



**DES de Néphrologie : Enseignement l'Option SOINS INTENSIFS en
NÉPHROLOGIE**

Le transplanté rénal aux soins intensifs : prise en charge pré- et post-greffe précoce

Pr Dany Anglicheau

Service des maladies du rein et du métabolisme, transplantation et
immunologie clinique
Hôpital Necker, Paris

dany.anglicheau@aphp.fr

Février 2023

Avec l'aide du Pr Nicolas Maillard, Saint Etienne



Objectifs du cours



- Faire un tour d'horizon des prescriptions de base de la période péri-opératoire de transplantation rénale



QCM d'auto-évaluation 1



Parmi les affirmations suivantes relatives à l'indication de séance d'hémodialyse pré-opératoire immédiatement avant la transplantation, laquelle ou lesquelles sont justes ?

- A. Une séance de dialyse pré-opératoire réduit le risque d'hyperkaliémie post-opératoire
- B. Une anticoagulation au citrate a montré son bénéfice pour réduire le risque de saignement per-opératoire
- C. Les recommandation européennes suggèrent de ne pas faire d'UF au cours de la séance de dialyse pré-opératoire en dehors de surcharge cliniquement évidente
- D. Une séance de dialyse pré-opératoire accroît le risque de retard de reprise de fonction du greffon
- E. Les recommandation européennes suggèrent de réaliser une séance de dialyse pré-opératoire immédiatement avant la transplantation



QCM d'auto-évaluation 2



Parmi les affirmations suivantes relatives aux modalités de remplissage per- et post-transplantation, laquelle ou lesquelles sont justes ?

- A. Les solutés balancés, comparés aux soluté salé isotonique, réduisent le risque de retard de reprise de fonction du greffon
- B. Les solutés balancés, comparés aux soluté salé isotonique, sont associés à un pH sanguin significativement plus élevé
- C. Les solutés balancés, comparés aux soluté salé isotonique, sont associés à une kaliémie significativement plus basse
- D. L'objectif du remplissage est de maintenir une pression veineuse centrale $> 8 \text{ cmH}_2\text{O}$
- E. Un remplissage excessif pourrait augmenter la pression intra-abdominale



Enjeux de la prise en charge précoce



- La période précoce post-opératoire est celle de tous les dangers !
- Complications liés à la chirurgie de transplantation de sujets très comorbides :
 - Risques de défaillance cardio-circulatoire (syndromes cardio-rénaux, SCA, troubles du rythme, ...)
 - Risques infectieux (sonde vésicale, sonde JJ, infections du site opératoire, infections urinaires, ...)
 - Risques hémorragiques
 - Thromboses vasculaires du greffon
 - Ischémie de membre
- Enjeux de la « Réanimation » per- et post-opératoire
 - Rôle prépondérant des enjeux cardiovasculaires
 - Gestion du risque infectieux



Enjeux de la prise en charge précoce

Death after Kidney Transplantation: An Analysis by Era and Time Post-Transplant

Tracy Ying,^{1,2,3} Bao Shi,^{1,2,3} Patrick J. Kelly,⁴ Helen Pimm,⁵ Philip A. Clayton,^{1,2,3,7} and Steven J. Chadban^{1,2,8}

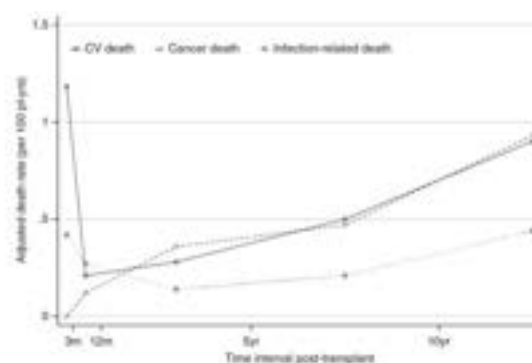
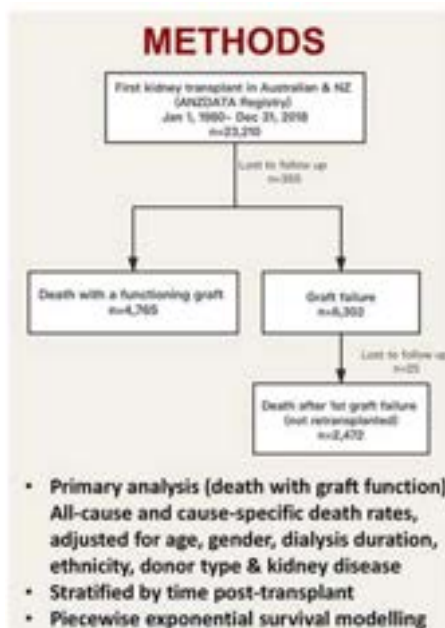


Figure 5. Cancer death match cardiovascular death beyond the first post-transplant year. Rates adjusted for age at transplant, sex, ethnicity, duration of dialysis, donor type, cause of kidney disease, and stratified by time period post-transplant. CV, cardiovascular; pyrs, patient-years.



JASN 31: 2887–2899, 2020

Sommaire

- Dialyse pré-transplantation
- Type de remplissage
- Niveau de remplissage
- Thromboprophylaxie
- Antibiprophyllaxie
- Lasilix
- Antalgiques
- Prophylaxie de l'ulcère



Dialyse pré-transplantation

- **Objectifs théoriques :**
 - Mettre le patient dans de bonnes conditions en vue de l'anesthésie générale en particulier pour la kaliémie
 - Elle est donc utile **en cas d'hyperkaliémie** (objectif de kaliémie pré-opératoire variable selon les équipes anesthésiques)
 - Pourrait être théoriquement utile en cas de **surcharge symptomatique** (exceptionnelle)
- **En pratique :**
 - Inutile de façon systématique
 - **Sans héparine** pour limiter le risque de saignement
 - Cibler une kaliémie raisonnable (<4,8 mmol/L dans notre centre, mais très centre-dépendant) ; donc une hémodialyse courte est souvent suffisante
 - Laisser le patient **au dessus de son poids sec** pour limiter les hypotensions per- et post-opératoires ?
- **Particularité du dialysé péritonéal :** partir au bloc ventre vide



Dialyse pré-transplantation

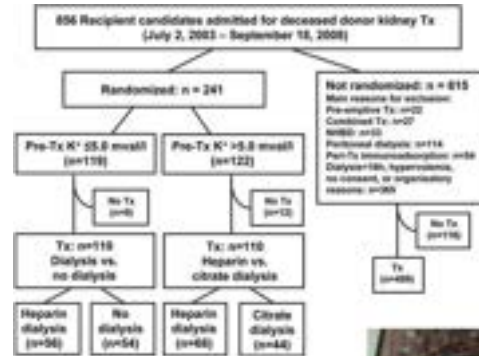
- Etude randomisée (x 2 !) :
 - Dialyse pré-op vs. pas de dialyse chez les patients ayant un $K \leq 5$ mmol/L
 - Dialyse avec héparine (bolus initial de 1000 UI puis 1000 UI/h) vs. Dialyse avec citrate chez les patients ayant un $K > 5$ mmol/L
 - Plus de 50 patients par bras
 - Primary endpoint : DFGe à J5

→ Aucune différence

In summary, hemodialysis in the hours preceding transplant surgery did not enhance the risk of posttransplant acute renal failure in patients anticipating deceased donor kidney transplantation. Moreover, considering our observation that regional citrate anticoagulation may not ameliorate reperfusion/ischemia injury, this strategy should be restricted to patients requiring pretransplant dialysis who are at an elevated risk of bleeding.

Effect of Hemodialysis Before Transplant Surgery on Renal Allograft Function—A Pair of Randomized Controlled Trials

Zilke Klatz,¹ Matthias Levin,² Greg Sander-Flaemmig,³ Martin Schilling,⁴ Heinz Regel,⁵ Georg Gyss,⁶ Ferdinand Mühlbacher,⁷ Wolfgang C. Winkelmayer,⁸ and Georg A. Böhm,^{1,2}



Transplantation 88(12):p 1377-1385, December 27, 2009

Dialyse pré-transplantation

Quel poids viser ???

- Etude multicentrique (23 centres anglais)
- Questionnaire électronique

Dialysis. The majority of centres (63.6%) dialyse preoperatively to the recipient's 'dry weight'. Three centres (13.6%) stated that they target a post-dialysis body weight 1-2 kg above the recipient's dry weight, whereas the others do not specify a preoperative dialysis target weight.



Clinical Kidney Journal, 2019, vol. 12, no. 6, 880-887

Dialyse pré-transplantation

European Renal Best Practice Guideline on kidney donor and recipient evaluation and perioperative care

Daniel Abramowitz¹, Pierre Cochat^{2,3}, Franz H.J. Cloer⁴, Uwe Hartmann⁵, John Pascoe⁶, C. Dudley⁷, Paul Haidich⁸, Marianne Himmelfarb⁹, Umberto Maggiore¹⁰, Maurizio Salvadori¹¹, Geor Spasovski¹², Jean-Paul Squifflet¹³, Jörg Stenger¹⁴, Armando Torres^{15,16}, Oded Vidicky¹⁷, Martin Ziser¹⁸, Raymond Verbeke¹⁹, Wan Yan Fung²⁰ and Eva Nagler²¹

Chapter 4. Perioperative care of the kidney transplant recipient

4.1. What are the indications for an additional haemodialysis session in the recipient immediately before the transplantation procedure?

4.1.1. We recommend not routinely performing a haemodialysis session immediately before the actual transplantation procedure unless there are specific clinical indications. (1C)

4.1.2. When additional haemodialysis is performed immediately before the transplantation procedure, we recommend not using ultrafiltration unless there is evidence of fluid overload. (1C)



Nephrol Dial Transplant (2015) 30: 1790–1797

Dialyse pré-transplantation

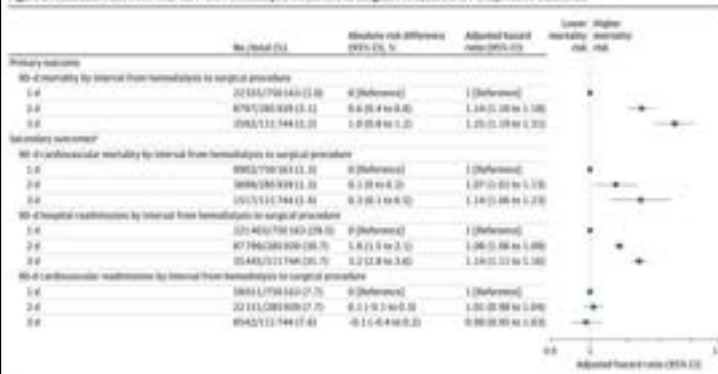
- Retrospective cohort study of 1 147 846 procedures among 346 828 Medicare beneficiaries with end-stage kidney disease treated with hemodialysis who underwent surgical procedures.

JAMA | Original Investigation

Association Between Preoperative Hemodialysis Timing and Postoperative Mortality in Patients With End-stage Kidney Disease

Wenxin Feeding Singh, MD, JD; Matthew W. Semmes, MD; Yohan Lingam, MD; Joseph F. Reinhardt, MD; Wolfgang L. Himmelfarb, MD, MPH, ScD; Tsz-Li Chung, MD, MS; Vincent L. Go, MD, MS; Eugene C. Ha, MD, MS

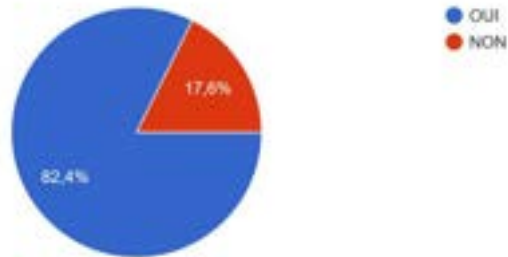
Figure 3. Association Between Interval From Hemodialysis Treatment to Surgical Procedure and Perioperative Outcomes



Quel type de remplissage en post-greffe ?



Faites vous une compensation des fluides volume par volume pendant les 48h post greffe?
17 réponses

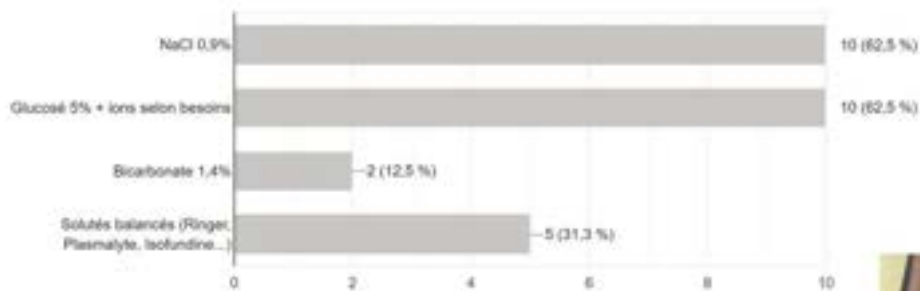


Enquête FIRN 2022

Quel type de remplissage en post-greffe ?



Quels solutés d'hydratation utilisez-vous?
16 réponses



Enquête FIRN 2022

Quel type de remplissage en post-greffe ?

Should chloride-rich crystalloids remain the mainstay of fluid resuscitation to prevent 'pre-renal' acute kidney injury?: con

Deepak N. Lobo¹ and Shirel Awad²

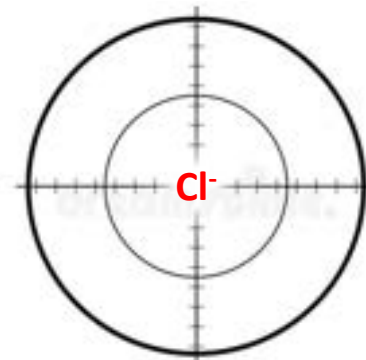
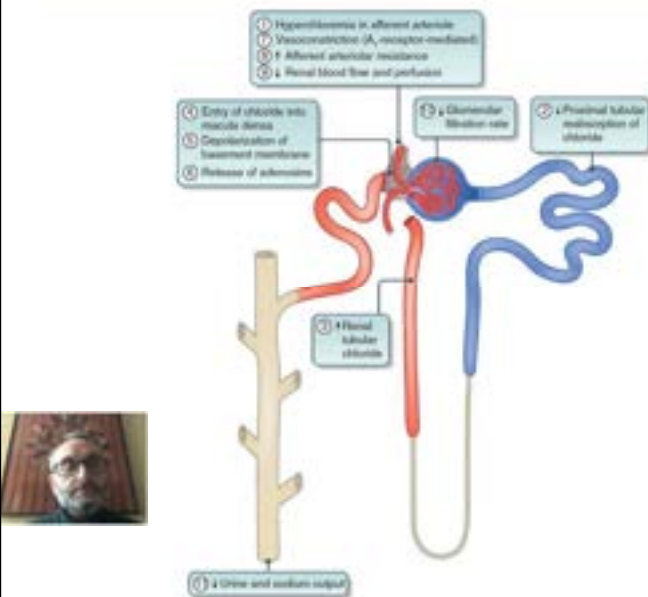


Figure 2 | Schematic diagram of the sequential effects of hyperchloremia on the kidney. Numbers indicate the sequence of events. A₁ receptor, adenosine receptor.

Kidney International (2014) 86, 1096–1105

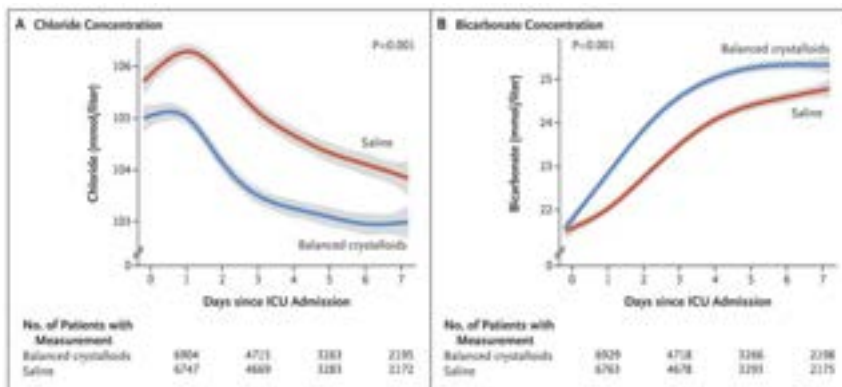
Quel type de remplissage en post-greffe ?

Etude SMART

- 15,802 adultes randomisés pour Soluté salé 0.9% vs. Soluté balancé crystalloïde (Ringer lactate ou Plasma-Lyte A)
- Le critère principal était un événement rénal indésirable majeur dans les 30 jours :
 - critère composite de décès quelle qu'en soit la cause, traitement de suppléance ou dysfonction rénale persistante (définie comme une élévation de créatinine à ≥ 200 % de la valeur de base) - tous censurés à la sortie de l'hôpital ou 30 jours

Balanced Crystalloids versus Saline in Critically Ill Adults

Matthew W. Semler, M.D., Wesley H. Self, M.D., M.P.H., Jonathan P. Moayeri, M.D., David M. Howard, M.D., M.P.H., Yi Wang, M.D., Daniel M. Sessler, M.D., James A. Gallagher, Pharm.D., Kenneth B. Horvath, Ph.D., Christopher G. Hughes, M.D., Melissa Horvath, M.D., David D. Gombert, M.D., M.P.H., Matthew S. Park, M.D., Lisa Weaver, M.B., B.Ch., Jonathan D. Crane, M.D., Edward C. Stone, M.D., Andrew S. Ryan, M.B., Gordon D. Bernard, M.D., and Todd W. Rice, M.D., for the SMART Investigators
Acute Respiratory Distress Syndrome Group



N Engl J Med 2018;378:829-39

Quel type de remplissage en post-greffe ?



**Cochrane
Library**

Cochrane Database of Systematic Reviews



Normal saline versus lower-chloride solutions for kidney transplantation (Review)

Wan S, Roberts MA, Mount P

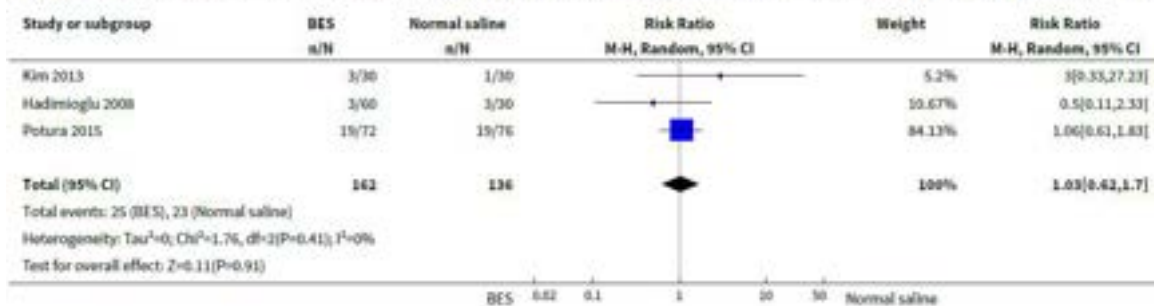
- 6 études incluses (477 participants)
- Tous adultes
- 70 % de DV

cochrane database syst rev 2016 Aug; 2016(8): CD010741

Quel type de remplissage en post-greffe ?

Risque de reprise retardée de fonction

Analysis 1.1. Comparison 1 Balanced electrolyte solutions versus normal saline, Outcome 1 Delayed graft function.



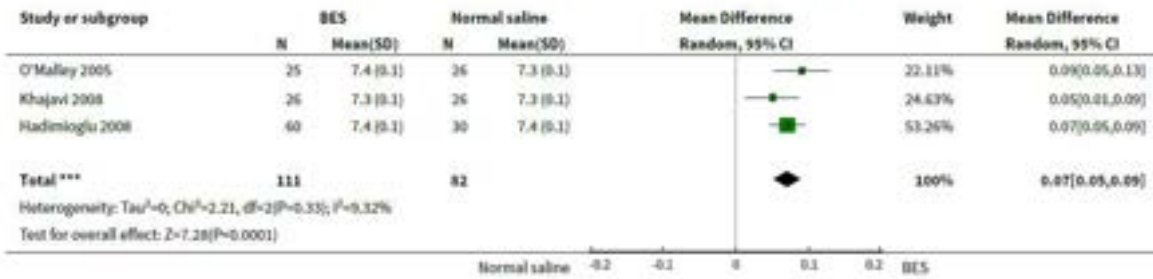
cochrane database syst rev 2016 Aug; 2016(8): CD010741

Quel type de remplissage en post-greffe ?



pH sanguin

Analysis 1.3. Comparison 1 Balanced electrolyte solutions versus normal saline, Outcome 3 Blood pH at end of surgery.



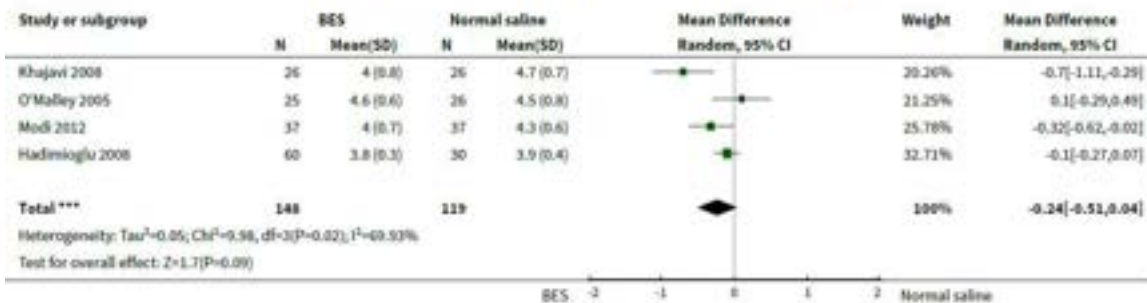
cochrane database syst rev 2016 Aug; 2016(8): CD010741

Quel type de remplissage en post-greffe ?



Kaliémie post-opératoire

Analysis 1.6. Comparison 1 Balanced electrolyte solutions versus normal saline, Outcome 6 Serum potassium at end of surgery.



cochrane database syst rev 2016 Aug; 2016(8): CD010741

Quel type de remplissage en post-greffe ?

Baseline Characteristics and Representativeness of Participants in the BEST-Fluids Trial: A Randomized Trial of Balanced Crystalloid Solution Versus Saline in Deceased Donor Kidney Transplantation

Michael G. Collins, PhD,^{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106,107,108,109,110,111,112,113,114,115,116,117,118,119,120,121,122,123,124,125,126,127,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,144,145,146,147,148,149,150,151,152,153,154,155,156,157,158,159,160,161,162,163,164,165,166,167,168,169,170,171,172,173,174,175,176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255,256,257,258,259,260,261,262,263,264,265,266,267,268,269,270,271,272,273,274,275,276,277,278,279,280,281,282,283,284,285,286,287,288,289,290,291,292,293,294,295,296,297,298,299,300,301,302,303,304,305,306,307,308,309,310,311,312,313,314,315,316,317,318,319,320,321,322,323,324,325,326,327,328,329,330,331,332,333,334,335,336,337,338,339,340,341,342,343,344,345,346,347,348,349,350,351,352,353,354,355,356,357,358,359,360,361,362,363,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,380,381,382,383,384,385,386,387,388,389,390,391,392,393,394,395,396,397,398,399,400,401,402,403,404,405,406,407,408,409,410,411,412,413,414,415,416,417,418,419,420,421,422,423,424,425,426,427,428,429,430,431,432,433,434,435,436,437,438,439,440,441,442,443,444,445,446,447,448,449,450,451,452,453,454,455,456,457,458,459,460,461,462,463,464,465,466,467,468,469,470,471,472,473,474,475,476,477,478,479,480,481,482,483,484,485,486,487,488,489,490,491,492,493,494,495,496,497,498,499,500,501,502,503,504,505,506,507,508,509,510,511,512,513,514,515,516,517,518,519,520,521,522,523,524,525,526,527,528,529,530,531,532,533,534,535,536,537,538,539,540,541,542,543,544,545,546,547,548,549,550,551,552,553,554,555,556,557,558,559,560,561,562,563,564,565,566,567,568,569,570,571,572,573,574,575,576,577,578,579,580,581,582,583,584,585,586,587,588,589,590,591,592,593,594,595,596,597,598,599,600,601,602,603,604,605,606,607,608,609,610,611,612,613,614,615,616,617,618,619,620,621,622,623,624,625,626,627,628,629,630,631,632,633,634,635,636,637,638,639,640,641,642,643,644,645,646,647,648,649,650,651,652,653,654,655,656,657,658,659,660,661,662,663,664,665,666,667,668,669,670,671,672,673,674,675,676,677,678,679,680,681,682,683,684,685,686,687,688,689,690,691,692,693,694,695,696,697,698,699,700,701,702,703,704,705,706,707,708,709,710,711,712,713,714,715,716,717,718,719,720,721,722,723,724,725,726,727,728,729,730,731,732,733,734,735,736,737,738,739,740,741,742,743,744,745,746,747,748,749,750,751,752,753,754,755,756,757,758,759,760,761,762,763,764,765,766,767,768,769,770,771,772,773,774,775,776,777,778,779,780,781,782,783,784,785,786,787,788,789,790,791,792,793,794,795,796,797,798,799,800,801,802,803,804,805,806,807,808,809,810,811,812,813,814,815,816,817,818,819,820,821,822,823,824,825,826,827,828,829,830,831,832,833,834,835,836,837,838,839,840,841,842,843,844,845,846,847,848,849,850,851,852,853,854,855,856,857,858,859,860,861,862,863,864,865,866,867,868,869,870,871,872,873,874,875,876,877,878,879,880,881,882,883,884,885,886,887,888,889,890,891,892,893,894,895,896,897,898,899,900,901,902,903,904,905,906,907,908,909,910,911,912,913,914,915,916,917,918,919,920,921,922,923,924,925,926,927,928,929,930,931,932,933,934,935,936,937,938,939,940,941,942,943,944,945,946,947,948,949,950,951,952,953,954,955,956,957,958,959,960,961,962,963,964,965,966,967,968,969,970,971,972,973,974,975,976,977,978,979,980,981,982,983,984,985,986,987,988,989,990,991,992,993,994,995,996,997,998,999,1000}

- Plasma-Lyte 148 vs. Salé isotonique pour réduire le risque de retard de reprise de fonction
- 808 patients enrôlés

... à suivre



Transplantation Direct 2022;8: e139

Quel type de remplissage en post-greffe ?

European Renal Best Practice Guideline on kidney donor and recipient evaluation and perioperative care

Daniel Abramowitz¹, Pierre Cocher², Franz H.J. Cloer³, Uwe Hartmann⁴, John Pascoe⁵, C. Doherty⁶, Paul Hinder⁷, Marianne Hochmann⁸, Umberto Maggiore⁹, Maurizio Salvadori¹⁰, Gino Spavola¹¹, Jean-Paul Szeffer¹², Jörg Weiger¹³, Armando Torres^{14,15}, Olof Ullrich¹⁶, Martin Zoller¹⁷, Raymond Verbeek¹⁸, Wim Van Biesen¹⁹ and Eli Nagler²⁰

4.3. In kidney transplant recipients during the perioperative period, does the use of intravenous solutions other than 0.9% sodium chloride improve patient and/or graft outcome?

- 4.3.1. There is no evidence to prefer one type of solution (crystalloids versus colloids, normal saline versus Ringer) for intravenous volume management of the recipient during kidney transplant surgery.
- 4.3.2. In view of the available data in the literature, and in line with the ERBP position on prevention of AKI, we suggest to be cautious with the use of starches in the kidney transplant recipient during the perioperative period, although specific data in this setting are lacking. (Ungraded Statement)
- 4.3.3. We recommend monitoring for metabolic acidosis when normal saline is used as the only intravenous fluid in the perioperative and post-operative period. (1B)

4.4. Does the use of dopaminergic agents (dopamine and its alternatives) improve early post-operative graft function?

4.4.1. We do not recommend the use of 'renal doses' of dopaminergic agents in the early post-operative period, since it does not improve graft function or survival. (1B)



Nephrol Dial Transplant (2015) 30: 1790–1797

Quel niveau de remplissage en post-greffe ?

Fluid Management During Kidney Transplantation: A Consensus Statement of the Committee on Transplant Anesthesia of the American Society of Anesthesiologists

Colleen Higgins, MD,¹ Daniel Robinson, MD, PhD,² Cynthia Wang, MD,³ Elizabeth Knapik, MD,⁴ Caroline Day, MD,⁵ Chyi Soriano, MD,⁶ James Reed, MD,⁷ James G. Wintchur, MD, PhD,⁸ Maria Magalini, MD,⁹ Barbara Rando-Rodriguez, MD, PhD,¹⁰ Raymond M. Plummer, MD,¹¹ David M. Florentz, MD,¹² Scott Lindberg, MD,¹³ Norman Schumert, MD, PhD,¹⁴ and Evan G. Phelan, MD¹⁵

TABLE 1.
Summary of conclusions

Recommendation	Background	Center for Evidence-Based Medicine		GRADE system	
		Level of evidence	Grade of recommendation	Level of evidence	Grade of recommendation
General large volume fluid administration or "high CVP" is not recommended	Not sufficient and only weak evidence to support generally large volume fluid administration or aim for high CVP (level III–IV evidence)	3–4	C	B	2
There is probably no benefit for routine use of albumin over crystalloids	KT: No benefit in 2 RCTs (level II) Non-KT: No benefit in large, multicenter RCTs (level IA)	1B–1A	B	A	4
Balanced crystalloid solutions are at least equal if not better than 0.9% saline	KT: Balanced crystalloid solutions are associated with a better metabolic profile and equal if not lower potassium levels compared to 0.9% saline	1A	A	A	1
Use of starches is not recommended	KT: Worse renal outcomes with starches (II B) Non-KT: Strong evidence of worse outcomes in multiple RCTs (I A)	2B–1A	A	A	4
Central venous pressure is not a useful endpoint for fluid administration	Non-KT: Systematic review of 24 studies assessing CVP as a monitor for volume status found "a very poor relationship between CVP and blood volume" (A)	1A	A	A	4

CVP, central venous pressure; GRADE, Grading of Recommendations Assessment, Development and Evaluation; KT, kidney transplant.



Transplantation 2021;105: 1677–1684

Quel niveau de remplissage en post-greffe ?

European Renal Best Practice Guideline on kidney donor and recipient evaluation and perioperative care

Daniel Abramowitz,¹ Pierre Cocheret,² Franz H.J. Claes,³ Uwe Hartmann,⁴ John Pascoe,⁵ C. Doherty,⁶ Paul Hinder,⁷ Massimo Piccinini,⁸ Umberto Maggiore,⁹ Maurizio Salvadori,¹⁰ Gino Spavone,¹¹ Jean-Paul Szeffler,¹² Jörg Weiger,¹³ Armando Torro,^{14,15} Olof Wijkby,¹⁶ Martin Ziser,¹⁷ Raymond Verbeke,¹⁸ Wim Van Biesen,¹⁹ and Eli Nagler²⁰

4.2. Does the use of central venous pressure measurement as a guidance tool for fluid management in kidney transplant recipients improve the outcome after transplantation?

4.2.1. We suggest that central venous pressure be measured and corrected in the early post-operative period to prevent hypovolemia and delayed graft function. (2D)



Nephrol Dial Transplant (2015) 30: 1790–1797

Quel niveau de remplissage en post-greffe ?

- Association between intra-abdominal pressure (IAP, assessed by intravesical pressure), weight gain, central venous pressure (CVP, measured by a jugular catheter), mean arterial pressure (MAP), mean perfusion pressure (MPP=MAP-CVP), and abdominal perfusion pressure (APP=MAP-IAP) within the first 72 hours after kidney transplantation and day 30 estimated glomerular filtration rate (eGFR).
- N=55 KTRs, 11% Living donor, 18% DGF, Day-30 eGFR at 47±22 ml/min per 1.73 m2
- Fluid administration was used to maintain CVP above 5cmH₂O without exceeding a 8 to 10% increase in Δweight.

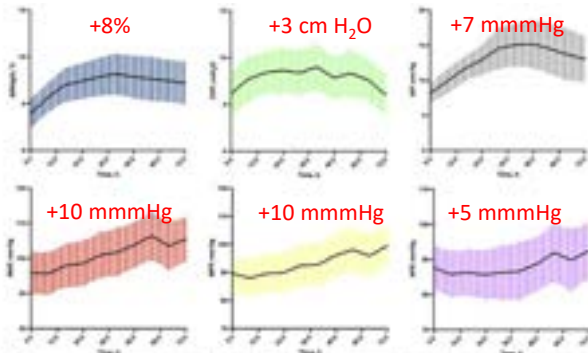


Figure 1. Time series of fluid status indicators within the first 72 hours after kidney transplantation. Evolution of each fluid status indicator (ΔWeight, MAP, CVP, IAP, MPP, and APP) within the first 72 hours after kidney transplantation. Results are illustrated as mean and SD. ΔWeight, weight gain; MPP, abdominal perfusion pressure; CVP, central venous pressure; IAP, intra-abdominal pressure; MAP, mean arterial pressure; MPP, mean perfusion pressure.

A Pilot Study on the Association Between Early Fluid Status Indicators After Kidney Transplantation and Graft Function Recovery

Vincent Dupuis^{1,2,3}, Anne Sophie Bonnet-Labrousse¹, Alice Bellere², Alouette Delmondes¹, Alain Wyckel¹, Antoine Bissacoste¹, Charlotte Corcos¹, Leontine Mader¹, Renaud Serravallo¹, Vincent Valadier¹, Corinne Barthe¹, Mathieu Jozanet^{1,2} and Philippe Fouillat¹

Table 1. Association between fluid status indicators levels within the first 72 hours after kidney transplantation and day 30 eGFR outcomes of the different regression models.

Variable	β coefficient (95% CI)	P value
ΔWeight gain	0.00 ± 0.00	0.99
MAP (mmHg) < 10	0.00 ± 0.00	0.99
MAP (mmHg) > 10	0.00 ± 0.00	0.99
CVP (cmH ₂ O) < 5	0.00 ± 0.00	0.99
CVP (cmH ₂ O) > 5	0.00 ± 0.00	0.99
IAP (mmHg) < 10	0.00 ± 0.00	0.99
IAP (mmHg) > 10	0.00 ± 0.00	0.99
MPP (mmHg) < 10	0.00 ± 0.00	0.99
MPP (mmHg) > 10	0.00 ± 0.00	0.99
APP (mmHg) < 10	0.00 ± 0.00	0.99
APP (mmHg) > 10	0.00 ± 0.00	0.99



← C'est ajusté !

Kidney Int Rep (2022) 7, 1416–1419

Quel niveau de remplissage en post-greffe ?

- Association between intra-abdominal pressure (IAP, assessed by intravesical pressure), weight gain, central venous pressure (CVP, measured by a jugular catheter), mean arterial pressure (MAP), mean perfusion pressure (MPP=MAP-CVP), and abdominal perfusion pressure (APP=MAP-IAP) within the first 72 hours after kidney transplantation and day 30 estimated glomerular filtration rate (eGFR).
- N=55 KTRs, 11% Living donor, 18% DGF, Day-30 eGFR at 47±22 ml/min per 1.73 m2
- Fluid administration was used to maintain CVP above 5cmH₂O without exceeding a 8 to 10% increase in Δweight.

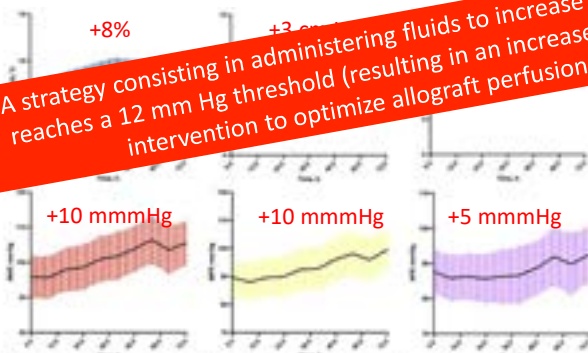


Figure 1. Time series of fluid status indicators within the first 72 hours after kidney transplantation. Evolution of each fluid status indicator (ΔWeight, MAP, CVP, IAP, MPP, and APP) within the first 72 hours after kidney transplantation. Results are illustrated as mean and SD. ΔWeight, weight gain; MPP, abdominal perfusion pressure; CVP, central venous pressure; IAP, intra-abdominal pressure; MAP, mean arterial pressure; MPP, mean perfusion pressure.

A Pilot Study on the Association Between Early Fluid Status Indicators After Kidney Transplantation and Graft Function Recovery

Vincent Dupuis^{1,2,3}, Anne Sophie Bonnet-Labrousse¹, Alice Bellere², Alouette Delmondes¹, Alain Wyckel¹, Antoine Bissacoste¹, Charlotte Corcos¹, Leontine Mader¹, Renaud Serravallo¹, Vincent Valadier¹, Corinne Barthe¹, Mathieu Jozanet^{1,2} and Philippe Fouillat¹

Table 1. Association between fluid status indicators levels within the first 72 hours after kidney transplantation and day 30 eGFR outcomes of the different regression models.

Variable	β coefficient (95% CI)	P value
ΔWeight gain	0.00 ± 0.00	0.99
MAP (mmHg) < 10	0.00 ± 0.00	0.99
MAP (mmHg) > 10	0.00 ± 0.00	0.99
CVP (cmH ₂ O) < 5	0.00 ± 0.00	0.99
CVP (cmH ₂ O) > 5	0.00 ± 0.00	0.99
IAP (mmHg) < 10	0.00 ± 0.00	0.99
IAP (mmHg) > 10	0.00 ± 0.00	0.99
MPP (mmHg) < 10	0.00 ± 0.00	0.99
MPP (mmHg) > 10	0.00 ± 0.00	0.99
APP (mmHg) < 10	0.00 ± 0.00	0.99
APP (mmHg) > 10	0.00 ± 0.00	0.99



A strategy consisting in administering fluids to increase MAP but stopping fluid administration when IAP reaches a 12 mm Hg threshold (resulting in an increased APP) could represent a feasible and promising intervention to optimize allograft perfusion while avoiding renal congestive injury.

←

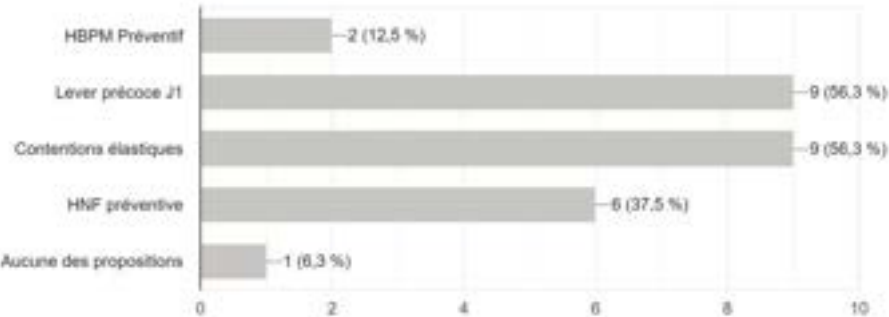
Kidney Int Rep (2022) 7, 1416–1419

Thromboprophylaxie ?



Quelle thromboprophylaxie en post-opératoire immédiat faites-vous de manière habituelle?

16 réponses



→ Stratégie variable selon les centres français

Enquête FIRN 2022

Thromboprophylaxie ?

Efficacy and safety of chemical thromboprophylaxis in renal transplantation – A systematic review

Rachika Khatib^{1,2,3}, Lise Estroff⁴, Abbas Zeidi⁵, Raj Tharasingham⁶, Suzanne Forbes⁷, Peter MacCallum^{8,9}, Joachim Tan¹⁰, Laura Green^{1,2,3}

- 13 études correspondant à 1600 patients

Table 1
General characteristics of included studies

Author	Year	Country	Multi-centre	Sample size	Intervention (days)	Comparison (days)	Start of TP	Duration of TP	Follow-up period
Randomised controlled trials									
Strom (14)	2007	Spain	No	70	LAMN (2000s BID)	LBN (2000s BID) No intervention	NS	1 week	2 weeks
Strom (14)	2014	United Kingdom	Yes (2/3)	34	Warfarin (dose adjusted to maintain the prothrombin time between 2 and 3 times normal)	No intervention	Onset of bleeding (bleeds no longer on dialysis)	8 weeks	6 months
Harash (11)	1975	Australia/New Zealand	No	36	LBN (2000s per day three continuously of 30)	Placebo	NS	Intermittently per day 17 days	14 months
Wadhwa (10)	1979	Australia	No	34	GAC (dose adjusted to maintain the prothrombin time between 1 and 1.5 times normal) + Dipyridazole (25 mg QID, increased to aspirin 100 mg QID by end of week 3)	No intervention	As soon as clinically possible - mean 4day 17 days	NS	GAC + Dipyridazole (mean 30.3 months (no range given)) No intervention (mean 26.4 months (no range given)) 36 days
Ueda (12)	1989	United Kingdom	No	49	LBN (2000s BID)	No intervention	NS	7 days/fully mobile	36 days
Controlled trial (Beyers (13))	1994	France	No	47	LAMN (dose NS)	No intervention	NS	NS	NS
Observational studies									
Howell (15)	2011	United Kingdom	No	47	LBN (dose NS) (2000s then 10,000-15000s continuous subcut)	LAMN (dose NS) No intervention	LBN (dose NS) LAMN NS	LBN 2 days LAMN 2-4 days	14 days
Hg (16)	2016	Canada	No	147	Enoxaparin (weight based doses, 2000s QD, 2000s BID, 2000s qHS)	No intervention	NS	Intermittent per day 3.4 days Treatment heparin mean 3.1 days	NS
Subtotal (11)	2012	Turkey	No	36	LAMN (40 mg QID)	No intervention	1 day pre-op	First post-op week	LAMN (mean 11 days (9-20)) No intervention (mean 11 days (7-20))
Schulze (11)	2012	Iran	No	47	LBN (200 mg qHS) + ASA (75 mg/kg three times/week)	No intervention	NS	Heparin, 7 days + ASA, 3 months	Heparin + ASA 24 or 48 months (unknown) No intervention 170 months
Leadbetter (17)	2000	Sweden	No	130	LAMN (variable doses and frequencies) 20 mg QID, 40 mg QID, 2000s QID, 10000s QID)	No intervention	Post-op	Mean 10.4 days (3.0-27)	47 days
Howell (15)	2000	Australia	No	320	LBN (2000s BID)	No intervention	NS	Mean 9 days (3-24)	NS
Warshawski (11)	2000	USA	No	40	Heparin + warfarin	Heparin + Aspirin Heparin No intervention	NS	NS	NS

TP, thromboprophylaxis; LBN, low molecular weight heparin; LAMN, low molecular weight heparin; ASA, aspirin; NS, not stated; GAC, oral anticoagulant; qHS, every 8 h; QID, every 12 h; QD, once a day; QOD, four times a day; BID, twice a day.

Thrombosis Research 192 (2020) 88-95



Thromboprophylaxie ?

Efficacy and safety of chemical thromboprophylaxis in renal transplantation – A systematic review

Rachika Kohli^{1,2,3}, Ute Estroff⁴, Abbas Zeidi⁵, Raj Tharasingham⁶, Suzanne Forbes⁷, Peter MacCallum⁸, Jouchien Tan^{9,10}, Laura Green^{1,2,3}



	Random sequence generation	Blinding of participants and personnel	Blinding of outcome assessment	Statistical analysis	Missing data	Reporting	Other issues	Overall
Active vs. control	Yellow	Yellow	Red	Yellow	Yellow	Red	Yellow	Red
Active vs. active	Yellow	Yellow	Green	Green	Yellow	Red	Yellow	Red
Active vs. active	Red	Red	Red	Red	Yellow	Red	Yellow	Red
Active vs. active	Red	Red	Red	Red	Yellow	Red	Yellow	Red
Active vs. active	Yellow	Green	Red	Yellow	Yellow	Red	Yellow	Red

→ Mauvaise qualité des données

Table 3
Number of participants with VTE

Author/year	Intervention type (n)	Events in VTE	Follow-up period	Certainty of evidence (grade)
Active treatment versus no treatment				
Symptomatic VTE				
Kangh (2009) (11)	No Rx (193) UFH (145)-chem LMWH (13)	98 0	2 weeks	⊕ ⊕ ⊕ ⊕ very low
Active treatment versus another treatment				
Asymptomatic VTE				
Deman (2007) (24)	No Rx (20) LMWH (20) UFH (20)	0 0 0	2 weeks	⊕ ⊕ ⊕ ⊕ very low

→ Peu de thromboses

Studies	Intervention type (n)	Major Bleeding (95% CI)
Active treatment versus no treatment		
Control studies		
Kangh (2009) (11)	UFH (145) No Rx (193)	30 (62.5%) 31 (25.5%)
Landin (2002) (11)	LMWH (36) No Rx (64)	4 (11.7%) 2 (4.7%)
Marcellino (2010) (11)	Variable: Heparin + warfarin; Heparin + aspirin; Heparin (44) No Rx (152)	5 (11.3%) 3 (6.3%)
Active treatment versus another treatment		
RCT		
Deman (2007) (24)	No Rx (20) LMWH (20) UFH (20)	0 3 (4%) 0
Control studies		
Ng (2016) (11)	No Rx (240) Prophylactic Heparin (240) No Heparin (15)	6 (13.4%) 8 (2%) 4 (46.7%)
Pawlich (2011) (11)	UFH intra-op then LMWH (15) LMWH (18) No Rx (18)	7 (46.7%) 4 (22%) 6 (33.3%)

→ Beaucoup de saignement

Thrombosis Research 192 (2020) 88-95

Thromboprophylaxie ?

Efficacy and safety of chemical thromboprophylaxis in renal transplantation – A systematic review

Rachika Kohli^{1,2,3}, Ute Estroff⁴, Abbas Zeidi⁵, Raj Tharasingham⁶, Suzanne Forbes⁷, Peter MacCallum⁸, Jouchien Tan^{9,10}, Laura Green^{1,2,3}



	Random sequence generation	Blinding of participants and personnel	Blinding of outcome assessment	Statistical analysis	Missing data	Reporting	Other issues	Overall
Active vs. control	Yellow	Yellow	Red	Yellow	Yellow	Red	Yellow	Red
Active vs. active	Yellow	Yellow	Green	Green	Yellow	Red	Yellow	Red
Active vs. active	Red	Red	Red	Red	Yellow	Red	Yellow	Red
Active vs. active	Red	Red	Red	Red	Yellow	Red	Yellow	Red
Active vs. active	Yellow	Green	Red	Yellow	Yellow	Red	Yellow	Red

→ Mauvaise qualité des données

Table 3
Number of participants with VTE

Author/year	Intervention type (n)	Events in VTE	Follow-up period	Certainty of evidence (grade)
Active treatment versus no treatment				
Symptomatic VTE				
Kangh (2009) (11)	No Rx (193) UFH (145)-chem LMWH (13)	98 0	2 weeks	⊕ ⊕ ⊕ ⊕ very low
Active treatment versus another treatment				
Asymptomatic VTE				
Deman (2007) (24)	No Rx (20) LMWH (20) UFH (20)	0 0 0	2 weeks	⊕ ⊕ ⊕ ⊕ very low

→ Peu de thromboses

Studies	Intervention type (n)	Major Bleeding (95% CI)
Active treatment versus no treatment		
Control studies		
Kangh (2009) (11)	UFH (145) No Rx (193)	30 (62.5%) 31 (25.5%)
Landin (2002) (11)	LMWH (36) No Rx (64)	4 (11.7%) 2 (4.7%)
Marcellino (2010) (11)	Variable: Heparin + warfarin; Heparin + aspirin; Heparin (44) No Rx (152)	5 (11.3%) 3 (6.3%)
Active treatment versus another treatment		
RCT		
Deman (2007) (24)	No Rx (20) LMWH (20) UFH (20)	0 3 (4%) 0
Control studies		
Ng (2016) (11)	No Rx (240) Prophylactic Heparin (240) No Heparin (15)	6 (13.4%) 8 (2%) 4 (46.7%)
Pawlich (2011) (11)	UFH intra-op then LMWH (15) LMWH (18) No Rx (18)	7 (46.7%) 4 (22%) 6 (33.3%)

→ Beaucoup de saignement

Thrombosis Research 192 (2020) 88-95

Etudes très hétérogènes, à faible valeur méthodologique et faible puissance
Pas de différence du risque de thrombose 0.2 [95% CI 0.01–4.63]

Thromboprophylaxie ?

European Renal Best Practice Guideline on kidney donor and recipient evaluation and perioperative care

Daniel Abramowitz¹, Pierre Cochat^{2,3}, Franz H.J. Cloos⁴, Uwe Hartmann⁵, Jairo Pascoal⁶, C. Dalry⁷, Paul Harden⁸, Massimo Nicotri⁹, Umberto Maggiore¹⁰, Maurizio Salvadori¹¹, Gino Spavola¹², Jean-Paul Squifflet¹³, Jörg Seiger¹⁴, Armando Torres^{15,16}, Orlin Vildicky¹⁷, Martin Ziser¹⁸, Raymond Vanholder¹⁹, Wim Van Biesen²⁰ and Eva Nagler²¹

4.5. Should we use prophylactic antithrombotic agents during the perioperative period?

4.5.1. We do not recommend routinely using low-molecular-weight heparin, unfractionated heparin or aspirin before transplantation to prevent graft thrombosis. (1B)

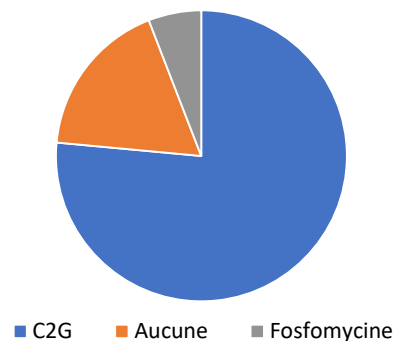


Nephrol Dial Transplant (2015) 30: 1790–1797

Antibioprophylaxie pré-greffe ?



- C2G = 11 centres/15
- Aucune = 3 centres
- Fosfomycine = 1 centre



Enquête FIRN 2022

Antibioprophylaxie pré-greffe ?



Guidelines
Antibioprophylaxis in surgery and interventional medicine (adult patients), Update 2017^{1,2,3}
 C. Martin¹, C. Auboyer², M. Besson³, H. Dupont⁴, R. Guent⁵, M. Killy⁶, M. Lemaire⁷, A. Lepage⁸, D. Mhanna⁹, P. Montravers¹⁰, J.L. Puissant¹¹. Steering committee of the French Society of Anesthesiology and Intensive Care Medicine (SFAR) responsible for the establishment of the guidelines.

Vascular surgery:

Surgery	Product	Initial dose	Re-injections and duration
Surgery of the aorta, arteries of the lower limbs, infra-auric trunk	Cefazolin	2g IV dose	Single dose (if time > 4 h, reagent 1g)
Arterial endoprosthesis, Carotid surgery with patch	Cefamandole or cefazolin	1.5g IV dose	Single dose (if duration > 2 h, reagent 0.75g)
Expansion with or without stent	Allygy: vancomycin ^a	30 mg/kg 120 min	Single dose
	See above	See above	Single dose
Carotid surgery without patch	No AMP	No AMP	No AMP
Liath amputation	Van A + BP ^b	2g IV dose	1g/8 hours for a period of 48 hours
	Allygy: clindamycin + gentamicin	300 mg IV dose	300 mg/8 hours for 48 hours
		5 mg/kg/8h	Reagent 3 mg/kg at hour 24
Vein surgery	No AMP	No AMP	No AMP

^a Indications of vancomycin: allergy to beta-lactams, suspected or proven colonization by methicillin-resistant staphylococci, osteoporosis in a patient hospitalized in a unit with an ecology including methicillin-resistant staphylococci strains, previous antibiotic therapy. The injection lasts 120 minutes and must end at the latest at the beginning of the intervention and the last 30 minutes before.

^b Aminopenicillin-beta-lactamase inhibitor.

→ Cefazoline

Surgery	Product	Initial dose	Re-injections and duration
Prostate surgery			
Endoscopic resection of the prostate, reversal-prostate incision prostatectomy	Cefazolin	2g IV dose	Single dose (if duration > 4h reagent 1 g)
	Cefamandole or cefazolin	1.5g IV dose	Single dose (if duration > 2h, reagent 0.75 g)
	Allygy: gentamicin	5 mg/kg	Single dose
Radical prostatectomy	No AMP	No AMP	No AMP
Penile surgery			
Penile biopsy	Ofloxacin orally	Single dose 400 mg (1 hour prior to biopsy)	Single dose
	Allygy: cefazolin	1g	Single dose
Biliary surgery, adrenal and urinary tract			
Endoscopic treatment of the renal and ureteral strictures, pyelonephritis, pyelocystostomy, nephroliothotomy, nephrostomy, if prefer inserted or ureteral	Cefazolin	2g IV dose	Single dose (if duration > 4h reagent 1 g)
	Cefamandole and cefazolin	1.5g IV dose	Single dose (if duration > 2h, reagent 0.75 g)
	Allygy: gentamicin	5 mg/kg/day	Single dose
Nephrectomy and other upper tract surgery	No AMP	No AMP	No AMP
Adrenalectomy	No AMP	No AMP	No AMP
Transurethral lithotripsy	No AMP	No AMP	No AMP



Antibioprophylaxie pré-greffe ?

One-shot versus multidose perioperative antibiotic prophylaxis after kidney transplantation: A randomized, controlled clinical trial

Giuseppe Orlando, MD, PhD,¹ Francesco Maria Marotta, MD, PhD,² Roberto Sanga, PhD,³ Giuseppe Iorio, MD, PhD,⁴ Roberto Angillo, MD,⁵ Daniele Mirra, MD,⁶ Luca Toti, MD, PhD,⁷ Andrea Felice, MD,⁸ Tiziana Paoletti, MD,⁹ Rafi Khatib, MD,¹⁰ Juan Pablo Sanchez, MD, PhD,¹¹ Andrea Marzi, MD,¹² Nicola Paolo Bellomo, MD,¹³ Raulo Oksanen, MD,¹⁴ Pasquale Di Corleto, MD,¹⁵ Linda De Luca, MD, PhD,¹⁶ Gennaro Tarantini, MD, PhD,¹⁷ Antonio Fumagalli, MD,¹⁸ Stefano Ciliberto, MD,¹⁹ Giuseppe Serrone, MD,²⁰ Francesco Pizzi, MD,²¹ and Jacques Bonaguidi, MD, PhD,²² Steven Berlin, MD,²³ and Steve and I. Napoli, MD

- Etude multicentrique prospective randomisée
 - Simple dose (n=103) vs. multidose (n=102) chez des transplantés rénaux adultes, non diabétiques, sans obésité morbide
 - Primary endpoint : infection du site chirurgical
- Trois cas d'infections du site opératoire (2% vs. 1%; P=NS), toutes dans la première semaine



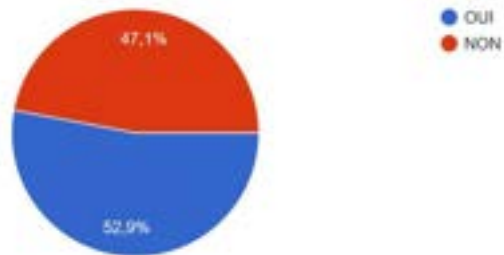
Surgery. 2015 Jan;157(1):104-10

Le furosémide !



Utilisez vous (de façon systématique ou protocolisée) le furosémide intraveineux en post-opératoire?

17 réponses



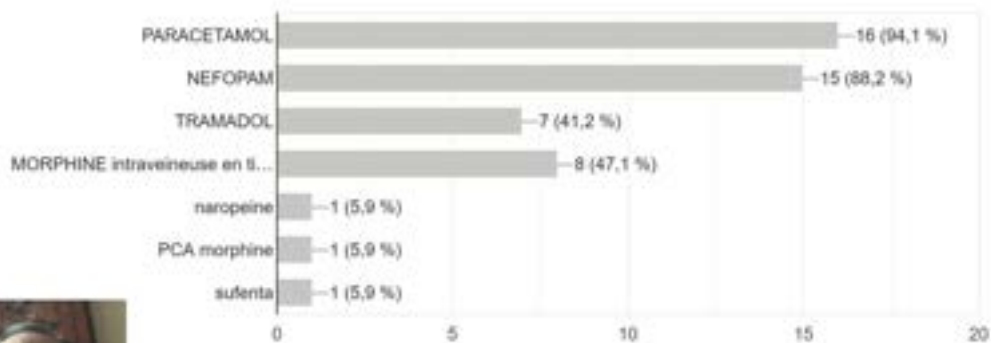
Enquête FIRN 2022

L'antalgie



Quels antalgiques utilisez vous en post-opératoire?

17 réponses

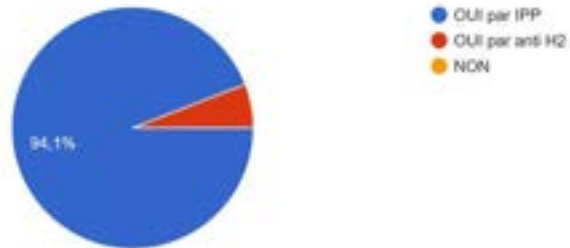


Enquête FIRN 2022

Prévention de l'ulcère



Faites vous une prévention de l'ulcère gastroduodénal systématique?
17 réponses



Enquête FIRN 2022

QCM d'auto-évaluation 1



Parmi les affirmations suivantes relatives à l'indication de séance d'hémodialyse pré-opératoire immédiatement avant la transplantation, laquelle ou lesquelles sont justes ?

- A. Une séance de dialyse pré-opératoire réduit le risque d'hyperkaliémie post-opératoire
- B. Une anticoagulation au citrate a montré son bénéfice pour réduire le risque de saignement per-opératoire
- C. Les recommandation européennes suggèrent de ne pas faire d'UF au cours de la séance de dialyse pré-opératoire en dehors de surcharge cliniquement évidente
- D. Une séance de dialyse pré-opératoire accroît le risque de retard de reprise de fonction du greffon
- E. Les recommandation européennes suggèrent de réaliser une séance de dialyse pré-opératoire immédiatement avant la transplantation



QCM d'auto-évaluation 2



Parmi les affirmations suivantes relatives aux modalités de remplissage per- et post-transplantation, laquelle ou lesquelles sont justes ?

- A. Les solutés balancés, comparés aux soluté salé isotonique, réduisent le risque de retard de reprise de fonction du greffon
- B. Les solutés balancés, comparés aux soluté salé isotonique, sont associés à un pH sanguin significativement plus élevé
- C. Les solutés balancés, comparés aux soluté salé isotonique, sont associés à une kaliémie significativement plus basse
- D. L'objectif du remplissage est de maintenir une pression veineuse centrale $> 8 \text{ cmH}_2\text{O}$
- E. Un remplissage excessif pourrait augmenter la pression intra-abdominale

