptor alpha gene affect the risk of developing endometriosis in a Japanese population. *Fertil Steril*. 2004;81:1650–1656.
19. Lattuada D, Somigliana E, Vigano P, et al. Genetics of endometriosis: a role for the progesterone receptor gene polymorphism PROGINS?. *Clin Endocrinol*. 2004;61:190–194.
20. Treloar SA, Zhao ZZ, Armitage T, et al. Association between polymorphisms in the progesterone receptor gene and endometriosis. *Mol Hum Reprod*. 2005;11:641–647
21. Sahmani M, Darabi M, Darabi M, Dabaghi T, Alizadeh SA and Najafipour R: The 763C>G Polymorphism of the secretory PLA2IIa gene is associated with endometriosis in Iranian women. *Int J Fertil Steril* 8: 437-444, 2015.
22. Simpson JL , Bischoff FZ: Increased heterogeneity of chromosome 17 aneuploidy in endometriosis. *Am J Obstet Gynecol* 180: 792-797, 1999
23. Chang CC, Hsieh YY, Tsai CH, et al. The proline form of p53 codon 72 polymorphism is associated with endometriosis. *Fertil Steril* 77: 43-45, 2002.
24. Martini M, Ciccarone M, Garganese G, et al. Possible involvement of hMLH1, p16(INK4a) and PTEN in the malignant transformation of endometriosis. *Int J Cancer* 102: 398-406, 2002.
25. Yu YX, Xiu YL, Chen X, et al. Transforming growth factor-beta 1 involved in the pathogenesis of endometriosis through regulating expression of vascular endothelial growth factor under hypoxia. *Chin Med J*. 2017;130:950–956.
26. Wieser F, Fabjani G, Tempfer C, et al. Tumor necrosis factor- α promoter polymorphisms and endometriosis. *J Soc Gynecol Investig*. 2002;9:313–318.
27. Ishii K, Takakuwa K, Kashima K, et al. Associations between patients with endometriosis and HLA class II; the analysis of HLA-DQB1 and HLA-DPB1 genotypes. *Hum Reprod*. 2003;18:985–989
28. Vigano P, Pardi R, Magri B, et al. Expression of intercellular adhesion molecule-1 (ICAM-1) on cultured human endometrial stromal cells and its role in the interaction with natural killers. *Am J Reprod Immunol*. 1994;32:139–145.
29. Semino C, Semino A, Pietra G, et al. Role of major histocompatibility complex class I expression and natural killer-like T cell in the genetic control of endometriosis. *Fertil Steril*. 1995;64:909–916.
30. Perini JA, Cardozo JV, Berardo PT, et al. Role of vascular endothelial growth factor polymorphisms (_2578C>A, _460T>C, _1154G>A, §405G>C and §936C>T) in endometriosis: a case-control study with Brazilians. *BMC Womens Health*. 2014;14:117.
31. Hsieh YY, Chang CC, Tsai FJ, et al. T homozygote and allele of epidermal growth factor receptor 2073 gene polymorphism are associated with higher susceptibility to endometriosis and leiomyomas. *Fertil Steril*. 2005;83:796–799.
32. Attar R, Cacina C, Sozen S, et al. DNA repair genes in endometriosis. *Genet Mol Res*. 2010;9:629–636
33. Guo SW. Glutathione S-transferases M1/T1 gene polymorphisms and endometriosis: a meta-analysis of genetic association studies. *Mol Hum Reprod*. 2005;11:729–743. doi: 10.1093/molehr/gah206.
34. Wang M, Hao C, Huang X, et al. Aberrant Expression of lncRNA (HOXA11-AS1) and Homeobox A (HOXA9, HOXA10, HOXA11, and HOXA13) Genes in Infertile Women With Endometriosis. *Reprod Sci* 25: 654-661, 2018.
35. Pissetti C, Tanaka S, Hortolani A, et al. Gene polymorphisms in FAS (Rs3740286 and Rs4064) are involved in endometriosis development in Brazilian women, but not those in CASP8 (rs13416436 and rs2037815). *Rev Bras Ginecol Obstet* 40: 450-457, 2018
36. Penna I, Du H, Ferriani R and Taylor HS: Calpain5 expression is decreased in endometriosis and regulated by HOXA10 in human endometrial cells. *Mol Hum Reprod* 14: 613-618, 2008.

37. Treloar SA, Wicks J, Nyholt DR et al. Genome-wide linkage study in 1,176 affected sister pair families identifies significant susceptibility locus for endometriosis on chromosome 20q26. *Am. J. Hum. Genet.* 77, 365–376 (2005).
38. Zondervan KT, Treloar SA, Lin J et al. Significant evidence of one or more susceptibility loci for endometriosis with near-Mendelian inheritance on chromosome 7p13–15. *Hum.Reprod.* 22, 717–728 (2007).
39. Painter JN, Nyholt DR, Morris A, et al. High-density fine-mapping of a chromosome 10q26 linkage peak suggests association between endometriosis and variants close to CYP2C19. *Fertil Steril.* 2011 Jun;95(7):2236–40.
40. Lin J, Zong L., Kennedy SH., et al. Coding regions of INHBA, SFRP4 and HOXA10 are not implicated in familial endometriosis linked to chromosome 7p13 –15. *Molecular Human Reproduction*, Vol.17, No.10 pp. 605–611, 2011
41. Uno S, Zembutsu H, Hirasawa A et al. A genome-wide association study identifies genetic variants in the CDKN2BAS locus associated with endometriosis in Japanese. *Nat. Genet.* 42, 707–710 (2010).
42. Adachi S, Tajima A, Quan J et al. Meta-analysis of genome-wide association scans for genetic susceptibility to endometriosis in Japanese population. *J. Hum. Genet.* 55, 816–821 (2010).
43. Painter JN, Anderson CA, Nyholt DR et al. Genome-wide association study identifies a locus at 7p15.2 associated with the development of endometriosis. *Nat. Genet.* 43, 51–54 (2011).
44. Nyholt DR, Low SK, Anderson CA et al. Genome-wide association meta-analysis identified new endometriosis risk loci. *Nat. Genet.* 44(12), 1355–1359 (2012).
45. Albertsen HM, Chettier R, Farrington P, Ward K. Genomewide association study link novel loci to endometriosis. *PLoS ONE* 8, e58257 (2013).
46. Rahmioglu N, Nyholt DR, Morris AP, et al. Genetic variants underlying risk of endometriosis: insights from meta-analysis of eight genome-wide association and replication datasets. *Hum. Reprod. Update* 20(5), 702–716 (2014)
47. Sapkota Y, Steinhorsdottir V, Morris AP, et al. Meta-analysis identifies five novel loci associated with endometriosis highlighting key genes involved in hormone metabolism. *Nat Commun.* 2017 May 24;8:15539. doi: 10.1038/ncomms15539.
48. Anglesio MS, Papadopoulos N, Ayhan A, et al. Cancer-Associated Mutations in Endometriosis without Cancer. *N Engl J Med.* 2017 May 11;376(19):1835-1848. doi: 10.1056/NEJMoa1614814.
49. 40. Liang S, Huang Y, Fan Y. Vascular endothelial growth factor gene polymorphisms and endometriosis risk: a meta-analysis. *Arch Gynecol Obstet* 2012. This is a large meta-analysis of VEGF gene polymorphisms from 11 studies from Chinese, Indian, Korean, Japanese, Spanish, Turkish, Estonian, and Australian patients.
50. 41. Zhao ZZ, Nyholt DR, Thomas S, et al. Polymorphisms in the vascular endothelial growth factor gene and the risk of familial endometriosis. *Mol Hum Reprod.* 2008;14:531–8. doi: 10.1093/molehr/gan043. [PubMed]
51. 95. Wu Y, Guo SW and Fazleabas AT: Altered expression of HOXA10 in endometriosis: Potential role in decidualization. *Mol Hum Reprod* 13: 323-332, 2007.
52. 120. Yoo JY, Kim TH, Fazleabas AT, Palomino WA, Ahn SH, Tayade C, Schammel DP, Young SL, Jeong JW and Lessey BA: KRAS Activation and over-expression of SIRT1/BCL6 Contributes to the Pathogenesis of Endometriosis and Progesterone Resistance. *Sci Rep* 7: 6765, 2017.