Bölüm
15

SIVI TEDAVİSİ VE BESLENME

Ayhan ŞAHİN[1]

GİRİŞ

Yıllardır yoğun bir şekilde preklinik ve klinik araştırmalara rağmen çeşitli sıvı tedavi startejilerinin yoğun bakımda volüm genişletici etkileri hala belirsizliklerle doludur (1). Yeni vasküler permeabilite kavramları, sıvı tedavilerine ve etkinliklerinin arttırılması konusunda yaklaşımımızı değiştirmiştir. Yeni kavramların merkezinde, vasküler endotel lümeninde bulunan endotelial glikokaliks yer almaktadır. Endotelial glikokaliks bilgisi, klasik Starling yasasını revize edilmesine ve sıvının endotelial bariyerden akışını daha iyi açıklamamızı sağlamıştır (2).

Bu yeni endotelial geçirgenlik modeli, çalışmalarda öngörülen (1:3-1-5) ve gözlemlenen (1-1.3-1:1.4) kolloid-kristaloid oranının neden benzer hemodinamik sonuca ulaştığını açıklamaktadır. (1). Ayrıca, iso-onkotik kolloid infüzyonunun neden mevcut intertisyel ödemi geri çevirmeyeceğini (3), ve bazı durumlarda yoğun bakım hastasında neden daha az volüm ekspansiyonu ve daha fazla doku ödemine, kristaloidlerden daha fazla neden olduğunu açıklar (4). Verilen sıvıların volüm genişletici etkileri, infüzyon oranına, vazokontriksiyonun derecesine, endotelial glikokaliks bütünlüğüne ve volüme durumuna göre değişmektedir. Bu nedenle, sıvı tedavisi durum-bağımlı etkindir.

Endotelial glikokaliksin zarar görmesi, 'dökülme' olarak isimlendirilir, dökülmenin derecesi sepsis ve ciddi travma gibi çeşitli kritik hastalıklarla ilişkilendirilmiştir (5). Benzer şekilde, fakat hala ispat edilmemiş, endotelial glikokaliks tabakasının korunması ve yenilenmesi sonuçları geliştirmektedir. Çeşitli farmakolojik tedaviler araştırılmakta, ancak bunların çoğunluğu pre-klinik fazdadır ve klinik kullanımları için yeterli delilimiz yoktur (6). Bununla birlikte, kullandığımız sıvı tedavilerinin endotelilal glikokaliksi koruduğu, endotelial geçirgenliği modüle ettiğine dair artan kanıtlar bulunmaktadır, fakat sıvıların bu etkinlik yeterlilikleri değişkendir. Bu sebeple, sıvı tedavisini seçerken klinisyenlerin hastanın onkotik özelliklerini göz önünde bulundurması, entotelialal glikokaliks tabakasının korunmasında ve tamirinde önemlidir.

Endotelial Glikokaliks:

Endotelial glikokaliks, proteoglikandan oluşan iskele içeren, transmembrana bağlı sindican ve membrana bağlı glipikandan oluşur (Şekil 1). Ve bunlar ağırlıklı olarak heparan sülfat ile kondroitin sülfat ve az miktarda hyalüran içeren 5 tip glikozaminglikan yan zincirlerine bağlanır (7). Glikoproteinler aynı zamanda endoteliuma bağlıdır. Bunların çeşitli fonksiyonları vardır, adezyon molekülleri, intrasellüler reseptörler, fibrinoliz

[1] Dr. Öğretim Görevlisi, Tekirdağ Namık Kemal Üniversitesi Anesteziyoloji AD, aysahin@nku.edu.tr

72 saatte damaryolu bozulduğu için, infüzyon sırasında sistematik rotasyon sağlanmalıdır. Ancak yoğun bakımda kullanılabilir damar yolu sayısı kısıtlı olduğu için genellikle santral venöz yola ihtiyaç duyulur.

PN ve EN ilişkili morbidite oranları, yoğun bakımda kolayca kontrol altına alınabilen hiperglisemi sonucu meydana gelmektedir. Son çalışmalarda, kan şekeri ılımlı bir şekilde 180mg/dL'nin altında tutulan hastalarların kan şekeri daha katı şekilde 80-108 mg/dL arasında tutulanlara göre daha düşük mortaliteye sahip olduğu gösterilmiştir (128).

Tablo 1. EN nutrisyonun avantajları	
Yol: nasogastrik -nasoenteral	Enerji aktarımı açısından fark yok (105); postpilorik yerleştirme ile 30% pnömoni riski azalır (92);
Kan şekeri: hipoglisemi	PN'na göre EN'da belirgin artış (93)
Prokinetik ajanlar: metoklorpropamid, eritromisin	5-7 gün sonra artan taşiflaksi (94); metoklorpropamidin 10 ve 20 mg dozları arasında fark yoktur(95); eritromisinin artmış GI kanama riski (95)
Nutirsiyon: oran, kalori, dansite, volüm	Full-enerji beslemenin düşük (Trofik) beslemeye avantajı yok (126); günlük volüm bazlı beslenmenin hız bazlı beslemeye göre kümülatif olarak kalori defisitlerini tamamla oranı daha iyi, ancak beslenmenin kesilme oranları arsında fark yok (96)

Özetle, yoğun bakım klinisyeninin en büyük hedefi, ciddi nütrisyon desteğine ihtiyaç duyan hastaları tanıyıp, efektif ve iatrojenik komplikasonlara neden olmadan yönetebilmek olmalıdır.

Uzamış kritik hastalıkta, nutrisyon desteği temeldir. Nütrisyon için faydalı klavuzlar, enerji ihtiyacı tahminleri, nütrisyon veriliş yolları, kritik hastada efektif nütrisyon desteğinin tahminleri ve aynı zamanda komplikasyonlardan nasıl kaçınalacağı konusunda pratik noktalar vermektedir.

KAYNAKLAR

1. Finfer S, Myburgh J, Bellomo R. Intravenous fluid therapy in critically ill adults. Nat Rev Nephrol. 2018;14:541–57.
2. Levick JR, Michel CC. Microvascular fluid exchange and the revised Starling principle. Cardiovasc Res. 2010;87:198–210.
3. van der Heijden M, Verheij J, van Nieuw Amerongen GP, Groeneveld AB. Crystalloid or colloid fluid loading and pulmonary permeability, edema, and injury in septic and nonseptic critically ill patients with hypovolemia. Crit Care Med. 2009;37:1275–81.
4. Jacob M, Bruegger D, Rehm M, et al. The endothelial glycocalyx affords compat- ibility of Starling's principle and high cardiac interstitial albumin levels. Cardiovasc Res. 2007;73:575–86.
5. Johansson P, Stensballe J, Ostrowski S. Shock induced endotheliopathy (SHINE) in acute critical illness - a unifying pathophysiologic mechanism. Crit Care. 2017;21:25.
6. Schott U, Solomon C, Fries D, Bentzer P. The endothelial glycocalyx and its disruption, protection and regeneration: a narrative review. Scand J Trauma Resusc Emerg Med. 2016;24:48.
7. Reitsma S, Slaaf DW, Vink H, van Zandvoort MA, oude Egbrink MG. The endothelial glycocalyx: composition, functions, and visualization. Pflug Arch. 2007;454:345–59.
8. Lekakis J, Abraham P, Balbarini A, et al. Methods for evaluating endothelial function: a position statement from the European Society of Cardiology Working Group on peripheral circulation. Eur J CardiovascPrev-Rehabil.2011;18:775–89.
9. Nam EJ, Park PW. Shedding of cell membrane-bound proteoglycans. Methods Mol Biol. 2012;836:291–305
10. Starling EH. On the absorption of fluids from the connective tissue spaces. J Physiol. 1896;19:312–26.
11. Levick JR. Revision of the Starling principle: new views of tissue fluid balance. J Physiol. 2004;557(Pt 3):704.
12. Levick JR. Capillary filtration-absorption balance reconsidered in light of dynamic extravascular factors. Exp Physiol. 1991;76:825–57.
13. Yen WY, Cai B, Yang JL, et al. Endothelial surface glycocalyx can regulate flow-induced nitric oxide production in microvessels in vivo. PLoS One. 2015;10:e0117133.
14. Trani M, Dejana E. New insights in the control of vascular permeability: vascular endothelial- cadherin and other players. Curr Opin Hematol. 2015;22:267–72.
15. Woodcock TE, Woodcock TM. Revised Starling equation and the glycocalyx model of transvascular fluid exchange: an improved paradigm for prescribing intravenous fluid therapy. Br J Anaesth. 2012;108:384–94.
16. Tatara T. Context-sensitive fluid therapy in critical illness. J Intensive Care. 2016;4:20.
17. Hahn RG. Fluid therapy in uncontrolled hemorrhage-what experimental models have taught us. Acta Anaesthesiol Scand. 2013;57:16–28.
18. Jacob M, Chappell D, Hofmann-Kiefer K, et al. The intravascular volume effect of Ringer's lactate is below 20%: a prospective study in humans. Crit Care. 2012;16:R86.

19. Jacob M, Bruegger D, Rehm M, Welsch U, Conzen P, Becker BF. Contrasting effects of colloid and crystalloid resuscitation fluids on cardiac vascular permeability. Anesthesiology. 2006;104:1223–31.
20. Borup T, Hahn RG, Holte K, Ravn L, Kehlet H. Intra-operative colloid administration increases the clearance of a post-operative fluid load. Acta Anaesthesiol Scand. 2009;53:311–7.
21. Myburgh JA, Finfer S, Bellomo R, et al. Hydroxyethyl starch or saline for fluid resuscitation in intensive care. N Engl J Med. 2012;367:1901–11.
22. Finfer S, Bellomo R, Boyce N, et al. A comparison of albumin and saline for fluid resuscitation in the intensive care unit. N Engl J Med. 2004;350:2247–56.
23. Holcomb JB, Tilley BC, Baraniuk S, et al. Transfusion of plasma, platelets, and red blood cells in a 1:1:1 vs a 1:1:2 ratio and mortality in patients with severe trauma: the PROPPR randomized clinical trial. JAMA. 2015;313:471–82.
24. Khan S, Brohi K, Chana M, et al. Hemostatic resuscitation is neither hemostatic nor resuscitative in trauma hemorrhage. J Trauma Acute Care Surg. 2014;76:561–7.
25. Potter DR, Jiang J, Damiano ER. The recovery time course of the endothelial cell glycocalyx in vivo and its implications in vitro. Circ Res. 2009;104:1318–25.
26. Zeng Y, Adamson RH, Curry FRE, Tarbell JM. Sphingosine-1-phosphate protects endo- thelial glycocalyx by inhibiting syndecan-1 shedding. Am J Physiol Heart Circ Physiol. 2014;306:H363–72.
27. Adamson RH, Clark JF, Radeva M, Kheirolomoom A, Ferrara KW, Curry FE. Albumin modu- lates S1P delivery from red blood cells in perfused microvessels: mechanism of the protein effect. Am J Physiol Heart Circ Physiol. 2014;306:H1011–7.
28. Barelli S, Alberio L. The role of plasma transfusion in massive bleeding: protecting the endo- thelial glycocalyx? Front Med. 2018;5:91.
29. Ksiazek M, Chacinska M, Chabowski A, Baranowski M. Sources, metabolism, and regulation of circulating sphingosine-1-phosphate. J Lipid Res. 2015;56:1271–81.
30. Pati S, Potter DR, Baimukanova G, Farrel DH, Holcomb JB, Schreiber MA. Modulating the endotheliopathy of trauma: factor concentrate versus fresh frozen plasma. J Trauma Acute Care Surg. 2016;80:576–85.
31. Torres LN, Chung KK, Salgado CL, Dubick MA, Torres Filho IP. Low-volume resuscitation with normal saline is associated with microvascular endothelial dysfunction after hemorrhage in rats, compared to colloids and balanced crystalloids. Crit Care. 2017;21:160.
32. Kozar RA, Peng ZL, Zhang RZ, et al. Plasma restoration of endothelial glycocalyx in a rodent model of hemorrhagic shock. Anesth Analg. 2011;112:1289–95.
33. Genet GF, Bentzer P, Ostrowski SR, Johansson PI. Resuscitation with pooled and pathogen- reduced plasma attenuates the increase in brain water content following traumatic brain injury and hemorrhagic shock in rats. J Neurotrauma. 2017;34:1054–62.
34. Haywood-Watson RJ, Holcomb JB, Gonzalez EA, et al. Modulation of syndecan-1 shedding after hemorrhagic shock and resuscitation. PLoS One. 2011;6:e23530.
35. Schenk S, Schoenhals GJ, de Souza G, Mann M. A high confidence, manually validated human blood plasma protein reference set. BMC Med Genet. 2008;1:41.
36. Kozar RA, Pati S. Syndecan-1 restitution by plasma after hemorrhagic shock. J Trauma Acute Care Surg. 2015;78(6 Suppl 1):S83–6.
37. Diebel LN, Martin JV, Liberati DM. Microfluidics: a high-throughput system for the assess- ment of the endotheliopathy of trauma and the effect of timing of plasma administration on ameliorating shock-associated endothelial dysfunction. J Trauma Acute Care Surg. 2018;84: 575–82.
38. Sperry JL, Guyette FX, Brown JB, et al. Prehospital plasma during air medical transport in trauma patients at risk for hemorrhagic shock. N Engl J Med. 2018;379:315–26.
39. Brown LM, Aro SO, Cohen MJ, et al. A high fresh frozen plasma: packed red blood cell transfusion ratio decreases mortality in all massively transfused trauma patients regardless of admission international normalized ratio. J Trauma. 2011;71(2 Suppl 3):S358–63.
40. Pandey S, Vyas GN. Adverse effects of plasma transfusion. Transfusion. 2012;52(Suppl 1):65S–79S.
41. Stensballe J, Ulrich AG, Nilsson JC, et al. Resuscitation of endotheliopathy and bleeding in thoracic aortic dissections: the VIPER-OCTA randomized clinical pilot trial. Anesth Analg. 2018;127:920–7.
42. Torres LN, Sondeen JL, Dubick MA, Filho IT. Systemic and microvascular effects of resus- citation with blood products after severe hemorrhage in rats. J Trauma Acute Care Surg. 2014;77:716–23.
43. Selim S, Sunkara M, Salous AK, et al. Plasma levels of sphingosine 1-phosphate are strongly correlated with haematocrit, but variably restored by red blood cell transfusions. Clin Sci. 2011;121:565–72.
44. McQuilten ZK, French CJ, Nichol A, Higgins A, Cooper DJ. Effect of age of red cells for transfusion on patient outcomes: a systematic review and meta-analysis. Transfus Med Rev. 2018;32:77–88.
45. Cardenas JC, Zhang X, Fox EE, et al. Platelet transfusions improve hemostasis and survival in a substudy of the prospective, randomized PROPPR trial. Blood Adv. 2018;2:1696–704.
46. Holcomb JB, Zarzabal LA, Michalek JE, et al. Increased platelet:RBC ratios are associated with improved survival after massive transfusion. J Trauma. 2011;71(2 Suppl3):S318–28.
47. Baimukanova G, Miyazawa B, Potter DR, et al. Platelets regulate vascular endothelial sta- bility: assessing the storage lesion and donor variability of apheresis platelets.Transfusion. 2016;56(Suppl 1):S65–75.
48. Pienimaeki-Roemer A, Ruebsaamen K, Boettcher A, et al. Stored platelets alter glycerophos- pholipid and sphingolipid species, which are differentially transferred to newly released extra- cellular vesicles. Transfusion. 2013;53:612–26.
49. Baimukanova G, Miyazawa B, Potter DR, et al. The effects of 22 degrees C and 4 degrees C storage of platelets on vascular endothelial integrity and function. Transfusion. 2016;56(Suppl 1):S52–64.

50. Muller RB, Ostrowski SR, Haase N, Wetterslev J, Perner A, Johansson PI. Markers of endo- thelial damage and coagulation impairment in patients with severe sepsis resuscitated with hydroxyethyl starch 130/0.42 vs ringer acetate. J Crit Care. 2016;32:16–20.
51. Kim TK, Nam K, Cho YJ, et al. Microvascular reactivity and endothelial glycocalyx degrada- tion when administering hydroxyethyl starch or crystalloid during off-pump coronary artery bypass graft surgery: a randomised trial. Anaesthesia. 2017;72:204–13.
52. Sofia Furtado, Luis Reis. İnferior vena cava evalution in fluis therapy desicion making in intensivise care; pratical implications: Rev Brras Ter Intensiva.2019;31(2):240-247
53. Daniel-Mihai Rusu, Lanis Siripol, loana Grigos. Lung ultrasound fluid managment protocol fort he Critically III patient: study protocol for a multi-centre randomized controlled trial: Rusu et al Trials 2019:20:236
54. Greg S.Martin ,Paul Bassett. Crystalloids vs colloids for fluid resusciation in the intensive Care unit: a systematic review and meta-analysis: journal of critical care 50(2019) 144-154
55. Chau Liu, Guangming Lu, Dong Wang. Balanced crystalloids versus normal saline for fluid resuscitation in critically ill patients: Asystematic review and meta_ analysis with trial sequential analysis: American Journal Of Emergency Medicine: 2019.02.045
56. Suzana Souza Arantes,Joao Manoel Silva Jr, Jose Eduardo de Aguilar Nascimento. Effects of intravenous fluid overload on caloric and protein deficit in critically ill patients: Nutricion Hospitalaria;2018;35(5):1017-1023
57. Giner M, Laviano A, Meguid MM, et al: In 1995 a correlation between malnutrition and poor outcome in critically ill still exists. Nutrition 12:23–29, 1996.
58. McClave SA, Martindale RG, Vanek VW, et al: Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) J Parent Enteral Nutr 33:277–318, 2009.
59. McClave SA, Taylor BE, Martindale RG, et al: Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) J Parent Enteral Nutr 40:159–211, 2016.
60. Wolfe RR, Durkot MJ, Allsop JR, et al: Glucose metabolism in severely burned patients. Metabolism 28:1031–1039, 1979.
61. McMahon M, Bistrian BR: The physiology of nutritional assessment and therapy in protein-calorie malnutrition. Dis Mon 36:378–417, 1990.
62. Heymsfield SB, McManus C, Stevens C, et al: Muscle mass: reliable indicator of protein-energy malnutrition severity and outcome. Am J Clin Nutr 35:1192–1199, 1982.
63. Jahoor F, Shangraw RE, Miyoshi H, et al: Role of insulin and glucose oxidation in mediating the protein catabolism of burns and sepsis. Am J Physiol 257:E323–E331, 1989.
64. Klein S, Kinney J, Jeejeebhoy K, et al: Nutrition support in clinical practice: review of published data and recommendations for future research direction. J Parenter Enteral Nutr 21:133–156, 1997.
65. Preiser JC, Berre J, Carpentier Y, et al: Management of nutrition in European intensive care units: results of a questionnaire. Intensive Care Med 25:95–101, 1999
66. Cerra FB, Benitez MR, Blackburn GL, et al: Applied nutrition in ICU patients: a consensus statement of the American College of Chest Physicians. Chest 111:769–778, 1997.
67. Marik PE, Hooper MH: Normocaloric versus hypocaloric feeding on outcomes of ICU patients: a systematic review and meta-analysis. Intensive Care Med 42:316–323, 2016.
68. Baker JP, Detsky AS, Wesson DE, et al: Nutritional assessment: a comparison of clinical judgment and objective measures. N Engl J Med
69. Detsky AS, McLaughlin JR, Baker JP, et al: What is subjective global assessment of nutritional status? J Parenter Enteral Nutr 11:8–13, 1987
70. Pomposelli JJ, Baxter JK III, Babineau TJ: Early postoperative glucose control predicts nosocomial infection rate in diabetic patients. J Parenter Enteral Nutr 22:77–81, 1998
71. McCowen KC, Friel C, Sternberg J, et al: Hypocaloric total parenteral nutrition: effectiveness in prevention of hypoglycemia and infectious complications—a randomized clinical trial. Crit Care Med 28:3606– 3611, 2000.
72. McCowen KC, Friel C, Sternberg J, et al: Hypocaloric total parenteral nutrition: effectiveness in prevention of hypoglycemia and infectious complications—a randomized clinical trial. Crit Care Med 28:3606– 3611, 2000.
73. Kalfarentzos F, Kehagias J, Mead N, et al: Enteral nutrition is superior to parenteral nutrition in severe acute pancreatitis: results of a randomized prospective trial. Br J Surg 84:1665–1669, 1997.
74. Bakker OJ, van Brunschot HC, van Santvoort MG, et al: Early versus on-demand nasoenteric tube feeding in acute pancreatitis. N Engl J Med 371:1983–1993, 2014.
75. McClave SA, Sexton LK, Spain DA, et al: Enteral tube feeding in the intensive care unit: factors impeding adequate delivery. Crit Care Med 27:1252–1256, 1999
76. Kirby DF, Delegge MH, Fleming CR: American Gastroenterological Association Medical Position Statement: Guidelines for the use of enteral nutrition. Gastroenterology 108:1280–1301, 1995.
77. Wolfe MM, Sachs G: Acid suppression: optimizing therapy for gastroduodenal ulcer healing, gastroesophageal reflux disease, and stress-related erosive syndrome. Gastroenterology 118:S9–S31, 2000.
78. Billiar TR, Curren RD, Stueh DJ, et al: Inducible cytosolic enzyme activity for the production of nitric oxides from L-arginine. Biochem Biophys Res Commun 168:1034–1040, 1990
79. Mascioli EA, Leader L, Flores E, et al: Enhanced survival to endotoxin in guinea pigs fed IV fish oil. Lipids 23:623–625, 1988.
80. Mascioli EA, Iwasa Y, Trimbo S, et al: Endotoxin challenge after menhaden oil to diet: effects on survival of guinea pigs. Am J Clin Nutr 49:277–282, 1989.

81. Nompleggi DJ, Bonkovsky HL: Nutritional supplementation in chronic liver disease: an analytical review. Hepatology 19:518–533, 1994.
82. Lacey JM, Wilmore DW: Is glutamine a conditionally essential amino acid? Nutr Rev 48:297–309, 1990
83. Chen K, Okuma T, Okuma K, et al: Glutamine-supplemented parenteral nutrition improves gut mucosal metabolism and nitrogen balance in septic rats. J Parenter Enteral Nutr 18:167–171, 1994.
84. Inoue Y, Grant JP, Synder PJ: Effect of glutamine-supplemented total parenteral nutrition on recovery of small intestine after starvation atrophy. J Parenter Enteral Nutr 17:165–170, 1993.
85. Powell-Tuck J, Jamieson CP, Bettany EA, et al: A double blind randomized controlled trial of glutamine supplementation in parenteral nutrition. Gut 45:82–88, 1999.
86. Beale RJ, Bryg DJ, Bihari DJ: Immunonutrition in the critically ill: a systematic review of clinical outcome. Crit Care Med 27:2799–2805, 1999.
87. Bistrian BR: Enteral nutrition: just a fuel or an immunity enhancer? Minerva Anestesiol 65:471–474, 1999.
88. Driscoll DF, Bistrian BR: Special considerations required for the formulation and administration of total parenteral nutrition in the older patient. Drugs Aging 2:395–405, 1992.
89. Fushiki T, Iwai K: Two hypotheses on the feedback regulation of pancreatic enzyme stimulation. FASEB J 3:121–128, 1989.
90. Davies AR, Morrison SS, Bailey MJ, et al: A multicentre, randomized controlled clinical trial comparing early nasojejunal with nasogastric nutrition in critical illness. Crit Care Med 40:2342–2348, 2012.
91. The NICE-SUGAR Study Investigators: Intensive versus conventional glucose control in critically ill patients. N Engl J Med 360:1283–1297, 2009
92. Heyland DK, MacDonald S, Keefe L, et al: Total parenteral nutrition in the critically ill patient: a meta-analysis. JAMA 280:2013–2019, 1998.
93. Nguyen NQ, Chapman N, Fraser RJ, et al: Prokinetic therapy for feed intolerance in critical illness: One drug or two? Crit Care Med 35:2561–2567: 2007.
94. Heslin M, Lattany L, Leung D, et al: A prospective randomized trial of early enteral feeding after resection of upper gastrointestinal malignancies. Ann Surg 226:567–577, 1997.
95. Watters J, Krikpatrick S, Norris S, et al: Immediate postoperative enteral feeding results in impaired respiratory mechanics and decreased mobility. Ann Surg 226:369–377, 1997
96. Sandstrom R, Drott C, Hyltander A, et al: The effect of postoperative intravenous feeding (TPN) on outcome following major surgery evaluated in a randomized study. Ann Surg 217:185–195, 1993.