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**Transplant anesthesia and critical care: current research and possible future  
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Transplant anesthesia and critical care: current research and possible future developments

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1 The first human kidney transplantation, one of the seminal events of medical history, was  
2 performed in Boston on December 23, 1954 between the identical Herrick twins by a group of  
3 surgeons led by Dr. Murray. The recipient lived eight more years after the transplant and Dr Murray  
4 received the Nobel Prize in medicine for this achievement [1]. Since 1954, thousands of lives have  
5 been saved and quality of life of patients with kidney failure has improved. The first human  
6 orthotopic liver transplantation (OLT) was performed in 1963 by Thomas E. Starzl on a three-year-  
7 old child with biliary atresia, who sadly died during the operation. After some years of unsuccessful  
8 attempts, Starzl performed OLT on a patient with hepatoblastoma who survived 18 months. Since  
9 its first clinical attempts, OLT has grown rapidly with a remarkable evolution and nowadays it is  
10 the standard for treatment for both acute and chronic end-stage liver failure as well as for liver-  
11 dependent with, according to the European Association for the Study of the Liver (EASL), survival  
12 rates of 96% at one year and 71% at ten years [2-3]. The 1983 NIH conference report defined ten  
13 absolute and five relative contraindications to transplantation also outlining the characteristics of the  
14 ideal recipient [4]. If we were to follow these recommendations today, very few patients would  
15 receive a transplant. The history of OLT is characterized by an increasingly multi-disciplinary  
16 approach resulting in wider indications for transplantation and significant improvements in patient  
17 outcomes over the last several decades.

18 Advances in surgical techniques, improved understanding of pathophysiology, novel diagnostic  
19 and management tools all contributed to ever improving outcomes. Lastly, better understanding of  
20 the immune system and therefore more tailored immunosuppressive regimen removed one of the  
21 major obstacles of successful transplantation. Similarly, pancreas transplantation has broadly been  
22 accepted as a treatment to cure type 1 after this first one was performed at the University of  
23 Minnesota in 1966. Nowadays, combined pancreatic and renal transplantation remains standard  
24 treatment for a sub-set of patients with type 1 diabetes mellitus and renal failure with significant  
25 improvements in quality of life and life expectancy [5].

1 The importance of the anesthesiologist and critical care physician in the perioperative management  
2 and optimization of the AOT patients has been increasingly recognized, particularly in the last  
3 decade when ever more complex patients are being offered transplantation. In fact, improved  
4 knowledge and treatment options allows for recognition and treatment of metabolic  
5 abnormalities, manage complex hemodynamic changes, evaluate cardiac function, understand  
6 preservation techniques and cope with the multiple risk-factors for infection [6].  
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11 In this special edition of Best Practice & Research Clinical Anesthesiology, an international panel  
12 of experienced clinicians address some topics which are of particular interest during the  
13 perioperative care of patients undergoing AOT. They include some unresolved, or even  
14 controversial, issues in clinical care such as best preoperative cardiac assessment in liver transplant  
15 candidates, the perioperative management for patients with acute on chronic liver failure and that of  
16 patients undergoing kidney and kidney/pancreas transplantations, as well as our current  
17 understanding of the interaction between splanchnic and systemic circulation complement this  
18 issue. Also, concepts of enhanced recovery after transplantation and economic analyses are  
19 reviewed.  
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36 In conclusion, remarkable progress in surgical, perioperative care, and medical management, has  
37 led to better patient outcomes after AOT. However, despite these advances, well designed  
38 prospective outcome studies in the perioperative care setting are sparse. This is partially due to the  
39 widely divergent institutional or individual practice patterns that do not necessarily rely on  
40 evidence-based medicine [7]. Thus, in the absence of solid evidence, periodic review of currently  
41 accepted knowledge and practice pattern, as it is offered in this issue of Best Practice & Research  
42 Clinical Anesthesiology, becomes relevant and provides updates for every-day clinical  
43 perioperative care in the exciting field of anesthesiology and critical care medicine for AOT  
44 patients.  
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1. <https://unos.org/transplant/history/>
2. Meirelles, R.F.; Salvalaggio, P.; De Rezende, M.B.; Evangelista, A.S.; Della Guardia, B.; Matielo, C.E.L.; Neves, D.B.; Pandullo, F.L.; Felga, G.E.G.; Alves, J.A.D.S.; et al. Liver transplantation: History, outcomes and perspectives. *Einstein* **2015**, 13, 149–152.
3. European Association for the Study of the Liver. EASL Clinical Practice Guidelines: Liver transplantation. *J. Hepatol.* **2016**, 64, 433–485.
4. <https://consensus.nih.gov/1983/1983livertransplantation036html.htm>
5. Dholakia S, Oskrochi Y, Easton G, Papalois. *Advances in Pancreas Transplantation.* J. R. Soc Med 2016;109:141-6
6. Markin NW, Ringenberg KJ, Kassel CA, Walcutt CR, Chacon MM. 2018 Clinical Update in Liver Transplantation. *J Cardiothor Vasc Anesth* 2019;33:3239-3248
7. Biancofiore G., Niemann C. U. Liver transplant perioperative pathways: which way towards high-quality care and better outcomes? *Minerva Anesthesiol* 2010;76:769-70