



BÖLÜM 22

LAPAROSKOPİDE GÜVENLİ ABDOMİNAL GİRİŞ TEKNİKLERİ

Eralp BULUTLAR ¹

1. GİRİŞ

Laparoskopik ameliyatlarda postoperatif ağrı azalma, günlük hayata çok daha hızlı dönüş, laparotomiye kıyasla yara yeri enfeksiyonu ve insizyonel herni gibi komplikasyonlarda azalma sağlayarak adeta bir devrim yaratmıştır.¹ Ancak laparoskopinin de özellikle abdominal giriş sırasında karşılaşılabilen, her ne kadar nadir görülse de ciddi morbidite ve mortalite riski taşıyan bağırsak ve büyük damar yaralanması gibi komplikasyonları vardır.^{2 3 4 5 6}

Bu bölümde laparoskopik giriş teknikleri, portların yerleşim yerleri ve tek port (single port) giriş tekniklerinden bahsedilecektir.

2. KARIN DUVARI ANATOMİSİ

Laparoskopik aletlerin güvenli yerleştirilmesi için karın duvarı anatomisinin bilinmesi önemlidir. Bu aletler sırasıyla cilt, cilt altı dokusu, farklı myofasyal tabakalar, preperitoneal yağ dokusu ve parietal peritonu geçerler.

2.1. Rektus Kılıfı (Vagina Musculi Rekti Abdominis)

İki farklı organizasyon gösterir:

1. Kılıfın, umblicus ile symphysis pubica arası orta noktanın (linea arcuata) yukarisından processus xiphoideus'a kadarki organizasyonu:

Tablo-1: Karın Ön Duvarının Anatomisi (Üstten Alta)

DERİ	
YÜZEYEL FASYA	Karın duvarını örten fasya (fascia superficialis). İki yapraklıdır.
Camper Fasyası	Dış yaprak. Yağ dokusundan zengin.
Scarpa Fasyası	İç yaprak. Klitorisi karın duvarına bağlayan lig.fundiforme clitoridisi yapar.
DERİN FASYA	Karın duvarını örten derin fasya (fascia profunda). Lig. suspensorium clitorisi yapar.

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EVE GÖTÜRÜLECEK MESAJLAR

Laparoskopik ameliyatlarda postoperatif ağrıda azalma, günlük hayata hızlı dönüş, laparotomiye kıyasla yara yeri enfeksiyonu ve insizyonel herni gibi komplikasyonlarda azalma sağlayarak adeta bir devrim yaratmıştır.¹ Ancak laparoskopinin de özellikle abdominal giriş sırasında karşılaşılabilen, her ne kadar nadir görülsede ciddi morbidite ve mortalite riski taşıyan bağırsak ve büyük damar yaralanması gibi komplikasyonları vardır.

Her cerrahın kendine özgü giriş teknikleri olsa da mutlaka her giriş tekniğini bilmeli ve gerektiğinde kullanabilmelidir.

Laparoskopik cerrahilerin komplikasyonlarının yarısına yakınının abdominal giriş esnasında olduğu bilinmeli ve bu komplikasyonların neler olabileceği, olası komplikasyonlar esnasındaki müdahalelerin nasıl yapılabileceği ve hangi aşamalarında yardım çağırabileceği bilinmelidir.

KAYNAKLAR

1. Shabanzadeh, D. M.; Sørensen, L. T. Laparoscopic Surgery Compared with Open Surgery Decreases Surgical Site Infection in Obese Patients: A Systematic Review and Meta-Analysis. *Ann Surg* **2012**, *256* (6), 934–945. <https://doi.org/10.1097/SLA.0b013e318269a46b>.
2. Ahmad, G.; Baker, J.; Finnerty, J.; Phillips, K.; Watson, A. Laparoscopic Entry Techniques. *Cochrane Database of Systematic Reviews* **2019**, No. 1. <https://doi.org/10.1002/14651858.CD006583.pub5>.
3. Hasson, H. M. Open Laparoscopy as a Method of Access in Laparoscopic Surgery. *Gynaecological Endoscopy* **1999**, *8* (6), 353–362. <https://doi.org/10.1046/j.1365-2508.1999.00316.x>.
4. Molloy, D.; Kaloo, P. D.; Cooper, M.; Nguyen, T. V. Laparoscopic Entry: A Literature Review and Analysis of Techniques and Complications of Primary Port Entry. *Aust N Z J Obstet Gynaecol* **2002**, *42* (3), 246–254. <https://doi.org/10.1111/j.0004-8666.2002.00246.x>.
5. Jansen, F. W.; Kolkman, W.; Bakkum, E. A.; de Kroon, C. D.; Trimbos-Kemper, T. C. M.; Trimbos, J. B. Complications of Laparoscopy: An Inquiry about Closed-versus Open-Entry Technique. *American Journal of Obstetrics and Gynecology* **2004**, *190* (3), 634–638. <https://doi.org/10.1016/j.ajog.2003.09.035>.
6. Sharp, H. T.; Dodson, M. K.; Draper, M. L.; Watts, D. A.; Doucette, R. C.; Hurd, W. W. Complications Associated with Optical-Access Laparoscopic Trocars. *Obstet Gynecol* **2002**, *99* (4), 553–555. [https://doi.org/10.1016/s0029-7844\(02\)01656-3](https://doi.org/10.1016/s0029-7844(02)01656-3).
7. Tulikangas, P. K.; Robinson, D. S.; Falcone, T. Left Upper Quadrant Cannula Insertion. *Fertil Steril* **2003**, *79* (2), 411–412. [https://doi.org/10.1016/s0015-0282\(02\)04668-x](https://doi.org/10.1016/s0015-0282(02)04668-x).
8. Palmer, R. Safety in Laparoscopy. *J Reprod Med* **1974**, *13* (1), 1–5.
9. Rahn, D. D.; Phelan, J. N.; Roshanravan, S. M.; White, A. B.; Corton, M. M. Anterior Abdominal Wall Nerve and Vessel Anatomy: Clinical Implications for Gynecologic Surgery. *Am J Obstet Gynecol* **2010**, *202* (3), 234.e1-5. <https://doi.org/10.1016/j.ajog.2009.10.878>.
10. Hasson, H. M. A Modified Instrument and Method for Laparoscopy. *Am J Obstet Gynecol* **1971**, *110* (6), 886–887. [https://doi.org/10.1016/0002-9378\(71\)90593-x](https://doi.org/10.1016/0002-9378(71)90593-x).
11. Hasson, H. M.; Rotman, C.; Rana, N.; Kumari, N. A. Open Laparoscopy: 29-Year Experience. *Obstet Gynecol* **2000**, *96* (5 Pt 1), 763–766. [https://doi.org/10.1016/s0029-7844\(00\)01026-7](https://doi.org/10.1016/s0029-7844(00)01026-7).
12. Johnson, W. H.; Fecher, A. M.; McMahon, R. L.; Grant, J. P.; Pryor, A. D. VersaStep Trocar Hernia Rate in Unclosed Fascial Defects in Bariatric Patients. *Surg Endosc* **2006**, *20* (10), 1584–1586. <https://doi.org/10.1007/s00464-005-0747-8>.
13. Bonjer, H. J.; Hazebroek, E. J.; Kazemier, G.; Giuffrida, M. C.; Meijer, W. S.; Lange, J. F. Open versus Closed Establishment of Pneumoperitoneum in Laparoscopic Surgery. *Br J Surg* **1997**, *84* (5), 599–602.
14. Azevedo, J. L. M. C.; Azevedo, O. C.; Miyahira, S. A.; Miguel, G. P. S.; Becker, O. M.; Hypólito, O. H. M.; Machado, A. C. C. G.; Cardia, W.; Yamaguchi, G. A.; Godinho, L.; Freire, D.; Almeida, C. E. S.; Moreira, C. H.; Freire, D. F. Injuries Caused by Veress Needle Insertion for Creation of Pneumoperitoneum: A Systematic Literature Review. *Surg Endosc* **2009**, *23* (7), 1428–1432. <https://doi.org/10.1007/s00464-009-0383-9>.
15. Teoh, B.; Sen, R.; Abbott, J. An Evaluation of Four Tests Used to Ascertain Veres Needle Placement at Closed Laparoscopy. *J Minim Invasive Gynecol* **2005**, *12* (2), 153–158. <https://doi.org/10.1016/j.jmig.2005.01.011>.
16. Chapron, C. M.; Pierre, F.; Lacroix, S.; Querleu, D.; Lansac, J.; Dubuisson, J.-B. Major Vascular Injuries during Gynecologic Laparoscopy. *Journal of the American College of Surgeons* **1997**, *185* (5), 461–465. [https://doi.org/10.1016/S1072-7515\(01\)00958-9](https://doi.org/10.1016/S1072-7515(01)00958-9).
17. Shirk, G. J.; Johns, A.; Redwine, D. B. Complications of Laparoscopic Surgery: How to Avoid Them and How to Repair Them. *J Minim Invasive Gynecol* **2006**, *13* (4), 352–359; quiz 360–361. <https://doi.org/10.1016/j.jmig.2006.03.020>.
18. Reich, H.; Ribeiro, S. C.; Rasmussen, C.; Rosenberg, J.; Vidali, A. High-Pressure Trocar Insertion Technique. *JSLS* **1999**, *3* (1), 45–48.
19. Abu-Rafea, B.; Vilos, G. A.; Vilos, A. G.; Ahmad, R.;

- Hollett-Caines, J.; Al-Omran, M. High-Pressure Laparoscopic Entry Does Not Adversely Affect Cardiopulmonary Function in Healthy Women. *J Minim Invasive Gynecol* **2005**, *12* (6), 475–479. <https://doi.org/10.1016/j.jmig.2005.07.393>.
20. Vilos, G. A. The ABCs of a Safer Laparoscopic Entry. *J Minim Invasive Gynecol* **2006**, *13* (3), 249–251. <https://doi.org/10.1016/j.jmig.2005.12.005>.
 21. String, A.; Berber, E.; Foroutani, A.; Macho, J. R.; Pearl, J. M.; Siperstein, A. E. Use of the Optical Access Trocar for Safe and Rapid Entry in Various Laparoscopic Procedures. *Surg Endosc* **2001**, *15* (6), 570–573. <https://doi.org/10.1007/s004640080056>.
 22. Pelosi, M. A.; Pelosi, M. A. Laparoscopic Hysterectomy with Bilateral Salpingo-Oophorectomy Using a Single Umbilical Puncture. *N J Med* **1991**, *88* (10), 721–726.
 23. Cr, W. A Rapid Inexpensive and Effective Method of Surgical Sterilization by Laparoscopy. *undefined* **1969**.
 24. Gill, I. S.; Advincola, A. P.; Aron, M.; Cadeddu, J.; Canes, D.; Curcillo, P. G.; Desai, M. M.; Evanko, J. C.; Falcone, T.; Fazio, V.; Gettman, M.; Gumbs, A. A.; Haber, G.-P.; Kaouk, J. H.; Kim, F.; King, S. A.; Ponsky, J.; Remzi, F.; Rivas, H.; Rosemurgy, A.; Ross, S.; Schauer, P.; Sotelo, R.; Speranza, J.; Sweeney, J.; Teixeira, J. Consensus Statement of the Consortium for Laparoendoscopic Single-Site Surgery. *Surg Endosc* **2010**, *24* (4), 762–768. <https://doi.org/10.1007/s00464-009-0688-8>.
 25. Hernandez, J.; Ross, S.; Morton, C.; McFarlin, K.; Dahal, S.; Golkar, F.; Albrink, M.; Rosemurgy, A. The Learning Curve of Laparoendoscopic Single-Site (LESS) Cholecystectomy: Definable, Short, and Safe. *J Am Coll Surg* **2010**, *211* (5), 652–657. <https://doi.org/10.1016/j.jamcollsurg.2010.07.008>.
 26. Rawlings, A.; Hodgett, S. E.; Matthews, B. D.; Strasberg, S. M.; Quasebarth, M.; Brunt, L. M. Single-Incision Laparoscopic Cholecystectomy: Initial Experience with Critical View of Safety Dissection and Routine Intraoperative Cholangiography. *J Am Coll Surg* **2010**, *211* (1), 1–7. <https://doi.org/10.1016/j.jamcollsurg.2010.02.038>.
 27. Song, T.; Kim, M.-L.; Jung, Y. W.; Yoon, B. S.; Joo, W. D.; Seong, S. J. Laparoendoscopic Single-Site versus Conventional Laparoscopic Gynecologic Surgery: A Metaanalysis of Randomized Controlled Trials. *Am J Obstet Gynecol* **2013**, *209* (4), 317.e1-9. <https://doi.org/10.1016/j.ajog.2013.07.004>.
 28. Stamatakis, L.; Mercado, M. A.; Choi, J. M.; Sanchez, E. J.; Gaber, A. O.; Knight, R. J.; Mayer, W. A.; Link, R. E. Comparison of Laparoendoscopic Single Site (LESS) and Conventional Laparoscopic Donor Nephrectomy at a Single Institution. *BJU Int* **2013**, *112* (2), 198–206. <https://doi.org/10.1111/j.1464-410X.2012.11763.x>.
 29. Antoniou, S. A.; Koch, O. O.; Antoniou, G. A.; Lasithiotakis, K.; Chalkiadakis, G. E.; Pointner, R.; Granderath, F. A. Meta-Analysis of Randomized Trials on Single-Incision Laparoscopic versus Conventional Laparoscopic Appendectomy. *Am J Surg* **2014**, *207* (4), 613–622. <https://doi.org/10.1016/j.amjsurg.2013.07.045>.
 30. Fader, A. N.; Cohen, S.; Escobar, P. F.; Gunderson, C. Laparoendoscopic Single-Site Surgery in Gynecology. *Curr Opin Obstet Gynecol* **2010**, *22* (4), 331–338. <https://doi.org/10.1097/GCO.0b013e-32833be979>.
 31. Pryor, A. D.; Tushar, J. R.; DiBernardo, L. R. Single-Port Cholecystectomy with the TransEnterix SPIDER: Simple and Safe. *Surg Endosc* **2010**, *24* (4), 917–923. <https://doi.org/10.1007/s00464-009-0695-9>.
 32. Romanelli, J. R.; Earle, D. B. Single-Port Laparoscopic Surgery: An Overview. *Surg Endosc* **2009**, *23* (7), 1419–1427. <https://doi.org/10.1007/s00464-009-0463-x>.
 33. Canes, D.; Desai, M. M.; Aron, M.; Haber, G.-P.; Goel, R. K.; Stein, R. J.; Kaouk, J. H.; Gill, I. S. Transumbilical Single-Port Surgery: Evolution and Current Status. *Eur Urol* **2008**, *54* (5), 1020–1029. <https://doi.org/10.1016/j.eururo.2008.07.009>.
 34. Hung, A. J.; Abreu, A. L. D. C.; Shoji, S.; Goh, A. C.; Berger, A. K.; Desai, M. M.; Aron, M.; Gill, I. S.; Ukimura, O. Robotic Transrectal Ultrasonography during Robot-Assisted Radical Prostatectomy. *Eur Urol* **2012**, *62* (2), 341–348. <https://doi.org/10.1016/j.eururo.2012.04.032>.
 35. Haber, G.-P.; White, M. A.; Autorino, R.; Escobar, P. F.; Kroh, M. D.; Chalikonda, S.; Khanna, R.; Forest, S.; Yang, B.; Altunrende, F.; Stein, R. J.; Kaouk, J. H. Novel Robotic Da Vinci Instruments for Laparoendoscopic Single-Site Surgery. *Urology* **2010**, *76* (6), 1279–1282. <https://doi.org/10.1016/j.urology.2010.06.070>.
 36. Morgan, H. R. Laparoscopy: Induction of Pneumoperitoneum via Transfundal Puncture. *Obstet Gynecol* **1979**, *54* (2), 260–261.
 37. Neely, M. R.; McWilliams, R.; Makhlof, H. A. Laparoscopy: Routine Pneumoperitoneum via the Posterior Fornix. *Obstet Gynecol* **1975**, *45* (4), 459–460.
 38. Cheng, Y.; Lu, J.; Xiong, X.; Wu, S.; Lin, Y.; Wu, T.; Cheng, N. Gases for Establishing Pneumoperitoneum during Laparoscopic Abdominal Surgery. *Cochrane Database Syst Rev* **2013**, No. 1, CD009569. <https://doi.org/10.1002/14651858.CD009569.pub2>.
 39. Birch, D. W.; Dang, J. T.; Switzer, N. J.; Manouchehri, N.; Shi, X.; Hadi, G.; Karmali, S. Heated Insufflation with or without Humidification for Laparoscopic Abdominal Surgery. *Cochrane Database Syst Rev* **2016**, *10*, CD007821. <https://doi.org/10.1002/14651858.CD007821.pub3>.
 40. Gurusamy, K. S.; Vaughan, J.; Davidson, B. R. Low Pressure versus Standard Pressure Pneumoperitoneum in Laparoscopic Cholecystectomy. *Cochrane Database Syst Rev* **2014**, No. 3, CD006930. <https://doi.org/10.1002/14651858.CD006930.pub3>.
 41. Neudecker, J.; Sauerland, S.; Neugebauer, E.; Bergamaschi, R.; Bonjer, H. J.; Cuschieri, A.; Fuchs, K.-H.;

- Jacobi, C.; Jansen, F. W.; Koivusalo, A.-M.; Lacy, A.; McMahon, M. J.; Millat, B.; Schwenk, W. The European Association for Endoscopic Surgery Clinical Practice Guideline on the Pneumoperitoneum for Laparoscopic Surgery. *Surg Endosc* **2002**, *16* (7), 1121–1143. <https://doi.org/10.1007/s00464-001-9166-7>.
42. Ost, M. C.; Tan, B. J.; Lee, B. R. Urological Laparoscopy: Basic Physiological Considerations and Immunological Consequences. *J Urol* **2005**, *174* (4 Pt 1), 1183–1188. <https://doi.org/10.1097/01.ju.0000173102.16381.08>.
43. Berguer, R. A Technique for Full Thickness Closure of Laparoscopic Trocar Sites. *J Am Coll Surg* **1995**, *180* (2), 227–228.
44. Carter, J. E. A New Technique of Fascial Closure for Laparoscopic Incisions. *J Laparoendosc Surg* **1994**, *4* (2), 143–148. <https://doi.org/10.1089/lps.1994.4.143>.
45. Sigman, H. H.; Fried, G. M.; Garzon, J.; Hinchey, E. J.; Wexler, M. J.; Meakins, J. L.; Barkun, J. S. Risks of Blind versus Open Approach to Celiotomy for Laparoscopic Surgery. *Surg Laparosc Endosc* **1993**, *3* (4), 296–299.
46. Schäfer, M.; Lauper, M.; Krähenbühl, L. Trocar and Veress Needle Injuries during Laparoscopy. *Surg Endosc* **2001**, *15* (3), 275–280. <https://doi.org/10.1007/s004640000337>.
47. Merlin, T. L.; Hiller, J. E.; Maddern, G. J.; Jamieson, G. G.; Brown, A. R.; Kolbe, A. Systematic Review of the Safety and Effectiveness of Methods Used to Establish Pneumoperitoneum in Laparoscopic Surgery. *Br J Surg* **2003**, *90* (6), 668–679. <https://doi.org/10.1002/bjs.4203>.
48. Zaraca, F.; Catarci, M.; Gossetti, F.; Mulieri, G.; Carboni, M. Routine Use of Open Laparoscopy: 1,006 Consecutive Cases. *J Laparoendosc Adv Surg Tech A* **1999**, *9* (1), 75–80. <https://doi.org/10.1089/lap.1999.9.75>.
49. Jarrett, J. C. Laparoscopy: Direct Trocar Insertion without Pneumoperitoneum. *Obstet Gynecol* **1990**, *75* (4), 725–727.
50. Copeland, C.; Wing, R.; Hulka, J. F. Direct Trocar Insertion at Laparoscopy: An Evaluation. *Obstet Gynecol* **1983**, *62* (5), 655–659.
51. Poindexter, A. N.; Ritter, M.; Fahim, A.; Humphrey, H. Trocar Introduction Performed during Laparoscopy of the Obese Patient. *Surg Gynecol Obstet* **1987**, *165* (1), 57–59.
52. Borgatta, L.; Gruss, L.; Barad, D.; Kaali, S. G. Direct Trocar Insertion vs. Verres Needle Use for Laparoscopic Sterilization. *J Reprod Med* **1990**, *35* (9), 891–894.
53. Byron, J. W.; Markenson, G.; Miyazawa, K. A Randomized Comparison of Verres Needle and Direct Trocar Insertion for Laparoscopy. *Surg Gynecol Obstet* **1993**, *177* (3), 259–262.
54. Kaali, S. G.; Bartfai, G. Direct Insertion of the Laparoscopic Trocar after an Earlier Laparotomy. *J Reprod Med* **1988**, *33* (9), 739–740.
55. Fuller, J.; Ashar, B. S.; Carey-Corrado, J. Trocar-Associated Injuries and Fatalities: An Analysis of 1399 Reports to the FDA. *Journal of Minimally Invasive Gynecology* **2005**, *12* (4), 302–307. <https://doi.org/10.1016/j.jmig.2005.05.008>.
56. Larobina, M.; Nottle, P. Complete Evidence Regarding Major Vascular Injuries during Laparoscopic Access. *Surg Laparosc Endosc Percutan Tech* **2005**, *15* (3), 119–123. <https://doi.org/10.1097/01.sle.0000166967.49274.ca>.
57. Jansen, F. W.; Kapiteyn, K.; Trimbos-Kemper, T.; Hermans, J.; Trimbos, J. B. Complications of Laparoscopy: A Prospective Multicentre Observational Study. *Br J Obstet Gynaecol* **1997**, *104* (5), 595–600. <https://doi.org/10.1111/j.1471-0528.1997.tb11539.x>.
58. Minaker, S.; MacPherson, C.; Hayashi, A. Can General Surgeons Evaluate Visceral Slide with Transabdominal Ultrasound to Predict Safe Sites for Primary Laparoscopic Port Placement? A Prospective Study of Sonographically Naïve Operators at a Tertiary Center. *Am J Surg* **2015**, *209* (5), 804–808; discussion 808-809. <https://doi.org/10.1016/j.amjsurg.2014.12.020>.
59. Lamvu, G.; Zolnoun, D.; Boggess, J.; Steege, J. F. Obesity: Physiologic Changes and Challenges during Laparoscopy. *Am J Obstet Gynecol* **2004**, *191* (2), 669–674. <https://doi.org/10.1016/j.ajog.2004.05.077>.
60. Härkki-Sirén, P.; Kurki, T. A Nationwide Analysis of Laparoscopic Complications. *Obstet Gynecol* **1997**, *89* (1), 108–112. [https://doi.org/10.1016/s0029-7844\(96\)00390-0](https://doi.org/10.1016/s0029-7844(96)00390-0).
61. Curet, M. J. Special Problems in Laparoscopic Surgery. Previous Abdominal Surgery, Obesity, and Pregnancy. *Surg Clin North Am* **2000**, *80* (4), 1093–1110. [https://doi.org/10.1016/s0039-6109\(05\)70215-2](https://doi.org/10.1016/s0039-6109(05)70215-2).
62. Champagne, B. J.; Papaconstantinou, H. T.; Parmar, S. S.; Nagle, D. A.; Young-Fadok, T. M.; Lee, E. C.; Delaney, C. P. Single-Incision versus Standard Multiport Laparoscopic Colectomy: A Multicenter, Case-Controlled Comparison. *Ann Surg* **2012**, *255* (1), 66–69. <https://doi.org/10.1097/SLA.0b013e3182378442>.
63. St Peter, S. D.; Adibe, O. O.; Juang, D.; Sharp, S. W.; Garey, C. L.; Laituri, C. A.; Murphy, J. P.; Andrews, W. S.; Sharp, R. J.; Snyder, C. L.; Holcomb, G. W.; Ostlie, D. J. Single Incision versus Standard 3-Port Laparoscopic Appendectomy: A Prospective Randomized Trial. *Ann Surg* **2011**, *254* (4), 586–590. <https://doi.org/10.1097/SLA.0b013e31823003b5>.
64. Lee, P.-C.; Lo, C.; Lai, P.-S.; Chang, J.-J.; Huang, S.-J.; Lin, M.-T.; Lee, P.-H. Randomized Clinical Trial of Single-Incision Laparoscopic Cholecystectomy versus Minilaparoscopic Cholecystectomy. *Br J Surg* **2010**, *97* (7), 1007–1012. <https://doi.org/10.1002/bjs.7087>.
65. Tugcu, V.; Ilbey, Y. O.; Mutlu, B.; Tasci, A. I. Laparoendoscopic Single-Site Surgery versus Standard Laparoscopic Simple Nephrectomy: A Prospective Randomized Study. *J Endourol* **2010**, *24* (8), 1315–

1320. <https://doi.org/10.1089/end.2010.0048>.
66. Zapf, M.; Yetasook, A.; Leung, D.; Salabat, R.; Denham, W.; Barrera, E.; Butt, Z.; Carbray, J.; Du, H.; Wang, C. E.; Ujiki, M. Single-Incision Results in Similar Pain and Quality of Life Scores Compared with Multi-Incision Laparoscopic Cholecystectomy: A Blinded Prospective Randomized Trial of 100 Patients. *Surgery* **2013**, *154* (4), 662–670; discussion 670–671. <https://doi.org/10.1016/j.surg.2013.04.043>.
 67. Tsimoyiannis, E. C.; Tsimogiannis, K. E.; Pappas-Gogos, G.; Farantos, C.; Benetatos, N.; Mavridou, P.; Manataki, A. Different Pain Scores in Single Transumbilical Incision Laparoscopic Cholecystectomy versus Classic Laparoscopic Cholecystectomy: A Randomized Controlled Trial. *Surg Endosc* **2010**, *24* (8), 1842–1848. <https://doi.org/10.1007/s00464-010-0887-3>.
 68. Lai, E. C. H.; Yang, G. P. C.; Tang, C. N.; Yih, P. C. L.; Chan, O. C. Y.; Li, M. K. W. Prospective Randomized Comparative Study of Single Incision Laparoscopic Cholecystectomy versus Conventional Four-Port Laparoscopic Cholecystectomy. *Am J Surg* **2011**, *202* (3), 254–258. <https://doi.org/10.1016/j.amjsurg.2010.12.009>.
 69. Marks, J.; Tacchino, R.; Roberts, K.; Onders, R.; DeNoto, G.; Paraskeva, P.; Rivas, H.; Soper, N.; Rosemurgy, A.; Shah, S. Prospective Randomized Controlled Trial of Traditional Laparoscopic Cholecystectomy versus Single-Incision Laparoscopic Cholecystectomy: Report of Preliminary Data. *Am J Surg* **2011**, *201* (3), 369–372; discussion 372–373. <https://doi.org/10.1016/j.amjsurg.2010.09.012>.
 70. Asakuma, M.; Hayashi, M.; Komeda, K.; Shimizu, T.; Hirokawa, F.; Miyamoto, Y.; Okuda, J.; Tanigawa, N. Impact of Single-Port Cholecystectomy on Postoperative Pain. *Br J Surg* **2011**, *98* (7), 991–995. <https://doi.org/10.1002/bjs.7486>.
 71. Marks, J. M.; Phillips, M. S.; Tacchino, R.; Roberts, K.; Onders, R.; DeNoto, G.; Gecelter, G.; Rubach, E.; Rivas, H.; Islam, A.; Soper, N.; Paraskeva, P.; Rosemurgy, A.; Ross, S.; Shah, S. Single-Incision Laparoscopic Cholecystectomy Is Associated with Improved Cosmesis Scoring at the Cost of Significantly Higher Hernia Rates: 1-Year Results of a Prospective Randomized, Multicenter, Single-Blinded Trial of Traditional Multiport Laparoscopic Cholecystectomy vs Single-Incision Laparoscopic Cholecystectomy. *J Am Coll Surg* **2013**, *216* (6), 1037–1047; discussion 1047–1048. <https://doi.org/10.1016/j.jamcollsurg.2013.02.024>.
 72. Hua, J.; Gong, J.; Yao, L.; Zhou, B.; Song, Z. Low-Pressure versus Standard-Pressure Pneumoperitoneum for Laparoscopic Cholecystectomy: A Systematic Review and Meta-Analysis. *Am J Surg* **2014**, *208* (1), 143–150. <https://doi.org/10.1016/j.amjsurg.2013.09.027>.
 73. Donatsky, A. M.; Bjerrum, F.; Gögenur, I. Surgical Techniques to Minimize Shoulder Pain after Laparoscopic Cholecystectomy. A Systematic Review. *Surg Endosc* **2013**, *27* (7), 2275–2282. <https://doi.org/10.1007/s00464-012-2759-5>.
 74. Phelps, P.; Cakmakkaya, O. S.; Apfel, C. C.; Radke, O. C. A Simple Clinical Maneuver to Reduce Laparoscopy-Induced Shoulder Pain: A Randomized Controlled Trial. *Obstet Gynecol* **2008**, *111* (5), 1155–1160. <https://doi.org/10.1097/AOG.0b013e31816e34b4>.
 75. Palmes, D.; Röttgermann, S.; Classen, C.; Haier, J.; Horstmann, R. Randomized Clinical Trial of the Influence of Intraperitoneal Local Anaesthesia on Pain after Laparoscopic Surgery. *Br J Surg* **2007**, *94* (7), 824–832. <https://doi.org/10.1002/bjs.5810>.
 76. Cunniffe, M. G.; McAnena, O. J.; Dar, M. A.; Calleary, J.; Flynn, N. A Prospective Randomized Trial of Intraoperative Bupivacaine Irrigation for Management of Shoulder-Tip Pain Following Laparoscopy. *Am J Surg* **1998**, *176* (3), 258–261. [https://doi.org/10.1016/s0002-9610\(98\)00150-0](https://doi.org/10.1016/s0002-9610(98)00150-0).
 77. Tsai, H.-W.; Chen, Y.-J.; Ho, C.-M.; Hseu, S.-S.; Chao, K.-C.; Tsai, S.-K.; Wang, P.-H. Maneuvers to Decrease Laparoscopy-Induced Shoulder and Upper Abdominal Pain: A Randomized Controlled Study. *Arch Surg* **2011**, *146* (12), 1360–1366. <https://doi.org/10.1001/archsurg.2011.597>.
 78. Sharami, S. H.; Sharami, M. B.; Abdollahzadeh, M.; Keyvan, A. Randomised Clinical Trial of the Influence of Pulmonary Recruitment Manoeuvre on Reducing Shoulder Pain after Laparoscopy. *J Obstet Gynaecol* **2010**, *30* (5), 505–510. <https://doi.org/10.3109/01443611003802313>.
 79. Tsimoyiannis, E. C.; Siakas, P.; Tassis, A.; Lekkas, E. T.; Tzourou, H.; Kambili, M. Intraperitoneal Normal Saline Infusion for Postoperative Pain after Laparoscopic Cholecystectomy. *World J Surg* **1998**, *22* (8), 824–828. <https://doi.org/10.1007/s002689900477>.
 80. Tsimoyiannis, E. C.; Glantzounis, G.; Lekkas, E. T.; Siakas, P.; Jabarin, M.; Tzourou, H. Intraperitoneal Normal Saline and Bupivacaine Infusion for Reduction of Postoperative Pain after Laparoscopic Cholecystectomy. *Surg Laparosc Endosc* **1998**, *8* (6), 416–420.
 81. Barczycki, M.; Herman, R. M. Low-Pressure Pneumoperitoneum Combined with Intraperitoneal Saline Washout for Reduction of Pain after Laparoscopic Cholecystectomy: A Prospective Randomized Study. *Surg Endosc* **2004**, *18* (9), 1368–1373. <https://doi.org/10.1007/s00464-003-9299-y>.
 82. Esmat, M. E.; Elsebae, M. M. A.; Nasr, M. M. A.; El-sebaie, S. B. Combined Low Pressure Pneumoperitoneum and Intraperitoneal Infusion of Normal Saline for Reducing Shoulder Tip Pain Following Laparoscopic Cholecystectomy. *World J Surg* **2006**, *30* (11), 1969–1973. <https://doi.org/10.1007/s00268-005-0752-z>.