

Perioperatives Gerinnungsmanagement

Gestion de la coagulation périopératoire

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## Literatur

1. Kozek-Langenecker, S. A., Afshari, A., Albaladejo, P., et al. (2013). Management of severe perioperative bleeding – Guidelines from the European Society of Anesthesiology. *Eur J of Anesthesiol* 30:270-382
2. Grottke, O., Frietsch, H., Maas, M., et al. (2013). Umgang mit Massivblutungen und assoziierten perioperativen Gerinnungsstörungen. Handlungsempfehlung der Deutschen Gesellschaft für Anästhesiologie und Intensivmedizin. *Anaesthesist* 62:213-24
3. Grottke, O., Henzler, D., Spahn, D. R. (2007). Koagulopathie. *Anaesthesist* 56:95-108
4. Hoffman, M., Monroe, D. M. 3<sup>rd</sup> (2001). A cell-based model of hemostasis. *Thromb Haemost* 85:958-966
5. Kozek-Langenecker, S. A. (2010). Perioperative coagulation monitoring. *Best Pract Res Clin Anaesthesiol* 24:27-40
6. Ganter, M. T., Hofer, C. K. (2008). Coagulation monitoring: current techniques and clinical use of viscoelastic point-of-care coagulation devices. *Anesth Analg* 106:1366-1375
7. Haas, T., Spielmann, N., Mauch, J., et al. (2012). Comparison of thrombelastometry (ROTEM<sup>®</sup>) with standard plasmatic coagulation testing in paediatric surgery. *Br J Anaesth* 108:36-41
8. Weber, C. F., Gorlinger, K., Meininger, D., et al. (2012). Point-of-care testing: a prospective, randomized clinical trial of efficacy in coagulopathic cardiac surgery patients. *Anesthesiology* 117:531-547
9. Von Heymann, C., Kaufner, L. (2014). Differenzierte Therapie der akuten Blutung. *Anästhesiologie & Intensivmedizin* 55:58-67
10. Toulon, P., Ozier, Y., Ankri, A., et al. (2009). Point-of-care versus central laboratory coagulation testing during haemorrhagic surgery. A multicenter study. *Thromb Haemost* 101:394-401
11. Gorlinger, K., Dirkmann, D., Hanke, A. A., et al. (2011). First-line therapy with coagulation factor concentrates combined with Point-of-Care coagulation testing is associated with decreased allogeneic blood transfusion in cardiovascular surgery: a retrospective, single-center cohort study. *Anesthesiology* 115:1179-1191
12. Weber, C. F., Gorlinger, K., Meininger, D., et al. (2012). Point-of-care testing: a prospective, randomized clinical trial of efficacy in coagulopathic cardiac surgery patients. *Anesthesiology* 117:531-547
13. Weber, C. F., Zacharowski, K. (2012). Perioperative point-of-care coagulation testing. *Dtsch Arztebl Int* 109:369-375
14. Rossaint, R., Bouillon, B. (2010). Task force for Advanced Bleeding Care in Trauma (2010) Management of bleeding following major trauma: an updated European Guideline. *Crit Care* 14(2):R52
15. Wolberg, A. S., Meng, Z. H., Monroe, D. M., et al. (2004). A systematic evaluation of the effect of temperature on coagulation enzyme activity and platelet function. *J Trauma* 56:1221-1128
16. Spahn, D. R., Rossaint, R. (2005). Coagulopathy and blood component transfusion in trauma. *Br J Anaesth* 95:130-139
17. Meng, Z. H., Wolberg, A. S., Monroe, D. M. 3<sup>rd</sup>, et al. (2003). The effect of temperature and pH on the activity of factor VIIa in hypothermic and acidotic patients. *J Traum* 55:886-891

18. Engstrom, M., Schott, U., Romner, B., et al. (2006). Acidosis impairs the coagulation: A thrombelastographic study. *J Trauma* 61:624-628
19. Lier, H., Krep, H., Schroeder, S., et al. (2008). Preconditions of hemostasis in trauma: a review. The influence of acidosis, hypocalcemia, anemia and hypothermia on functional hemostasis in trauma. *J Trauma* 65:951-960
20. CRASH-2 trial collaborators, Shakur, H., Roberts, I., Bautista, R., et al. (2010). Effects of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant haemorrhage (CRASH-2): a randomized, placebo-controlled trial. *Lancet* 376:23-32
21. CRASH-2 trial collaborators, Roberts, I., et al. (2011). The importance of early treatment with tranexamic acid in bleeding trauma patients: an exploratory analysis of the CRASH-2 randomised controlled trial. *Lancet* 377: 1096-1101
22. Henry, D. A., Carless, P. A., Moxey, A. J., et al. (2011). Anti-fibrinolytic use for minimising perioperative allogeneic blood transfusion. *Cochrane Database Syst Rev* 3 CD001886
23. Weber, C. F., Gorlinger, K., Byhahn, C., et al. (2011). Tranexamic acid partially improves platelet function in patients treated with dual antiplatelet therapy. *Eur J Anaesthesiol* 28:57-62
24. Morrison, J. J., Dubose, J. J., Rasmussen, T. E., et al. (2012). Military Application of Tranexamic Acid in Trauma Emergency Resuscitation (MATTERs) Study. *Arch Surg* 147:113-119
25. Morrison, J. J., Dubose, J. J., Rasmussen, T. E., et al. (2012). Military Application of Tranexamic Acid in Trauma Emergency Resuscitation (MATTERs) Study. *Arch Surg* 147:113-119
26. Morrison, J. J., Ross, J. D., Dubose, J. J., et al. (2013). Association of cyoprecipitate and tranexamic acid with improved survival following wartime injury. *JAMA Surg* 148:218-225
27. Sniecinski, R. M., Chen, E. P., Makadia, S. S., et al. (2010). Changing from aprotinin to tranexamic acid results in increased use of blood products and recombinant factor VIIa for aortic surgery requiring hypothermic arrest. *J Cardiothorac Vasc Anaesth* 24:959-963
28. Martin, K., Wiesner, G., Breuer, T., et al. (2008). The risks of aprotinin and tranexamic acid in cardiac surgery: a one-year follow-up of 1188 consecutive patients. *Anesth Analg* 107:1783-1790
29. Hippala, S. T. (1995). Hemostatic factors and replacement of major blood loss with plasma-poor red cell concentrates. *Anesth Analg* 81:360-365
30. Kozek-Langenecker, S. A. (2011). Clinical effectiveness of fresh frozen plasma compared with fibrinogen concentrate: a systematic review. *Crit Care* 15:R239
31. Inaba, K., Karamanos, E., Lustenberger, T., et al. (2013). Impact of fibrinogen levels on outcomes after acute injury in patients requiring a massive transfusion. *J Am Coll Surg* 216:290–297
32. Spahn, D. R., Bouillon, B., Cerny, V., et al. (2013). Management of bleeding and coagulopathy following major trauma. *Crit Care* 19:17(2):R76
33. Rossaint, R., Bouillon, B. (2010). Task force for Advanced Bleeding Care in Trauma (2010) Management of bleeding following major trauma: an updated European Guideline. *Crit Care* 14(2):R52
34. Rossaint, R., Bouillon, B. (2010). Task force for Advanced Bleeding Care in Trauma (2010) Management of bleeding following major trauma: an updated European Guideline. *Crit Care* 14(2):R52
35. Schöchl, H., Nienaber, U., Hofer, G., et al. (2010). Goal-directed coagulation management of major trauma patients using thrombelastometry (ROTEM®)-guided administration of fibrinogen concentrate and prothrombin complex concentrate. *Crit Care* 14:R55
36. Bruce, D., Nokes, T. J. (2008). Prothrombin complex concentrate (Beriplex P/N) in severe bleeding: experience in a large tertiary hospital. *Crit Care* 12:R105

37. Schick, K. S., Fertmann, J. M., Jauch, K.W., et al. (2009). Prothrombin complex concentrate in surgical patients: retrospective evaluation of vitamin K antagonist reversal and treatment of severe bleeding. *Crit Care* 13:R191
38. Grottke, O., Braunschweig, T., Spronk, H. M., et al. (2011). Increasing concentrations of prothrombin complex concentrate induce disseminated intravascular coagulation in a pig model of coagulopathy with blunt liver injury. *Blood* 118:1943-1951
39. Schöchl, H., Forster, L., Woidke, R., et al. (2010). Use of rotation thrombelastometry (ROTEM®) to achieve successful treatment of polytrauma with fibrinogen concentrate and prothrombin complex concentrate. *Anaesthesia* 65:199-203
40. Rossaint, R., Bouillon, B. (2010). Task force for Advanced Bleeding Care in Trauma (2010) Management of bleeding following major trauma: an updated European Guideline. *Crit Care* 14(2):R52
41. Von Heymann, C., Kaufner, L. (2014). Differenzierte Therapie der akuten Blutung. *Anästhesiologie & Intensivmedizin* 55:58-67.
42. Hedner, U., Erhardtzen, E. (2003). Potential role of recombinant factor VIIa as a hemostatic agent. *Clin Adv Hematol Oncol* 1:112-119
43. Franchini, M., Franchi, M., Bergamini, V., et al. (2010). The use of recombinant activated FVII in postpartum hemorrhage. *Clin Obstet Gynecol* 53:219-227
44. Boffard, K. D., Riou, B., Warren, B., et al. (2005). Novo Seven Trauma Study Group (2005) Recombinant factor VIIa as adjunctive therapy for bleeding control in severely injured trauma patients: two parallel randomized, placebo-controlled, double-blind clinical trials. *J Trauma* 59:8-15
45. Hauser, C. J., Boffard, K., Dutton, R., et al. (2010). CONTROL Study Group (2010) Results of the CONTROL Trial: efficacy and safety of recombinant activated Factor VII in the management of refractory traumatic hemorrhage. *J Trauma* 69:489-500
46. Yank, V., Tuohy, C. V., Logan, A. C., et al. (2011). Systematic review: benefits and harms of in-hospital use of recombinant factor VIIa for off-label indications. *Ann Intern Med* 154:529-540
47. Hoffman, M., Monroe, D. M. 3<sup>rd</sup> (2001). A cell-based model of hemostasis. *Thromb Haemost* 85:958-966
48. Sagesaka, T. (2004). Influence of red blood cell concentration on the initiation time of blood coagulation: risk of thrombus formation by hemoconcentration. *Clin Hemorheol Microcirc* 31:243-249
49. Habler, O., Meier, J., Pape, A., et al. (2007). Tolerance to perioperative anemia. Mechanisms, influencing factors and limits. *Orthopade* 36:763-776
50. Carson, J. L., Carless, P.A., Hebert, P.C. (2012). Transfusion thresholds and other strategies for guiding allogeneic red blood cell transfusion. *Cochrane Database Syst Rev*:CD002042.
51. Carson, J. L., Terrin, M. L., Noveck, H., et al. (2011). Liberal or restrictive transfusion in high-risk patients after hip surgery. *N Engl J Med* 365:2453-2462
52. Villanueva, C., Colombo, A., Bosch, A., et al. (2013). Transfusion strategies for acute upper gastrointestinal bleeding. *N Engl J Med* 368:11-21
53. La Par, D. J., Crosby, I. K., Alilawadi, G., et al. (2013). Blood product conservation is associated with improved outcomes and reduced costs after cardiac surgery. *J Thorac Cardiovasc Surg* 145:796-804
54. [http://www.awmf.org/uploads/tx\\_szleitlinien/012-019I\\_S3\\_Polytrauma\\_Schwerverletzten-Behandlung\\_2011-07.pdf](http://www.awmf.org/uploads/tx_szleitlinien/012-019I_S3_Polytrauma_Schwerverletzten-Behandlung_2011-07.pdf). Zugegriffen: 10. Jan 2014
55. Sarani, B., Dunkman, W. J., Dean, L., et al. (2008). Transfusion of fresh frozen plasma in critically ill surgical patients is associated with an increased risk of infection. *Crit Care Med* 36:1114-1118
56. Carless, P., Henry, D. A., Moxey, A. J., et al. (2004). Desmopressin for minimising perioperative allogeneic blood transfusion. *Cochrane Database Syst Rev* 1:CD001884