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Perbandingan Pengaruh Oklusi Aorta + Vena Cava dan Manuver Pringle Intermiten terhadap Derasat Histopatologi Kerusakan Liver pada Trauma Liver (Studi Eksperimental pada Tikus Wistar Galur Murni)

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DAFTAR PUSTAKA

1. Cauchy F, Scatton O, Belghiti J, Soubrane O. Chapter 106. Vascular isolation techniques in hepatic resection. In: Blumgart L, Jarnagin W, Allen P, D'Angelica M, DeMatteo R, Gian Do R, et al., editors. Blumgart's Surgery of the Liver, Biliary Tract, and Pancreas. 6th ed. Philadelphia: Elsevier; 2017. p. 1612–22.
2. Ordoñez CA, Parra MW, Millán M, Caicedo Y, Guzmán-Rodríguez M, Padilla N, et al. Damage Control in Penetrating Liver Trauma: Fear of the Unknown. Vol. 51, Colombia Medica. Facultad de Salud de la Universidad del Valle; 2020.
3. Karmaniolou II, Theodoraki KA, Orfanos NF, Kostopanagiotou GG, Smyrniotis VE, Mylonas AI, et al. Resuscitation after hemorrhagic shock: The effect on the liver - A review of experimental data. Vol. 27, Journal of Anesthesia. 2013. p. 447–60.
4. Wei X, Zheng W, Yang Z, Liu H, Tang T, Li X, et al. Effect of the intermittent Pringle maneuver on liver damage after hepatectomy: A retrospective cohort study. World J Surg Oncol. 2019 Aug 13;17(1).
5. Zhang ZY, Zhang HY, Talmy T, Guo Y, Zhou SR, Zhang LY, et al. Management of non-compressible torso hemorrhage: An update. Vol. 24, Chinese Journal of Traumatology - English Edition. Elsevier B.V.; 2021. p. 125–31.



6. Chouillard EK, Gumbs AA, Cherqui D. Vascular clamping in liver surgery: physiology, indications and techniques. Vol. 4, Annals of Surgical Innovation and Research. 2010.
7. Geller DA, Goss JA, Busuttil RW, Tsung A. Liver. In: Brunicardi FC, Andersen DK, Billiar TR, Dunn DL, Hunter JG, Kao LS, et al., editors. Schwartz's Principles of Surgery. 11th ed. New York: Mc Graw Hill Education; 2019. p. 1346–86.
8. Kogure K, Ishizaki M, Nemoto M, Kuwano H, Makuuchi M. A Comparative Study of The Anatomy of Rat and Human Livers. J Hepatobiliary Pancreat Surg. 1999;6:171–5.
9. Madrahimov N, Dirsch O, Broelsch C, Dahmen U. Marginal hepatectomy in the rat: From anatomy to surgery. Ann Surg. 2006 Jul;244(1):89–98.
10. Man K., Lo CM., Liu CL., et al. Effects of the intermittent Pringle maneuver on hepatic gene expression and ultrastructure in a randomized clinical study. Br J Surg. 2003;90:183–9.
11. Delva E., Camus Y., Nordlinger B., et al. Vascular occlusions for liver resections: operative management and tolerance to hepatic ischemia: 142 cases. Ann Surg. 1989;209:211–8.
12. Smyrniotis V, Farantos C, Kostopanagiotou G, Arkadopoulos N. Vascular control during hepatectomy: Review of methods and results. Vol. 29, World Journal of Surgery. 2005. p. 1384–96.
13. Hannoun L, Borie D, Delva E, et al. Liver resection with normothermic ischaemia exceeding 1 h. Br J Surg. 1993;80:1161–5.



14. Smyrniotis VE, Kostopanagiotou GG, Kontis JC, et al. Selective hepatic vascular exclusion (SHVE) versus Pringle maneuver in major liver resections; a prospective study. *World J Surg.* 2003;27:765–9.
15. Arnoletti JP., Brodsky J. Reduction of transfusion requirements during major hepatic resections for metastatic disease . *Surgery.* 1999;125:166–71.
16. Smyrniotis V, Kostopanagiotou G, Lolis E, et al. Effects of hepatoprotective backflow on ischemic-reperfusion injuries in liver resections with the Pringle maneuver. *J Am Coll Surg.* 2003;197:949–54.
17. Detroz B, Honore' P, Denoiseux C, et al. Biology, physiology and physiopathology of clamping during liver surgery . *Hepatogastroenterology.* 1998;45:357–63.
18. Fung JJ. Ischemic preconditioning: application in clinical liver transplantation. *Liver Transpl.* 2001;7:300–1.
19. Imamura H, Takayama T, Sugawara Y, et al. Pringle's maneuver in living donors. *Lancet* 2002. 2002;360:2049–50.
20. Belghiti J, Noun R, Malafosse R, et al. Continuous versus intermittent portal triad clamping for liver resection: a con- trolled study. *Ann Surg .* 1999;229:369–75.
21. Elias F., Desruennes E., Lasser P. Prolonged intermittent clamping of the portal triad during hepatectomy. *Br J Surg.* 1991;78:42–4.
22. Man K., Fan St., Ng IOL. Prospective evaluation of Pringle maneuver in hepatectomy for liver tumors by a randomized study. *Ann Surg.* 1997;226:704–13.



23. Wu CC., Hwang CR., Liu TJ. Effects and limitations of prolonged intermittent ischaemia for hepatic resection of the cirrhotic liver. *Br J Surg* 1996;83:121–124. 1996;83:121–4.
24. Takayama T., Makuuchi M., Inoue K. Selective and unselective clamping in cirrhotic liver. *Hepatogastroenterology*. 1998;45:376–80.
25. Huguet C, Addario-Chieco P, Gavelli A, et al. Technique of hepatic vascular exclusion for extensive liver resection. *Am J Surg*. 1992;163:602–5.
26. Stephen MS., Gallagher PJ., Ross Sheil AG., et al. Hepatic resection with vascular isolation and routine supraceliac aortic clamping. . *Am J Surg*. 1996;171:351–5.
27. Guan Y, Chen P, Zhou H, Hong J, Yan Y, Wang Y. Common complications and prevention strategies for resuscitative endovascular balloon occlusion of the aorta: A narrative review. Vol. 102, *Medicine*. NLM (Medline); 2023. p. e34748.
28. Hughes CW. Use of an intra-aortic balloon catheter tamponade for controlling intra-abdominal hemorrhage in man. *Surgery*. 1954;36(1):65–8.
29. McGreevy DT, Björklund J, Nilsson KF, Hörer TM. Hemodynamic Effect Of Resuscitative Endovascular Balloon Occlusion Of The Aorta In Hemodynamic Instability Secondary To Acute Cardiac Tamponade In A Porcine Model. *Shock*. 2022 Feb 1;57(2):291–7.
30. Bini JK, Hardman C, Morrison J, et al. Survival benefit for pelvic trauma patients undergoing resuscitative endovascular balloon occlusion of the aorta:



- results of the AAST Aortic Occlusion for Resuscitation in Trauma Acute Care Surgery (AORTA) Registry. *Injury*. 2022;53:2126–32.
31. Halvachizadeh S, Mica L, Kalbas Y, Lipiski M, Canic M, Teuben M, et al. Zone-dependent acute circulatory changes in abdominal organs and extremities after resuscitative balloon occlusion of the aorta (REBOA): an experimental model. *Eur J Med Res*. 2021 Dec 1;26(1).
 32. Langan D, Caputo W, Swaminathan AK. REBOA and the Challenge of Research in Critical Illness: September 2023 Annals of Emergency Medicine Journal Club. *Ann Emerg Med*. 2023 Sep 1;82(3):408–10.
 33. Williams TK, Johnson A, Neff L, Horer T, Moore L, Brenner M, et al. “What’s in a Name?” A Consensus Proposal for a Common Nomenclature in the Endovascular Resuscitative Management and REBOA Literature. *J Endovasc Resusc Trauma Manag*. 2017;1(1):9–12.
 34. Wikström MB, Åström J, Stene Hurtsén A, Hörer TM, Nilsson KF. A porcine study of ultrasound-guided versus fluoroscopy-guided placement of endovascular balloons in the inferior vena cava (REBOVC) and the aorta (REBOA). *Trauma Surg Acute Care Open*. 2023 May 12;8(1).
 35. Reynolds CL, Celio AC, Bridges LC, Mosquera C, O’Connell B, Bard MR, et al. REBOA for the IVC? Resuscitative balloon occlusion of the inferior vena cava (REBOVC) to abate massive hemorrhage in retrohepatic vena cava injuries. In: *Journal of Trauma and Acute Care Surgery*. Lippincott Williams and Wilkins; 2017. p. 1041–6.



36. Wikström MB, Smårs M, Karlsson C, Stene Hurtsén A, Hörer TM, Nilsson KF. A randomized porcine study of the hemodynamic and metabolic effects of combined endovascular occlusion of the vena cava and the aorta in normovolemia and in hemorrhagic shock. *Journal of Trauma and Acute Care Surgery*. 2021;90(5):817–26.
37. Engelhardt M, Schmid R, Kölbel B, Hyhlik-Dürr A, Zerwes S, Zischek C. Training in vascular trauma surgery for non-vascular surgeons: Vascular trauma surgery skills course. *European Surgery - Acta Chirurgica Austriaca*. 2023 Jun 1;55(3–4):89–93.
38. Rampes S, Ma D. Hepatic ischemia-reperfusion injury in liver transplant setting: Mechanisms and protective strategies. Vol. 33, *Journal of Biomedical Research*. Nanjing Medical University and Chungbuk National University Press; 2019. p. 221–34.
39. Cannistrà M, Ruggiero M, Zullo A, Gallelli G, Serafini S, Maria M, et al. Hepatic ischemia reperfusion injury: A systematic review of literature and the role of current drugs and biomarkers. *International Journal of Surgery*. 2016 Sep 1;33:S57–70.
40. Olthof PB, van Golen RF, Meijer B, van Beek AA, Bennink RJ, Verheij J, et al. Warm ischemia time-dependent variation in liver damage, inflammation, and function in hepatic ischemia/reperfusion injury. *Biochim Biophys Acta Mol Basis Dis*. 2017 Feb 1;1863(2):375–85.
41. Sadeghi M, Dogan EM, Karlsson C, Jansson K, Seilitz J, Skoog P, et al. Total resuscitative endovascular balloon occlusion of the aorta causes inflammatory



- activation and organ damage within 30 minutes of occlusion in normovolemic pigs. *BMC Surg.* 2020 Mar 2;20(1).
42. Rönn T, Lendemans S, de Groot H, Petrat F. Original Research A New Model of Severe Hemorrhagic Shock in Rats. *Comp Med.* 2011;61(5):419–26.
43. Arifin WN, Zahiruddin WM. Sample size calculation in animal studies using resource equation approach. *Malaysian Journal of Medical Sciences.* 2017 Sep 1;24(5):101–5.
44. Ritschl LM, Fichter AM, Häberle S, Von Bomhard A, Mitchell DA, Wolff KD, et al. Ketamine-xylazine anesthesia in rats: Intraperitoneal versus intravenous administration using a microsurgical femoral vein access. *J Reconstr Microsurg.* 2015 Feb 19;31(5):343–7.
45. Office of Research Institutional Animal Care and Use Program. IACUC Guideline Blood Collection: The Rat [Internet]. Vol. 1, *Journal of Pharmacology and Pharmacotherapeutics.* 2022 Apr [cited 2023 Sep 16]. Available from:
<https://iacuc.ucsf.edu/sites/g/files/tkssra751/f/wysiwyg/GUIDELINE%20-%20Blood%20Collection%20-%20Rat.pdf>
46. Parasuraman S, Raveendran R, Kesavan R. Blood sample collection in small laboratory animals. *J Pharmacol Pharmacother.* 2010 Jul;1(2):87–93.
47. Choi SB, Park JS, Chung JW, Kim SW, Kim DW. Prediction of ATLS hypovolemic shock class in rats using the perfusion index and lactate concentration. *Shock.* 2015 Apr 16;43(4):361–8.



48. Liu C, Yuan D, Crawford R, Sarkar R, Hu B. Directly Cooling Gut Prevents Mortality in the Rat Model of Reboa Management of Lethal Hemorrhage. Shock. 2021 Nov 1;56(5):813–23.
49. Leary SL, American Veterinary Medical Association. AVMA guidelines for the euthanasia of animals : 2020 edition. 121 p.
50. Barnard EBG, Morrison JJ, Madureira RM, Lendrum R, Fragoso-Iñiguez M, Edwards A, et al. Resuscitative endovascular balloon occlusion of the aorta (REBOA): A population based gap analysis of trauma patients in England and Wales. Emergency Medicine Journal. 2015 Dec 1;32(12):926–32.
51. Wikström MB, Krantz J, Hörer TM, Nilsson KF. Resuscitative endovascular balloon occlusion of the inferior vena cava is made hemodynamically possible by concomitant endovascular balloon occlusion of the aorta-A porcine study. Journal of Trauma and Acute Care Surgery. 2020 Jan 1;88(1):160–8.
52. Behrends M, Martinez-Palli G, Niemann CU, Cohen S, Ramachandran R, Hirose R. Acute hyperglycemia worsens hepatic ischemia/reperfusion injury in rats. Journal of Gastrointestinal Surgery. 2010 Mar;14(3):528–35.
53. Morgan CE, Prakash VS, Vercammen JM, Pritts T, Kibbe MR. Development and validation of 4 different rat models of uncontrolled hemorrhage. JAMA Surg. 2015 Apr 1;150(4):316–24.
54. Vitello DJ, Ripper RM, Fettiplace MR, Weinberg GL, Vitello JM. Blood Density Is Nearly Equal to Water Density: A Validation Study of the



Gravimetric Method of Measuring Intraoperative Blood Loss. J Vet Med.

2015 Jan 29;2015:1–4.

55. Kuckelman J, Derickson M, Barron M, Phillips CJ, Moe D, Levine T, et al. Efficacy of intermittent versus standard resuscitative endovascular balloon occlusion of the aorta in a lethal solid organ injury model. *Journal of Trauma and Acute Care Surgery*. 2019 Jul 1;87(1):9–17.
56. Chu FY, Lin HJ, Guo HR, Liu TH, Foo NP, Chen KT. A reliable screening test to predict liver injury in pediatric blunt torso Trauma. *European Journal of Trauma and Emergency Surgery*. 2010 Feb;36(1):44–8.
57. Tian Z, Liu H, Su X, Fang Z, Dong Z, Yu C, et al. Role of elevated liver transaminase levels in the diagnosis of liver injury after blunt abdominal trauma. *Exp Ther Med*. 2012 Aug;4(2):255–60.
58. Shrestha A, Neupane HC, Tamrakar KK, Bhattacharai A, Katwal G. Role of liver enzymes in patients with blunt abdominal trauma to diagnose liver injury. *Int J Emerg Med*. 2021 Dec 1;14(1).
59. Maggio M, Guralnik JM, Longo DL, Ferrucci L. Interleukin-6 in Aging and Chronic Disease: A Magnificent Pathway [Internet]. Vol. 61, *Journal of Gerontology: MEDICAL SCIENCES*. 2006. Available from: <https://academic.oup.com/biomedgerontology/article/61/6/575/589467>
60. Dello SAWG, Bloemen JG, Van De Poll MCG, Van Dam RM, Stoot JHMB, Van Den Broek MAJ, et al. Gut and liver handling of interleukin-6 during liver resection in man. *HPB*. 2011;13(5):324–31.



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61. Olanders K, Sun Z, Bö A, Dib M, Andersson E, Lasson Å, et al. The Effect Of Intestinal Ischemia And Reperfusion Injury On ICAM-1 Expression, Endothelial Barrier Function, Neutrophil Tissue Influx, And Protease Inhibitor Levels In Rats. Shock [Internet]. 2002;18(1):86–92. Available from: <http://journals.lww.com/shockjournal>