

SPİNAL ANESTEZİDE NEOSTİGMİN VE DİĞER ADJUVAN İLAÇLAR

Yazar

Dr. Öğr. Üyesi Harun ÖZMEN

Sağlık Bilimleri Üniversitesi Hamidiye Tıp Fakültesi

Anestezi ve Reanimasyon AD.

Mersin Şehir Eğitim ve Araştırma Hastanesi



© Copyright 2026

Bu kitabın, basım, yayın ve satış hakları Akademisyen Yayinevi A.Ş.'ye aittir. Anılan kuruluşun izni alınmadan kitabın tümü ya da bölümleri mekanik, elektronik, fotokopi, manyetik kayıt ve/veya başka yöntemlerle çoğaltılamaz, basılamaz, dağıtılamaz. Tablo, şekil ve grafikler izin alınmadan, ticari amaçlı kullanılamaz. Bu kitap T.C. Kültür Bakanlığı bandrolü ile satılmaktadır.

Bu Kitap, "Spinal Anesteziye %0.5 Hiperbarik Bupivakaine Eklenen Neostigminin Anestezi Kalitesi, Hemodinami ve Analjezi Üzerine Etkileri" Adlı Uzmanlık Tezinden Üretilmiştir.

ISBN
978-625-362-037-0

Yayın Koordinatörü
Yasin DİLMEN

Kitap Adı
Spinal Anesteziye
Neostigmin ve Diğer Adjuvan İlaçlar

Sayfa ve Kapak Tasarımı
Akademisyen Dizgi Ünitesi

Editör
Sacit GÜLEÇ
ORCID iD: 0000-0002-7107-3798

Yayıncı Sertifika No
47518

Baskı ve Cilt
Vadi Matbaacılık

Yazar
Harun ÖZMEN
ORCID iD: 0000-0002-0392-9099

Bisac Code
MED006000

DOI
10.37609/akya.4193

UYARI

Bu üründe yer alan bilgiler sadece lisanslı tıbbi çalışanlar için kaynak olarak sunulmuştur. Herhangi bir konuda profesyonel tıbbi danışmanlık veya tıbbi tam amacıyla kullanılmamalıdır. Akademisyen Yayinevi ve alıcı arasında herhangi bir şekilde doktor-hasta, terapist-hasta ve/veya başka bir sağlık sunum hizmeti ilişkisi oluşmaz. Bu ürün profesyonel tıbbi kararların eşleniği veya yedeği değildir. Akademisyen Yayinevi ve bağlı şirketleri, yazarları, katılımcıları, partnerleri ve sponsorları ürün bilgilerine dayalı olarak yapılan bütün uygulamalardan doğan, insanlarda ve cihazlarda yaralanma ve/veya hasarlardan sorumlu değildir.

İlaçların veya başka kimyasalların reçete edildiği durumlarda, tavsiye edilen dozunu, ilacın uygulanacak süresi, yöntemi ve kontraendikasyonlarını belirlemek için, okuyucuya üretici tarafından her ilaca dair sunulan güncel ürün bilgisini kontrol etmesi tavsiye edilmektedir. Dozun ve hasta için en uygun tedavinin belirlenmesi, tedavi eden hekimin hastaya dair bilgi ve tecrübelerine dayanarak oluşturması, hekimin kendi sorumluluğundadır.

Akademisyen Yayinevi, üçüncü bir taraf tarafından yapılan kitaba dair değişikliklerden sorumlu değildir.

Kütüphane Kimlik Kartı
Özmen, Harun.

Spinal Anesteziye Neostigmin ve Diğer Adjuvan İlaçlar / Harun Özmen; ed. Sacit Güleç.

Ankara : Akademisyen Yayinevi Kitabevi, 2026.

68 s. : resim, tablo. ; 135x210 mm.

Kaynakça var.

ISBN 9786253620370

GENEL DAĞITIM
Akademisyen Yayinevi A.Ş.

Halk Sokak 5 / A
Yenişehir / Ankara
Tel: 0312 431 16 33
siparis@akademisyen.com

www.akademisyen.com

*Çok Değerli Hocam
Sayın Profesör Doktor Belkıs Tanrıverdi'ye
Çok Değerli Tez Hocam
Sayın Profesör Doktor Sacit Güleç'e
Teşekkür ederim*

Opiodlerden olabildiğince uzaklaşan peroperatif ve postoperative protokollerin, giderek yaygın kullanım bulduğu anestezi pratiğinde, azaltılmış dozlar ile lokal anestezi ve adjuvanların kombine edilerek uygulandığı santral ve periferik bloklar, yaygınlaşan günü birlik klinik tedavilerde, ERAS politikalarının da vazgeçilmez parçası olacaktır.

İÇİNDEKİLER

SPİNAL ANESTEZİ (SUBARAKNOİD BLOK).....	1
SPİNAL ANESTEZİ VE ADJUVAN İLAÇLARIN KISA TARİHÇESİ.....	3
MEDÜLLA SPİNALİS, VERTEBRA ANATOMİSİ VE SPİNAL ANESTEZİ UYGULAMASI.....	9
SPİNAL ADJUVAN İLAÇLAR	15
NEOSTİGMİN	17
OPIOİDLER.....	25
VAZOAKTİF İLAÇLAR.....	31
ALFA-2 ADRENERJİK AGONİSTLER	35
STEROİDLER.....	39
SODYUM BİKARBONAT	41
NMDA ANTAGONİSTLERİ	43
MİDAZOLAM.....	47
ADJUVAN İLAÇLARIN KLİNİK ETKİLERİ.....	49
KRONOLOJİK KAYNAKLAR.....	53

KRONOLOJİK KAYNAKLAR

1. **1933** | Pellandra CL. The morphine geneserine adjuvants of general anesthesia. *Lyon Med.* 157:653-7.
2. **1942** | Kremer M. Action of intrathecally injected prostigmine acetylcholine, and eserine on the central nervous system in man. *J Exp Physiol.* 31:337-57.
3. **1971** | Pleuvry BJ, Tobias MA. Comparison of the antinociceptive activities of physostigmine, oxotremorine and morphine in the mouse. *Br J Pharmacol.* 43:706-14.
4. **1974** | Nistri A, Pepeu G, Cammelli E, Spina L, De Bellis AM. Effects of morphine on brain and spinal acetylcholine levels and nociceptive threshold in the frog. *Brain Res.* 80:199-209.
5. **1981** | Moore, D. C. *Regional Block: A Handbook for Use in Clinical Practice of Medicine and Surgery.* 514 pages. (First published June 1, 1981).
6. **1981** | Wamsley JK, Lewis MS, Young WS, 3rd, Kuhar MJ. Autoradiographic localization of muscarinic cholinergic receptors in rat brainstem. *J Neurosci.* 1:176-91.
7. **1985** | Yaksh TL, Dirksen R, Harty GJ. Antinociceptive effects of intrathecally injected cholinomimetic drugs in the rat and cat. *Eur J Pharmacol.* 117:81-8.
8. **1986** | Peterson I, Gordh TE, Hartvig P, Wiklund L. A double-blind trial of the analgesic properties of physostigmine in postoperative patients. *Acta Anaesthesiol Scand.* 30:283-8.
9. **1989** | Gordh, T. Jr., Jansson, I., Hartvig, P., et al. Interactions between noradrenergic and cholinergic mechanisms involved in spinal nociceptive processing. *Acta Anaesthesiol Scand*, 33: 39-47.
10. **1989** | Smith MD, Yang XH, Nha JY, Buccafusco JJ. Antinociceptive effect of spinal cholinergic stimulation: Interaction with substance P. *Life Sci.* 45:1255-61.
11. **1990** | Ribeiro-Da-Silva, A., & Cuello, C. Choline Acetyltransferase-Immunoreactive Profiles are Presynaptic to Primary Sensory Fibers in the Rat Superficial Dorsal Horn. *J Comp Neurol*, 295: 370-384.
12. **1990** | Buccafusco, J. J., & Magri, V. The pressor response to spinal cholinergic stimulation in spontaneously hypertensive rats. *Brain Res*, 25: 69-74.
13. **1990** | Craig HJ. Anaesthetic gases. In: Dundee JW, Clarke RS, McCaughey W, editors. *Clinical Anesthetic Pharmacology.* New York: Churchill Livingstone; pp. 127-36.

SPİNAL ANESTEZİDE
NEOSTİĞMİN VE DİĞER ADJUVAN İLAÇLAR

14. **1993** | Collins, V. J. Principles of anesthesiology: general and regional anesthesia.
15. **1993** | Detweiler DJ, Eisenach JC, Tong C, Jackson C. A cholinergic interaction in alpha 2 adrenoceptor-mediated antinociception in sheep. *J Pharmacol Exp Ther.* 265:536-42.
16. **1993** | Hood, D. D., Mallak, K. A., Eisenach, J. C., & Tong, C. Interaction between intrathecal neostigmine and epidural clonidine in human volunteers. *Anesthesiology*, 78: 301-7.
17. **1993** | Erdine, S. Periferik sinir fizyolojisi ve lokal anestezipler, Spinal anestezi. Sinir Blokları (Birinci Basım), İstanbul, 49-80, 155-176.
18. **1994** | Carp, H., Jayaram, A., & Marrow, D. Intrathecal Cholinergic Agonists Lessen Bupivacaine Spinal Block-Induced Hypotension in Rats. *Anesth Analg.* 79(1): 112-115.
19. **1994** | Lothe, A., Li, P., Tong, C., et al. Spinal cholinergic, Alpha-2 adrenergic interactions in analgesia and hemodynamic control. *J Pharmacol Exp Ther*, 270(3): 1301-6.
20. **1994** | Flodmark S, Wrammer T. The analgesic action of morphine, eserine and prostigmine studied by a modified Handy-Wolff-Goodel method. *Acta Physiol Scand.* 9:88-96.
21. **1994** | Winne RP, Abram SE. Intrathecal morphine and neostigmine produce synergistic analgesia to noxious thermal stimuli in rats. *Reg Anesth.* 19:2:6.
22. **1995** | Bouaziz, H., Tong, C., & Eisenach, J. C. Postoperative Analgesia from intrathecal neostigmine in sheep. *Anesth Analg.* 80: 1140-43.
23. **1995** | Hood, D. D., Eisenach, J. C., & Tuttle, R. Phase I Safety Assessment of Intrathecal Neostigmine Methylsulfate in Humans. *Anesthesiology*, 82: 331-343.
24. **1995** | Hood, D. D., Eisenach, J. C., Tong, C., et al. Cardiorespiratory and Spinal Cord Blood Flow Effects of Intrathecal Neostigmine Methylsulfate, Clonidine and Their Combination in Sheep. *Anesthesiology*, 82: 428-435.
25. **1995** | Yaksh TL, Grafe MR, Malkmus S, Rathbun ML, Eisenach JC. Studies on the safety of chronically administered intrathecal neostigmine methylsulfate in rats and dogs. *Anesthesiology.* 82:412-27.
26. **1995** | Bouaziz H, Hewitt C, Eisenach JC. Subarachnoid neostigmine potentiation of alpha 2-adrenergic agonist analgesia. Dexmedetomidine versus clonidine. *Reg Anesth.* 20:121-7.
27. **1996** | Lauretti, G. R., & Lima, L. C. P. R. The effects of intrathecal neostigmine on somatic and visceral pain: Improvement by association with a peripheral anticholinergic. *Anesth Analg.* 82: 617-20.
28. **1996** | Lauretti, G. R., & Azevedo, V. M. S. Intravenous ketamine or fentanyl prolongs postoperative analgesia after intrathecal neostigmine. *Anesth Analg.* 83: 766-70.

29. **1996** | Klamt JG, Dos Reis MP, Barbieri Neto J, Prado WA. Analgesic effect of subarachnoid neostigmine in two patients with cancer pain. *Pain*. 66:389-91.
30. **1996** | Xu Z, Tong C, Eisenach JC. Acetylcholine stimulates the release of nitric oxide from rat spinal cord. *Anesthesiology*. 85:107-11.
31. **1996** | Lauretti GR, Reis MP, Prado WA, Klamt JG. Dose-response study of intrathecal morphine versus intrathecal neostigmine, their combination, or placebo for postoperative analgesia in vaginoplasty. *Anesth Analg*. 82:1182-7.
32. **1996** | Hood DD, Mallak KA, Eisenach JC, Tong C. Interaction between intrathecal neostigmine and epidural clonidine in human volunteers. *Anesthesiology*. 85:315-25.
33. **1997** | Gürün, M. S., Leinbach, R., Moore, L., et al. Studies on the safety of Glucose and Neostigmine Paraben-Containing for Intrathecal Administration. *Anesth Analg*, 85: 317-23.
34. **1997** | Altıntaş, F., Tunalı, Y., Utku, T., & Bozkurt, P. Spinal anesteziye bupivakain + neostigmin uygulaması. *Türk Anestezi ve Reanimasyon Mecmuası*, 25: 313-317.
35. **1997** | Sakura, S., Sumi, M., Sakaguchi, Y., et al. The addition of phenylephrine contributes to transient neurologic symptoms after spinal anesthesia. *Anesthesiology*, 87(4): 771-8.
36. **1997** | Prado WA, Gonçalves AS. Antinociceptive effect of intrathecal neostigmine evaluated in rats by two different pain models. *Braz J Med Biol Res*. 30:1225-31.
37. **1997** | Lauretti GR, Mattos AL, Gomes JM, Pereira NL. Postoperative analgesia and antiemetic efficacy after intrathecal neostigmine in abdominal hysterectomy. *Reg Anesth*. 22:527-33.
38. **1997** | Lauretti GR, Reis MP. Postoperative analgesia and antiemetic efficacy after subarachnoid neostigmine in orthopedic surgery. *Reg Anesth*. 22:337-42.
39. **1997** | Lauretti GR, Mattos AL, Reis MP, Prado WA. Intrathecal neostigmine for postoperative analgesia after orthopedic surgery. *J Clin Anesth*. 9:473-7.
40. **1997** | Lauretti GR. The clinical use of intrathecal neostigmine in regional anesthesia. *LASRA Journal*. 2:2-3.
41. **1998** | Shafer SL, Eisenach JC, Hood DD, Tong C. Cerebrospinal fluid pharmacokinetics and pharmacodynamics of intrathecal neostigmine methylsulfate in humans. *Anesthesiology*. 89:1074-88.
42. **1998** | Baba H, Kohno T, Okamoto M, Goldstein PA, Shimoji K, Yoshimura M. Muscarinic facilitation of GABA release in substantia gelatinosa of the rat spinal dorsal horn. *J Physiol*. 508:83-93.
43. **1998** | Ummenhofer WC, Brown SM, Bernards CM. Acetylcholinesterase and butyrylcholinesterase are expressed in the spinal meninges of monkeys and pigs. *Anesthesiology*. 88:1259-65.

SPİNAL ANESTEZİDE
NEOSTİGMİN VE DİĞER ADJUVAN İLAÇLAR

44. **1998** | Lauretti GR, Hood DD, Eisenach JC, Pfeifer BL. A multi-center study of intrathecal neostigmine for analgesia following vaginal hysterectomy. *Anesthesiology*. 89:913–8.
45. **1999** | Fawcett, W. J., Haxby, E. J., & Male, D. A. Magnesium: physiology and pharmacology. *Br J Anaesth*, 83: 302–20.
46. **1999** | Lauretti GR, Gomes JM, Reis MP, Pereira NL. Low doses of epidural ketamine or neostigmine, but not midazolam, improve morphine analgesia in terminal cancer pain. *J Clin Anesth*. 11:663–8.
47. **1999** | Chiari A, Tobin JR, Pan HL, Hood DD, Eisenach JC. Sex differences in cholinergic analgesia I: A supplemental nicotinic mechanism in normal females. *Anesthesiology*. 91:1447–54.
48. **1999** | Lavand'homme PM, Eisenach JC. Sex differences in cholinergic analgesia II: Differing mechanisms in two models of allodynia. *Anesthesiology*. 91:1455–61.
49. **2000** | Kathirvel, S., Sadhasivam, S., Saxena, A., et al. Effects of intrathecal ketamine added to bupivacaine for spinal anaesthesia. *Anaesthesia*, 55(9): 899-904.
50. **2000** | Honda K, Harada A, Takano Y, Kamiya H. Involvement of M3 muscarinic receptors of the spinal cord in formalin-induced nociception in mice. *Brain Res*. 859:38–44.
51. **2000** | Lauretti GR, de Oliveira R, Perez MV, Paccola CA. Postoperative analgesia by intraarticular and epidural neostigmine following knee surgery. *J Clin Anesth*. 12:444–8.
52. **2000** | Tan P-H, Kuo J-H, Liu K, et al. Efficacy of intrathecal neostigmine for the relief of postinguinal hemiorrhaphy pain. *Acta Anaesthesiol Scand*. 44:1056–60.
53. **2001** | Chen SR, Pan HL. Spinal endogenous acetylcholine contributes to the analgesic effect of systemic morphine in rats. *Anesthesiology*. 95:525–30.
54. **2001** | Genzen JR, Van Cleve W, McGehee DS. Dorsal root ganglion neurons express multiple nicotinic acetylcholine receptor subtypes. *J Neurophysiol*. 86:1773–82.
55. **2001** | Damaj MI. Influence of gender and sex hormones on nicotine acute pharmacological effects in mice. *J Pharmacol Exp Ther*. 296:132–40.
56. **2001** | Artico M, Cavallotti C. Catecholaminergic and acetylcholine esterase containing nerves of cranial and spinal dura mater. *Microsc Res Tech*. 53:212–20.
57. **2001** | Hwang JH, Hwang KS, Kim JU, et al. The interaction between intrathecal neostigmine and GABA receptor agonists in rats with nerve ligation injury. *Anesth Analg*. 93:1297–303.

58. **2002** | Duttaroy A, Gomeza J, Gan JW, et al. Evaluation of muscarinic agonist-induced analgesia in muscarinic acetylcholine receptor knockout mice. *Mol Pharmacol.* 62:1084–93.
59. **2002** | Saeki S, Kakishita M, Nakamura T, et al. The effects of intrathecally administered neostigmine on somato-sympathetic reflex potentials. *Masui.* 51:1322–30.
60. **2002** | Miranda HF, Sierralta F, Pinaridi G. Neostigmine interactions with non steroidal anti-inflammatory drugs. *Br J Pharmacol.* 135:1591–7.
61. **2003** | Chen SR, Pan HL. Spinal GABAB receptors mediate antinociceptive actions of cholinergic agents in normal and diabetic rats. *Brain Res.* 965:67–74.
62. **2003** | Kroin JS, Buvanendran A, Nagalla SK, Tuman KJ. Postoperative pain and analgesic responses are similar in male and female Sprague-Dawley rats. *Can J Anaesth.* 50:904–8.
63. **2003** | Dunbar SA, Karamian IG. Cross-tolerance between spinal neostigmine and morphine in the rat. *Br J Anaesth.* 91:427–9.
64. **2003** | Lin X, Wang Q, Huang W, Zhu L, Yang B. Study on the mechanism of antinociception of intrathecal neostigmine in the formalin test in rats. *Sichuan Da Xue Xue Bao Yi Xue Ban.* 34:698–700.
65. **2003** | Yegin A, Yilmaz M, Karsli B, Erman M. Analgesic effects of intrathecal neostigmine in perianal surgery. *Eur J Anaesthesiol.* 20:404–8.
66. **2004** | Vincler M, Eisenach JC. Plasticity of spinal nicotinic acetylcholine receptors following spinal nerve ligation. *Neurosci Res.* 48:139–45.
67. **2004** | Chen SR, Pan HL. Activation of muscarinic receptors inhibits spinal dorsal horn projection neurons: Role of GABAB receptors. *Neuroscience.* 125:141–8.
68. **2004** | Yoon MH, Choi JI, Kwak SH. Characteristic of interactions between intrathecal gabapentin and either clonidine or neostigmine in the formalin test. *Anesth Analg.* 98:1374–9.
69. **2004** | Buvanendran A, Kroin JS, Kerns JM, et al. Characterization of a new animal model for evaluation of persistent postthoracotomy pain. *Anesth Analg.* 99:1453–60.
70. **2005** | Pryn A, Young S. Intrathecal diamorphine. *Anaesthesia.* 2005 Aug;60(8):820-1.
71. **2006** | Umeda E, Aramaki Y, Mori T, Kazama T. Muscarinic receptor subtypes modulate the release of [3H]-noradrenaline in rat spinal cord slices. *Brain Res Bull.* 70:99–102.
72. **2006** | Rashid MH, Furue H, Yoshimura M, Ueda H. Tonic inhibitory role of alpha4 beta2 subtype of nicotinic acetylcholine receptors on nociceptive transmission. *Pain.* 125:125–35.
73. **2007** | Yoon SY, Kwon YB, Kim HW, et al. A spinal muscarinic M2 receptor-GABAergic disinhibition pathway that modulates peripheral inflammation. *Neuropharmacology.* 53:677–86.

SPİNAL ANESTEZİDE
NEOSTİGMİN VE DİĞER ADJUVAN İLAÇLAR

74. **2008** | Fidan, H., Ela, Y., Altınel, L., et al. Meperidine, as an effective adjuvant agent in unilateral spinal anaesthesia for knee arthroscopy. *Eur J Gen Med*, 5(1): 36-41.
75. **2008** | Schechtmann G, Song Z, Ultenius C, et al. Cholinergic mechanisms involved in the pain relieving effect of spinal cord stimulation. *Pain*. 139:136–45.
76. **2009** | Ghrab, B. E., Maatoug, M., Kallel, N., et al. Does combination of intrathecal magnesium sulfate and morphine improve postcaesarean section analgesia? *Ann Fr Anesth Reanim*, 28(5): 454-9.
77. **2011** | Bani-Hashem, N., Hassan-Nasab, B., Pour, E. A., et al. Addition of intrathecal Dexamethasone to Bupivacaine for spinal anesthesia. *Saudi J Anaesth*, 5(4): 382-6.
78. **2011** | Werdehausen R, Braun S, Hermanns H, et al. The influence of adjuvants used in regional anesthesia on lidocaine-induced neurotoxicity in vitro. *Reg Anesth Pain Med*. 36:436–43.
79. **2011** | Salamone G, Lombardi G, Gori S, et al. Cholinergic modulation of dendritic cell function. *J Neuroimmunol*. 236:47–56.
80. **2012** | Guarnieri, M., Brayton, C., DeTolla, L., et al. Safety and efficacy of buprenorphine for analgesia in laboratory mice and rats. *Lab Anim (NY)*, 41(11): 337-43.
81. **2012** | Jain, A., Jain, K., & Bhardawaj, N. Analgesic efficacy of low-dose intrathecal neostigmine in combination with fentanyl and bupivacaine. *J Anaesthesiol Clin Pharmacol*, 28: 486–490.
82. **2012** | Thomsen MS, Mikkelsen JD. The $\alpha 7$ nicotinic acetylcholine receptor ligands reduce lipopolysaccharide-induced TNF- α release from microglia. *J Neuroimmunol*. 251:65–72.
83. **2012** | De Angelis F, Bernardo A, Magnaghi V, et al. Muscarinic receptor subtypes as potential targets to modulate oligodendrocyte progenitor survival. *Dev Neurobiol*. 72:713–28.
84. **2013** | Staikou, C., & Paraskeva, A. The effects of intrathecal and systemic adjuvants on subarachnoid block. *Minerva Anesthesiol*, 80(1): 96-112.
85. **2013** | Pawlowski SA, Gaillard S, Ghorayeb I, et al. A novel population of cholinergic neurons in the macaque spinal dorsal horn for pain therapy. *J Neurosci*. 33:3727–37.
86. **2014** | Agarwal, D., Chopra, M., Mohta, M., & Sethi, A. K. Clonidine as an adjuvant to hyperbaric bupivacaine for spinal anesthesia in elderly patients. *Saudi J Anaesth*, 8(2): 209-14.
87. **2014** | Yoganarasimha, N., Raghavendra, T. R., Amitha, S., et al. A comparative study between intrathecal clonidine and neostigmine with intrathecal bupivacaine. *Indian J Anaesth*, 58: 43-7.
88. **2014** | Özmen H, Gulec S, Tanrıverdi B. Spinal Anesteziye % 0.5 lik Hipobarik Bupivacaine Eklene Neostigminin Anestezi Kalitesi, Hemodinami ve Analjezi Üzerine Etkileri. *Osmangazi Tıp Dergisi*. 2014;36(3):3.

89. **2014** | Rabiee SM, Alijanpour E, Jabbari A, Rostami S. Benefits of using intrathecal buprenorphine. *Caspian J Intern Med.* 2014 Summer;5(3):143-7.
90. **2015** | Lauretti, G. R. The evolution of spinal/epidural neostigmine in clinical application: Thoughts after two decades. *Saudi J Anaesth*, 9(1): 71-81.
91. **2015** | Abdolmohammadi, S., Héту, P. O., Néron, A., & Blaise, G. Efficacy of an intrathecal multidrug infusion for pain control: A report of three cases. *Pain Res Manag*, 20(3): 118-22.
92. **2015** | Joshi-Khadke, S., Khadke, V. V., Patel, S. J., et al. Efficacy of spinal additives neostigmine and magnesium sulfate on subarachnoid block. *Anesth Essays Res*, 9: 63-71.
93. **2016** | Feng, L. S., Hong, G., Yan, Z., et al. Intrathecal Sufentanil Does Not Reduce Shivering During Neuraxial Anesthesia: A Meta-Analysis. *Med Sci Monit*, 22: 258-66.
94. **2016** | Yallapragada, S. V., Vemuri, N. N., & Shaik, M. S. Effect of adding clonidine to intrathecal bupivacaine on the quality of subarachnoid block. *Anesth Essays Res*, 10(3): 451-454.
95. **2017** | Wick EC, Grant MC, Wu CL. Postoperative Multimodal Analgesia Pain Management With Nonopioid Analgesics and Techniques: A Review. *JAMA Surg.* 2017 Jul 1;152(7):691-697.
96. **2018** | Katz, D., Hamburger, J., Gutman, D., et al. The Effect of Adding Subarachnoid Epinephrine to Hyperbaric Bupivacaine and Morphine. *Anesth Analg*, 127(1): 171-178.
97. **2019** | Kayhan, Z. *Klinik Anestezi 4. Basım* .2019
98. **2019** | Pergolizzi, J. V. Jr., & Raffa, R. B. Safety And Efficacy Of The Unique Opioid Buprenorphine For The Treatment Of Chronic Pain. *J Pain Res*, 12: 3299-3317.
99. **2021** | Hadzic's. *Peripheral Nerve Blocks And Anatomy For Ultrasound-Guided Regional Anesthesia*, 3rd Edition. 2021.
100. **2022** | Kanawati, S., Barada, M. A., Naja, Z., et al. Comparison of clinical effects of meperidine and sufentanil added to 0.5% hyperbaric bupivacaine. *J Anesth*, 36, 201-209.
101. **2022** | Azemati, S., Zarghami, A., Jouybar, R., & Naderi-Boldaji, V. Analgesic Characteristics of Bupivacaine with Dexmedetomidine or Meperidine. *Pain Res Manag*, 2022: 5111214.
102. **2022** | Kalagac Fabris, L. Pro and contra on adjuvants to neuroaxial anesthesia and peripheral nerve blocks. *Acta clin croat*, 61(suppl 2): 57-66
103. **2023** | Rambhia, M. T., DeLeon, A. M., Bauchat, J., et al. Effects of Adding Intrathecal Epinephrine to Spinal Anesthesia on Cesarean Delivery. *Cureus*, 15(9): e45147.

SPİNAL ANESTEZİDE
NEOSTİGMİN VE DİĞER ADJUVAN İLAÇLAR

104. **2023** | Rezvani Habibabadi, M., Safaee, M., & Rezaei, A. The Assessment of Marcaine Versus Meperidine for Spinal Anesthesia in Anorectal Surgery. *Anesth Pain Med*, 13(5): e136871.
105. **2024** | Kummer, I., Lüthi, A., Klingler, G., et al. Adjuvant Analgesics in Acute Pain – Evaluation of Efficacy. *Curr Pain Headache Rep*, 28(9): 843-852.
106. **2024** | Pascarella, G., et al. Intrathecal dexamethasone as an adjuvant for spinal anesthesia: a systematic review. *Minerva Anestesiol*, 90(7-8): 662-671.
107. **2024** | Cansian, J. M., D'Angelo Giampaoli, A. Z., et al. The efficacy of buprenorphine compared with dexmedetomidine: a meta-analysis. *Braz J Anesthesiol*, 74(6): 844557.
108. **2025** | Gropper, M. A. (Ed.). *Miller's Anesthesia, 2-Volume Set, 10th Edition*.
109. **2025** | Gurnal, P., Fecek, C., Hendrix, J. M., & Goldstein, S. Spinal Opioids in Anesthetic Practice. (StatPearls).
110. **2026** | Landau, R., & Sultan, P. Neuraxial anesthesia and pain management for cesarean delivery. *Am J Obstet Gynecol*, 233(6S): S135-S152.
111. **2026** | American Society of Anesthesiologists. Statement on the Use of Adjuvant Medications and Management of Intraoperative Pain During Cesarean Delivery.
112. **2026** | Ollosu M, Tripodi VF, Bonu A, Cittadini G, Musu M, Ippolito M, Cortegiani A, Finco G, Sardo S. Efficacy and safety of intrathecal adjuvants for perioperative management of cesarean delivery: a systematic review and network meta-analysis of randomized controlled trials. *Reg Anesth Pain Med*. 2026 Apr 2;51(4):385-403. doi: 10.1136/rapm-2024-106345. PMID: 40147822.