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

Transplantation Rénale & Anesthésie-Réanimation

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Février 2023

OBJECTIFS du COURS

A. Aborder les interactions entre l'anesthésie et la fonction rénale
B. Aborder les interactions entre l'anesthésie et l'hémodynamique lors de la transplantation rénale
   A. Objectifs hémodynamiques
   B. Moyens: monitorage et traitements
   C. Chronologie

QCM auto-évaluation 1 (exemple)

Enoncé 1 : Vous prescrivez la séance de dialyse avant une transplantation rénale

Q1 – Quel est le poids cible post dialyse?

A. Poids sec
B. Poids sec + 1 kg
C. Poids sec -1 kg
D. Poids sec + 10g / kg de poids sec
E. Qu'importe, le collègue anesthésiste-réanimateur se débrouillera au bloc opératoire

QCM auto-évaluation 2

Enoncé 2 : De nombreuses études expérimentales ont mis en évidence l'effet préconditionnant de certains hypnotiques (effet protecteur lors de la séquence ischémie-reperfusion).

Q2 - Parmi les hypnotiques suivant, lesquels sont le plus souvent présentés comme des traitement préconditionnants?

A. - les halogénés (isoflurane, sévoflurane, desflurane)
B. - le propofol
C. - la kétamine
D. - les benzodiazépines (midazolam)
E. - l'étomidate

CONSENSUS STATEMENT

NATURE REVIEWS | NEPHROLOGY

VOLUME 17 | SEPTEMBER 2021 | 605

« ADQI & POQI »

Postoperative acute kidney injury in adult non-cardiac surgery: joint consensus report of the Acute Disease Quality Initiative and PeriOperative Quality Initiative

John R. Prowle[1,10], Lui G. Forni[2,3], Max Bell[4], Michelle S. Chew[5], Mark Edwards[6], Morgan E. Grams[7], Michael P. W. Grocott[8], Kathleen D. Liu[9], David McIlroy[10], Patrick T. Murray[11], Marlies Ostermann[12], Alexander Zarbock[13], Sean M. Bagshaw[14], Raquel Bartz[15], Samira Bell[16], Azra Bihorac[17], Tong J. Gan[18], Charles E. Hobson[19], Michael Joannidis[20], Jay L. Koyner[21], Denny Z. H. Levett[8], Ravindra L. Mehta[22], Timothy E. Miller[23], Michael G. Mythen[24], Mitra K. Nadim[25], Rupert M. Pearse[7], Thomas Rimmele[26], Claudio Ronco[27], Andrew D. Shaw[28,30] and John A. Kellum[29,30]

Preoperative factors
- Pre-existing kidney dysfunction
- Diabetes
- Cardiac dysfunction
- Age > 50 years
- Sepsis
- Volume depletion
- Hepatic failure
- Crush injury
- Exposure to nephrotoxins

Intraoperative factors
- Hypovolaemia (caused by bleeding and insensible fluid losses)
- Kidney ischaemia
- Inflammation
- Increased intra-abdominal pressure
- Decreased cardiac output (caused by anaesthetic)
- Vasodilatation (caused by anaesthetic)
- Exposure to nephrotoxins
- Embolism

Postoperative factors
- Hypovolaemia (caused by bleeding and insensible fluid losses)
- Kidney ischaemia
- Inflammation
- Increased intra-abdominal pressure
- Decreased cardiac output (caused by anaesthetic)
- Vasodilatation (caused by anaesthetic)
- Exposure to nephrotoxins
- Urinary obstruction
- Acute lung injury
- Mechanical ventilation

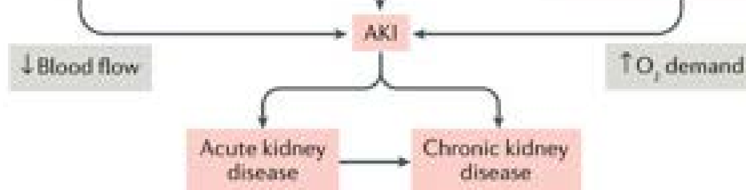

Fig. 1 | **Pathophysiology of PO-AKI.** Similar to most other forms of acute kidney injury

Postoperative acute kidney injury in adult non-cardiac surgery: joint consensus report of the Acute Disease Quality Initiative and PeriOperative Quality Initiative

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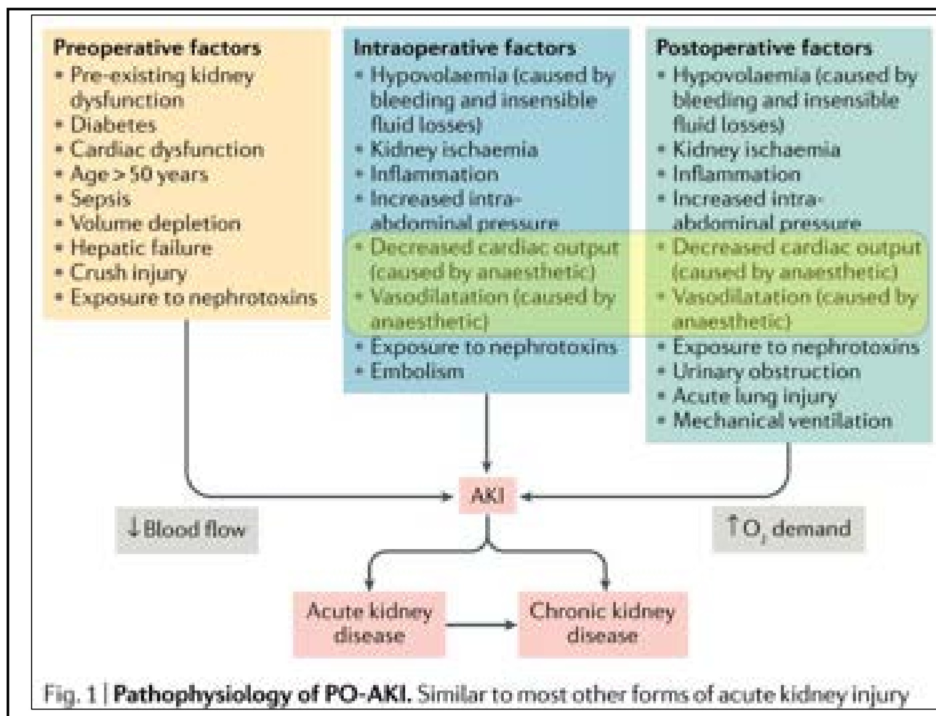

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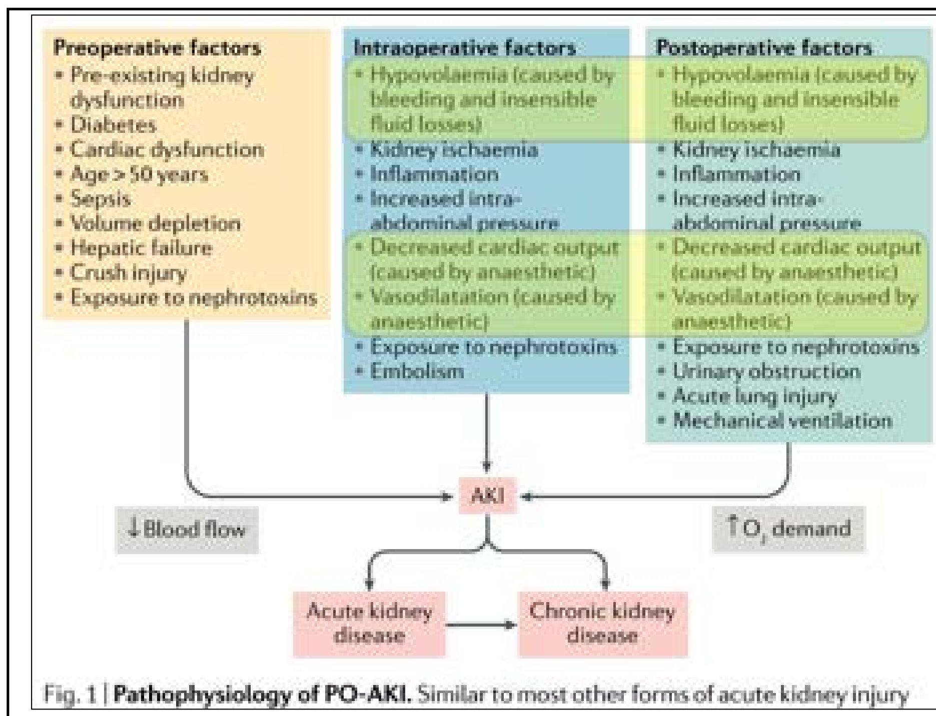

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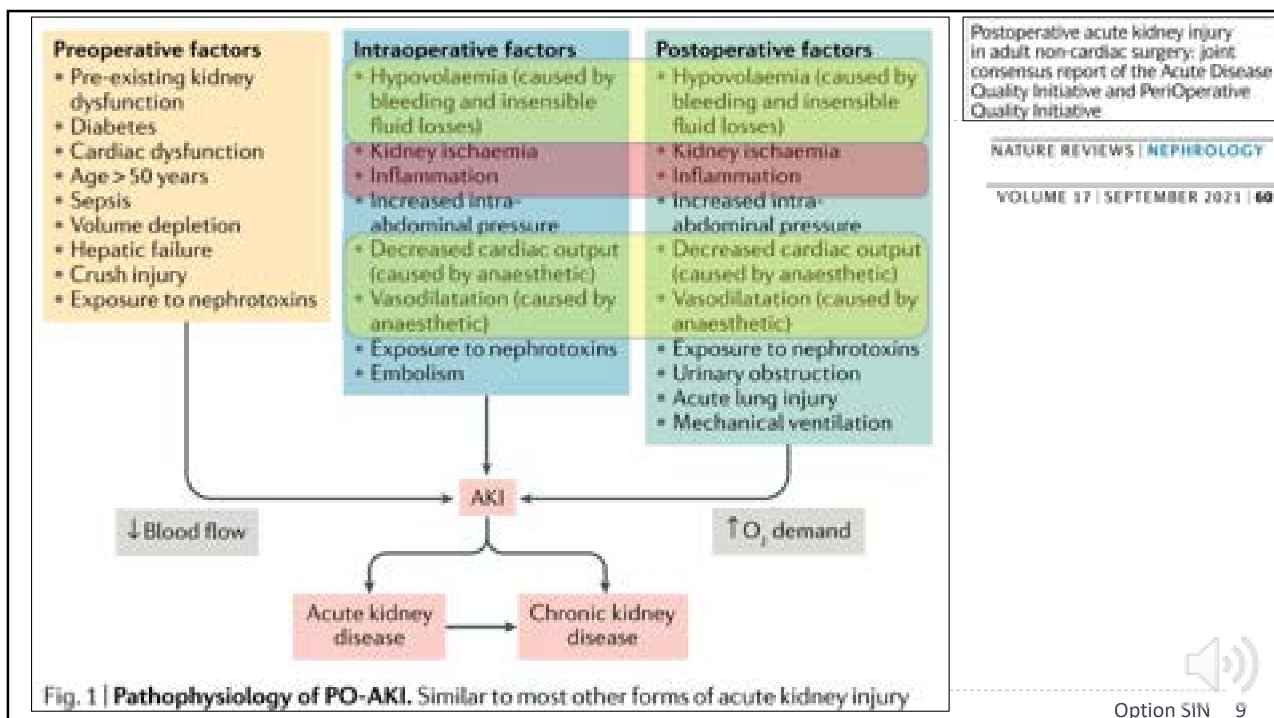

Optimisation Rénale péri-opératoire

- Contrôle de l'inflammation
- Optimisation anesthésie-réanimation
  - Anesthésie: hypnotique ± curare + analgésie

Nephrology

In-Depth Topic Review

A Review of Anesthetic Effects on Renal Function: Potential Organ Protection

Table 2. Proposed interactions and mechanisms of anesthetics

Drug	Proposed interactions
Volatile anesthetics	
Sevoflurane	No deterioration of renal function [15] Protective effect against IR injury [24] Nephrotoxicity due to production of inorganic fluoride ions and Compound A Preconditioning renoprotective effects [30]
Isoflurane	Preconditioning renoprotective effects [28] Protected against renal tubular necrosis and inflammation by inducing renal tubular CD73 and adenosine generation [29]
Intravenous anesthetics	
Ketamine	Ameliorated the up-regulation of inflammatory pathways and reduction of metabolism caused by hypoxia [33]
Dexmedetomidine	Inhibited oxidative stress and inflammation [53]
Propofol	Reduced renal IR injury in rat model [40] Significantly reduced the incidence and severity of AKI in comparison to sevoflurane [48] and midazolam [49] Pretreatment prevented decrease in renal function and an increase in tubular apoptosis by inhibiting oxidative stress [42] Pretreatment protected cells against apoptosis induced by IR [46] Modulated systemic inflammation from IR by decreasing expression of nuclear factor-κB [43] Mitigated renal IR injury via heme oxygenase-1 expression induction [44] Attenuated post-AOLT AKI via inhibition of Cx32 function [63] Promising renoprotective agent in renal transplantation [54]
Regional anesthetics	
Bupivacaine	Lower toxicity for the recipient and renal allografts during renal transplantation [57]
Lidocaine	Lower toxicity for the recipient and renal allografts during renal transplantation [57] Protection against IR injury via miRNA dysregulation prevention [60]

Nephrology

In-Depth Topic Review

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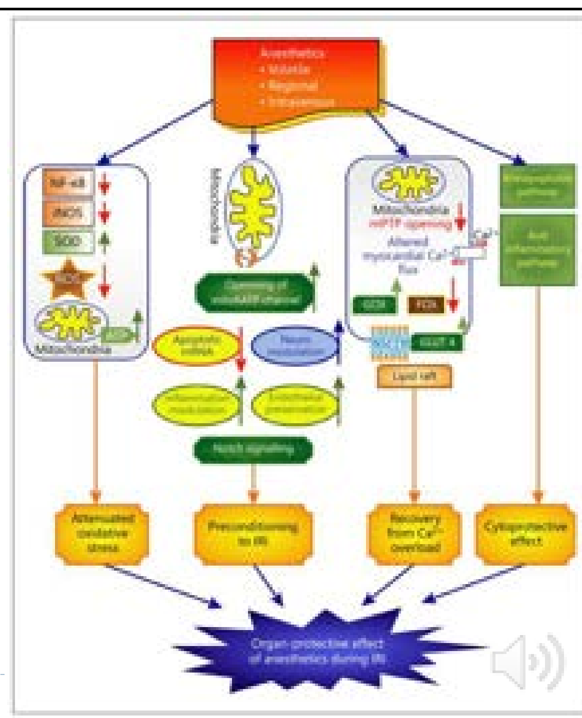


Fig. 1. Hypothesized mechanisms for protective effects of anesthetics.

J Anesth (2013) 27:48–55
DOI 10.1007/s00540-012-1461-z

ORIGINAL ARTICLE

No renal protection from volatile-anesthetic preconditioning in open heart surgery

Wacharin Sindhvananda · Krit Phisaiphun · Prut Prapongsena

Received: 14 November 2011 / Accepted: 18 July 2012 / Published online: 12 August 2012
© Japanese Society of Anesthesiologists 2012

JAMA Network Open.

Original Investigation | Anesthesiology

Effect of Perioperative Dexmedetomidine on Delayed Graft Function Following a Donation-After-Cardiac-Death Kidney Transplant
A Randomized Clinical Trial

JAMA Network Open. 2022;5(6):

- Dexmedetomidine = agoniste sélectif α2
  - Sédation, anxiolyse, sympatholytique, analgésie
  - Effet préconditionnant ?
- RCT single center, 56 DEX IVSE/24h vs. 55 control
- Diminution DGF (dialyse/week) : 18% vs 34%; OR = 0,41, CI [0,17-0,98]; p=0,04

CONCLUSIONS AND RELEVANCE This randomized clinical trial found that 24-hour perioperative dexmedetomidine decreased the incidence of DGF after DCD kidney transplant. The findings support the use of dexmedetomidine in kidney transplants.

Optimisation Rénale péri-opératoire

- **Contrôle de l'inflammation**
- **Optimisation anesthésie**
  - **Hypnotique**
    - Actuellement: AG / propofol ou halogénés (sévoflurane)
    - Chez l'humain: pas de preuve formelle d'une protection lors de la Tx rénale
    - Dexmedetomidine = à suivre?

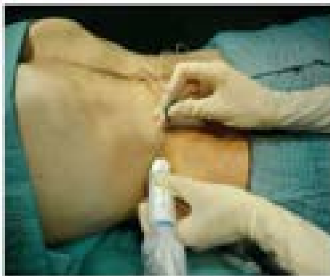
Curares & Tx = monitorage

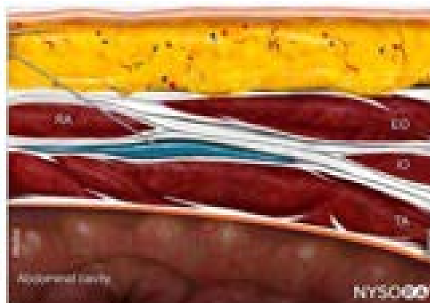
- **Succinylcholine** (induction « séquence rapide » / urgence / « estomac plein »)
  - Augmentation kaliémie
    - Sans IRC: + 0,18 mEq/L
    - Avec IRC + neuropathie urémique : + 0,24 mEq/L
    - CCL:
      - Hyperkaliémie = pas de succinylcholine
      - Kaliémie normale = succinylcholine dose habituelle
  - **Dialyse** = ↓ cholinestérase plasmatique = ↑ durée bloc neuro-musculaire
- **Autres**
  - **Rocuronium** = non modifié par l'insuffisance rénale
  - Vécuronium = bloc prolongé +20% (élimination rénale)
  - **Atracurium et cisatracurium** (induction « standard ») = pas d'adaptation
- **Néostigmine** = élimination rénale (50%) = action prolongée chez le patient insuffisant rén…

Analgésie multimodale

- **Transplantation rénale: chirurgie considérée relativement peu douloureuse**
- **Objectifs Analgésie Multimodale**
  - **EVA <3**
  - **en utilisant le moins de morphine/dérivés morphiniques possible**
  - **Réhabilitation précoce: lever précoce**
- **Moyens**
  - **Analgésiques systémiques**
    - **Palier I (hors AINS) = paracétamol, néfopam**
    - **Palier II = tramadol, si besoin** (tramadol, « opiacé faible », agoniste des récepteurs μ)
    - Palier III = morphine en titration / **attention! M**orphine nécessaire = recherche d'une complication aigue (ischémie/hématome/urinome etc..)
  - **Anesthésie locorégionale =**
    - Historiquement rachianesthésie/péridurale (attention anticoagulation peropératoire)
    - **Actuellement: TAP block ?**

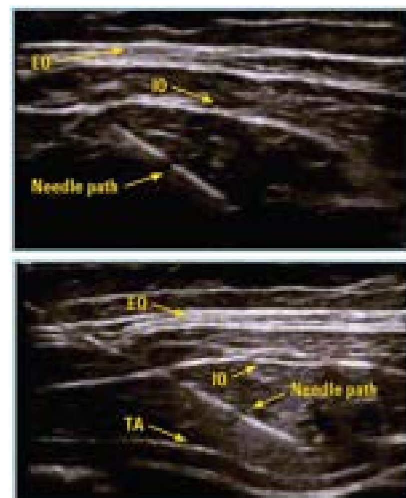
Transversus Abdominis Plane (TAP) Block





From the Compendium of Regional Anesthesia: Reverse Ultrasound Anatomy for a subcostal TAP block with needle insertion in-plane and local anesthetic spread (blue). TA, transversus abdominis; RA, rectus abdominis; IO, internal oblique; EO, external oblique muscles.

Ex: 20 mL 0.5% ropivacaine



Lateral approach

https://www.nysora.com/topics/regional-anesthesia-for-specific-surgical-procedures/abdomen/ultrasound-guided-transversus-abdominis-plane-quadratus-lumborum-blocks/

Transversus Abdominis Plane Block for Analgesia in Renal Transplantation: A Randomized Controlled Trial

Noelle M. Freir, MB, FCARCSI, Caitriona Murphy, MB, FCARCSI, Mohan Mugawar, MB, FCARCSI, FRCA, Anna Linnane, MB, and Anthony J. Cunningham, MD, FCARCSI, FANZCA, FRCPC

Table 1. Baseline Patient and Surgical Data

Anesth Analg 2012 Vol. 115 Issue 4 Pages 953-7

Etude 2012 randomisée (32 vs 33)
Négative: morphine idem

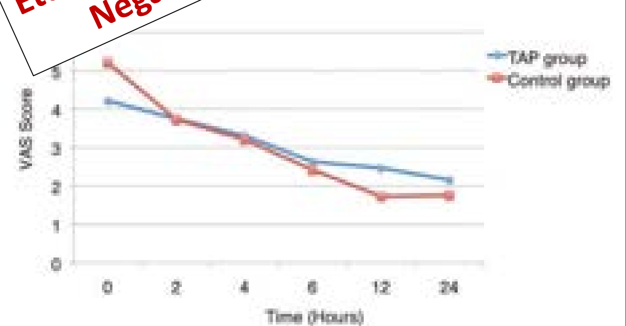


Figure 1. Mean postoperative visual analog scale (VAS) pain scores on movement in each group. *P* = ns at all time points. *TAP* = transversus abdominis plane.

Continuous Transversus Abdominis Plane Block for Renal Transplant Recipients

Jankovic, Pollard and Nachiappan; Anesth Analg 2009

Cathéter mis en place chirurgicalement en fin d'intervention
Bolus puis injection continue /24h

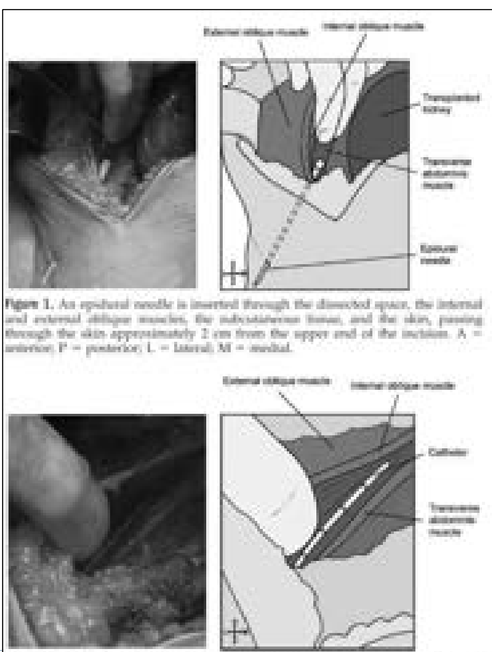
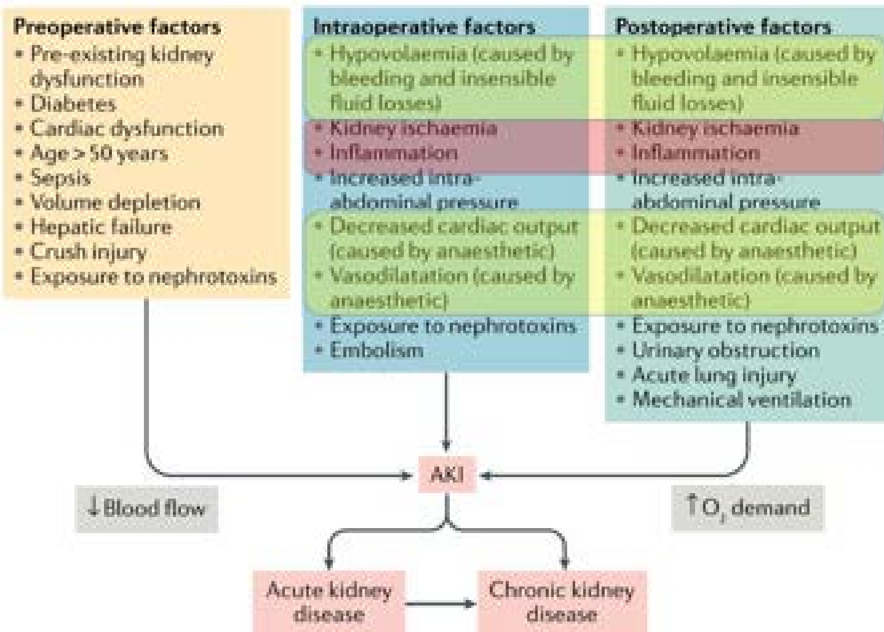


Figure 1. An epidural needle is inserted through the dissected space, the internal and external oblique muscles, the subcutaneous tissue, and the skin, passing through the skin approximately 2 cm from the upper end of the incision. A = anterior; P = posterior; L = lateral; M = medial.

Figure 2. Epidural catheter positioned between the transverse abdominis and internal oblique muscle. A = anterior; P = posterior; L = lateral; M = medial.

Optimisation Rénale péri-opératoire

- Contrôle de l'inflammation
- Optimisation anesthésie
  - Adaptation de l'anesthésie
    - **Hypnotique et curare = standard** (dexmedetomidine?)
    - **Analgésie = standard + TAP Block ?!**



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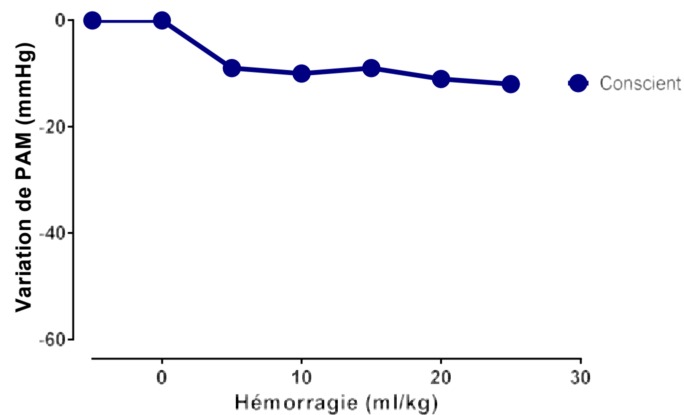
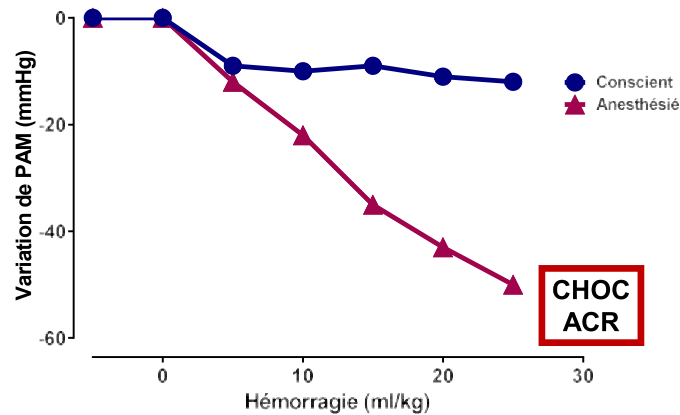
Optimisation Rénale péri-opératoire

- Contrôle de l'inflammation
- Optimisation anesthésie
  - Adaptation de l'anesthésie
  - Optimisation hémodynamique



Adapté de Vatner & Braunwald, NEJM, 1975



Adapté de Vatner & Braunwald, NEJM, 1975

Anesthésie

- Diminution dose dépendante du baroréflexe
- Hypotension artérielle + hypovolémie relative
- Diminution possible de l'autorégulation rénale
  - Bénéfique?
  - Délétère?

CARDIOVASCULAR

Intraoperative hypotension and the risk of postoperative adverse outcomes: a systematic review

E. M. Wesselink[1,*], T. H. Kappen[1], H. M. Torn[1], A. J. C. Slooter[2] and W. A. van Klei[1]

British Journal of Anaesthesia, 121 (4): 706–721 (2018)

- Méta-analyse de 42 études / cohorte
- ↗ du risque de dysfonction d'organe
  - PAM < 80 mmHg > 10 minutes
  - PAM < 70 mmHg < 10 minutes
- ↗↗ du risque
  - PAM < 60-65 mmHg
  - PAM < 50-55 mmHg « *any exposure* »

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

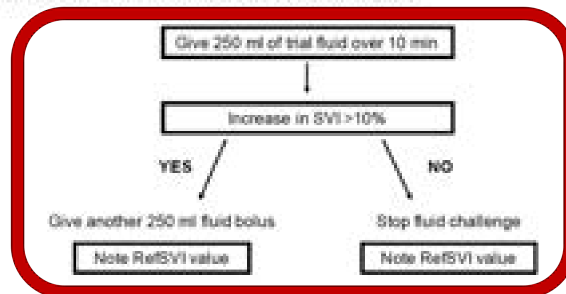
Effect of Individualized vs Standard Blood Pressure Management Strategies on Postoperative Organ Dysfunction Among High-Risk Patients Undergoing Major Surgery
A Randomized Clinical Trial

JAMA. 2017;318(14):1346-1357. doi:10.1001/jama.2017.14172
Published online September 27, 2017.

Etude INPRESS
Chirurgie abdominale

INPRESS Trial algorithm for fluid administration: Administering fluid to a stroke volume endpoint

- **Step 1. After induction of anesthesia**: Assessment of reference stroke volume index (SVI) = RefSVI
  Maximum 500 ml of fluid for initial refSVI determination



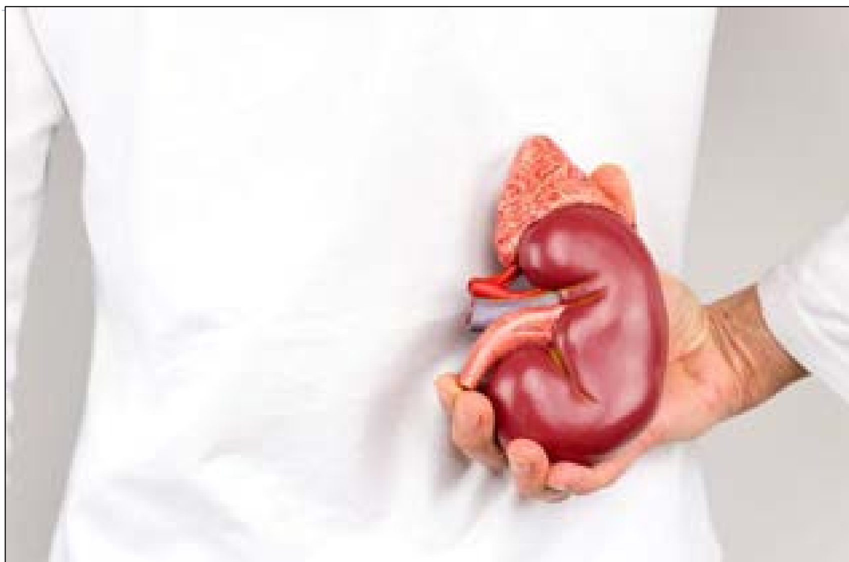
- **Step 2. During surgery**: If SVI decreases >10% from its reference value
  Repeat 250 ml fluid boluses until an increase of SVI of less than 10%
  Persistent stroke volume responsiveness suggests continued fluid loss
  Fluid responsiveness is defined as a stroke volume increase ≥10%

Synthèse, hors transplantation rénale

Hémodynamique peropértoire & fonction rénale

- L'hypotension artérielle, même de courte durée, est associée à la dysfonction rénale post-opératoire
  - Quelle est la PA optimale?
  - Quel algorithme ? objectifs hémodynamiques / monitorage/remplissage vasculaire / vasoconstricteurs

Transplantation rénale?



REVIEW Open Access

Perioperative fluid management in kidney transplantation: a black box

Maria Helena Calixto Fernandes, Thomas Schricker, Sheldon Magder and Rougen Hatzakorzian

Calixto Fernandes et al. Critical Care (2018) 22:14

1982-2015
- 14 études
- Méthodologie médiocre

Pré-transplantation

Per-transplantation
= potentiellement important!
= « black box » à ouvrir

Post-transplantation

Hemodynamic Management During Kidney Transplantation: A French Survey

Olivier Collange, Charles Tacquard, Walid Oulehri, Jérome Biehler, Bruno Moulin, Paul-Michel Mertes, Anne Lejay, and Sophie Caillard
Department of Anesthesia, Critical Care and Perioperative Medicine, Nouvel Hôpital Civil, University Hospitals of Strasbourg

Transplantation Proceedings, 53, 1450–1453 (2021)

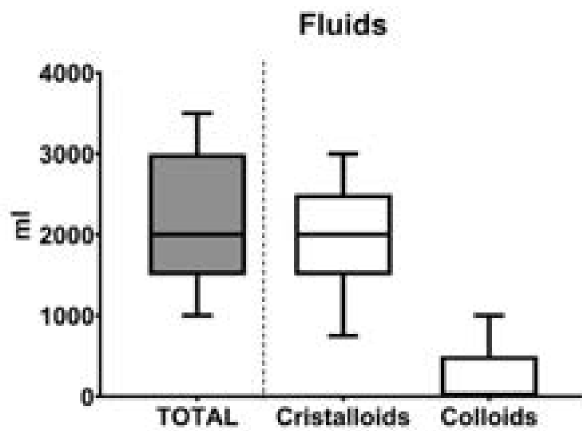


Fig 4. Fluid administration. Crystalloids, colloids, and total fluids (crystalloids + colloids) administered during kidney transplantation.

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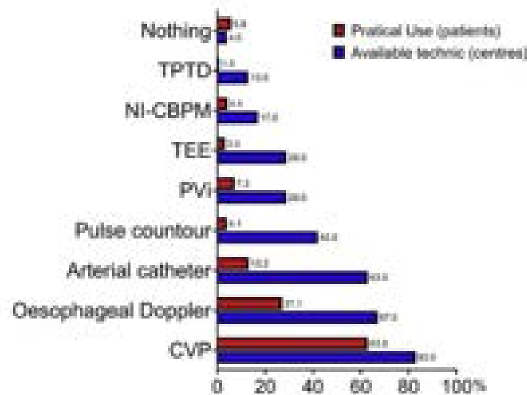

Fig 2. Use of monitoring during kidney transplantation. AC, arterial catheter; CVP, central venous pressure; NI-CBP, noninvasive continuous arterial blood pressure measurement; OD, esophageal Doppler; PVI, plethysmographic variability index; TEE, transoesophageal echocardiography; TPTD, transpulmonary thermodilution.

Hemodynamic Management During Kidney Transplantation: A French Survey

Olivier Collange[a,b,*], Charles Tacquard[a,b,c], Walid Oulehri[a,b], Jérome Biehler[a], Bruno Moulin[c], Paul-Michel Mertes[a,b], Anne Lejay[b,e], and Sophie Caillard[d]
[a]Department of Anesthesia, Critical Care and Perioperative Medicine, Nouvel Hôpital Civil, University Hospitals of Strasbourg,

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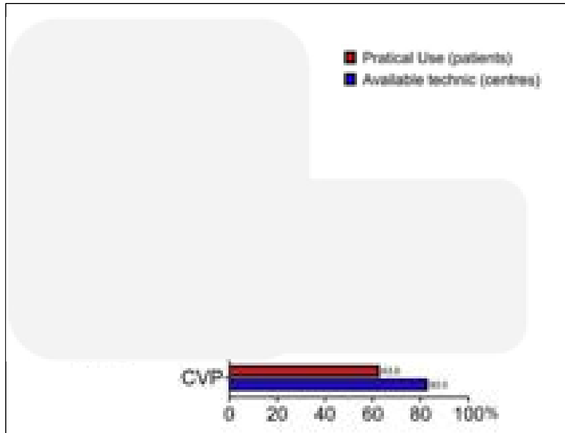
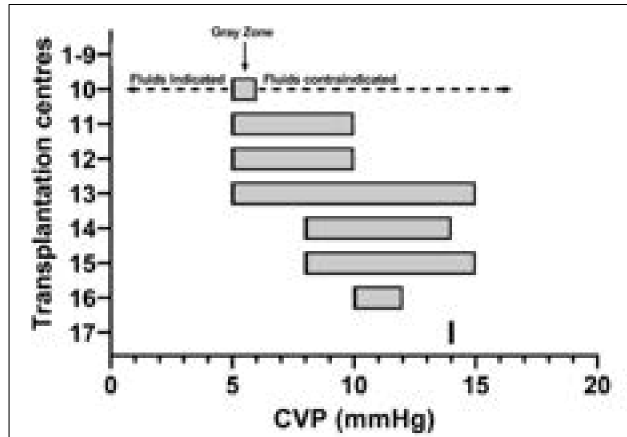




Intraoperative Pleth Variability Index Is Linked to Delayed Graft Function After Kidney Transplantation

O. Collange[a,b,*], L. Jazaerli[a], A. Lejay[b,c], C. Biermann[a], S. Caillard[d], B. Moulin[d], N. Chakfe[c], F. Severac[e], M. Schaeffer[e], P.-M. Mertes[a,b], and A. Steib[a,b]

Transplantation Proceedings, 48, 2615–2621 (2016)

Etude rétrospective
40 patients

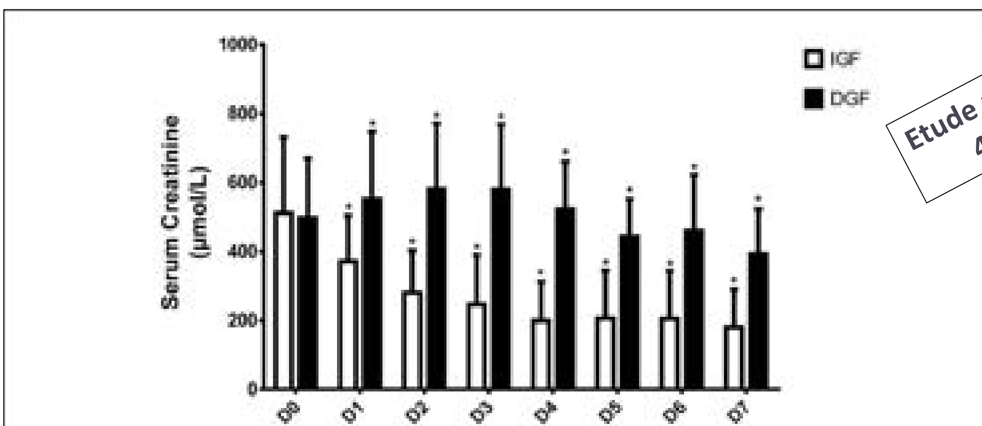


Fig 1. Early renal function after kidney transplantation. Results are represented as mean ± SD. Abbreviations: IGF, immediate graft function, DGF, delayed graft function. From day 1 (D1) to day 7 (D7), serum creatinine was significantly higher in the DGF group (*P < .0001).

Table 3. Multivariate Analysis Before and After Independent Predictors of DGF–Variable Selection

Variable	Estimate ± SE	OR (95% CI)	P Value
Before			
Age, donor	0.131 ± 0.141	1.141 (0.869–1.566)	.35
Age, recipient	0.051 ± 0.077	1.053 (0.905–1.254)	.50
Nyberg score	−0.144 ± 0.247	0.866 (0.508–1.416)	.56
Cold ischemia time	0.001 ± 0.02	1.001 (0.998–1.005)	.49
HR T3	0.011 ± 0.055	1.011 (0.905–1.134)	.84
MAP T3	−0.036 ± 0.061	0.965 (0.846–1.087)	.56
CVP T3	−0.197 ± 0.179	0.821 (0.548–1.1150)	.27
PVI T3	0.286 ± 0.329	1.331 (0.742–3.130)	.38
PVI T4	0.077 ± 0.204	1.080 (0.720–1.712)	.70
Crystalloids	−0.001 ± 0.001	1 (0.998–1.000)	.07
Albumin 4%	−0.004 ± 0.002	0.996 (0.992–0.999)	.05
After			
PVI T3	0.2901 ± 0.1357	1.34 (1.07–1.82)	.03

Abbreviations: HR, heart rate; MAP, mean arterial pressure; CVP, central venous pressure; PVI, Pleth variability index; T3, before unclamping the renal artery; T4, after unclamping; OR, odds ratio; other abbreviations as in Tables 1 and 2.

SFNDT FIRN

« Adequacy »

Thromboprophylaxie

Volémie

Homéostasie

Risque hémorragique

Risque infectieux

Thromboses vasculaires

- euvolémie (PVC 4-8, prise de 3-4kg max, absence d'oedèmes/TJ, VCI <20mm, PAM>65, PAS<140)
- Etre à l'Euvolemie avec tolérance PA sus décalée
- protocole ecrit disponible
- Diurèse
- Euvolémie clinique
- Surcharge hydrosodée "raisonnable". Normotension, poumons sec, PVC<10
- Discrète surcharge hydrosodée
- Discrète surcharge clinique sans besoin en oxygène et TA limite haute (>130/80)
- Objectif : + 5 à 7% du poids d'entrée
- +4 a 10% vs poids sec, arrêt si reflux hépato jugulaire, objectif TA >12/7 (personnalisé)
- +2kg par rapport au poids idéal sans signes de surcharge
- PAM 65 mmHg sans surcharge; diurèse > 1L;
- Eviter toute hypovolémie, tolérer la prise de poids tant que bien tolérée pour une baisse progressive et selon PA
- Max 2kg au dessus du poids sec
- Compensation volume à volume les premières 24h, maintien poids à +2 Kg du poids sec, PAM >65 mmHg

Optimisation hémodynamique

- Importante en toute situation
- Cruciale lors de la reperfusion du transplant
  - Objectifs
    - Pression artérielle ? (PAM 75 mmHg?)
    - Débit cardiaque ? (VES optimisé?)
    - Débit rénal ?
    - Pression veineuse ? Pression intra rénale?
  - Moyens
    - Monitorage hémodynamique
    - Traitement
      - Soluté de remplissage vasculaire (solutés balancés)
      - Vasopresseur (noradrénaline)
  - Au bloc opératoire et en SSPI …

Optimisation Rénale péri-opératoire

- Adaptation de l'anesthésie
  - **Hypnotique et curare** = standard (dexmedetomidine?)
  - **Analgésie** = standard + **TAP Block ?!**
- Optimisation hémodynamique
  - **Objectifs : PA? / Débits? / systémique vs rénal?**
  - **Moyens?**
    - **Outils de monitorage ?**
    - **Traitement: Cristalloïdes balancés / Noradrénaline**
  - **Pre- per- et post opératoire**

Merci pour votre attention

QCM auto-évaluation 1 (exemple)

Enoncé 1 : Vous prescrivez la séance de dialyse avant une transplantation rénale

Q1 – Quel est le poids cible post dialyse?

A. **Poids sec**

B. **Poids sec + 1 kg**

C. **Poids sec -1 kg**

D. Poids sec + 10g / kg de poids sec

E. Qu'importe, le collègue anesthésiste-réanimateur se débrouillera au bloc opératoire

Commentaire: je ne suis pas certain qu'il existe une réponse univoque à cette question! Quel est votre avis?

QCM auto-évaluation 2

Enoncé 2 : De nombreuses études expérimentales ont mis en évidence l'effet préconditionnant de certains hypnotiques (effet protecteur lors de la séquence ischémie-reperfusion).

Q2 - Parmi les hypnotiques suivant, lesquels sont le plus souvent présentés comme des traitement préconditionnants?

A. **- les halogénés (isoflurane, sévoflurane, desflurane)**

B. **- le propofol**

C. - la kétamine

D. - les benzodiazépines (midazolam)

E. - l'étomidate

Commentaire: palmarès très discutable! Les études peuvent être contradictoires.

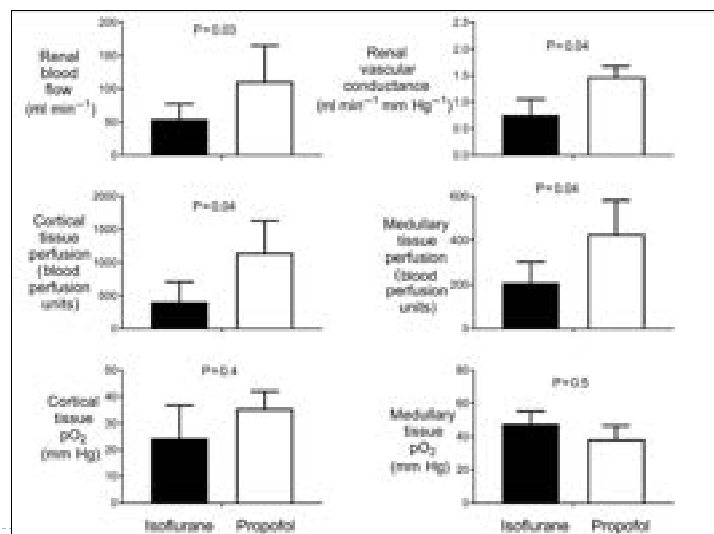
Si le sujet vous intéresse…

- Anesthésie & protection rénale
  - Quelques diapositives complémentaires

Renal perfusion, oxygenation, and sympathetic nerve activity during volatile or intravenous general anaesthesia in sheep

Naoya Iguchi, Junko Kosaka, Lindsea C. Booth, Yoko Iguchi, Roger G. Evans, Rinaldo Bellomo, Clive N. May and Yugeesh R. Lankadeva
Preclinical Critical Care Unit, Florey Institute of Neuroscience and Mental Health, Melbourne, Victoria,

British Journal of Anaesthesia, 122 (3): 342–349 (2019)



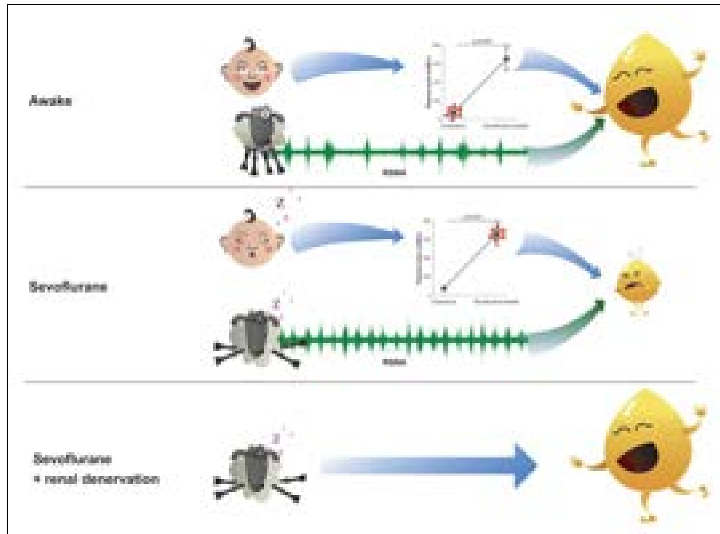
RESEARCH ARTICLE

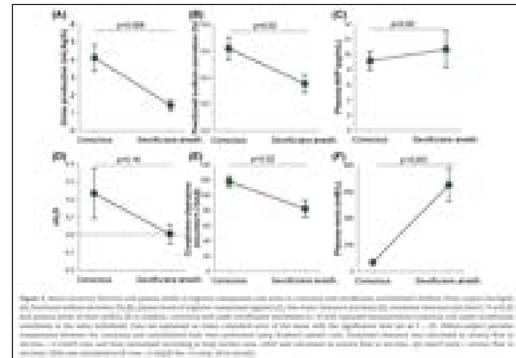
Role of Renal Sympathetic Nerve Activity in Volatile Anesthesia's Effect on Renal Excretory Function

Micael Taavo[1,*], Mats Rundgren[1], Peter Frykholm[1], Anders Larsson[2], Stephanie Franzén[1], Karin Vargmar[1], Jean F. Valarcher[3], Gerald F. DiBona[4], Robert Frithiof[1]

[1]Department of Surgical Sciences, Anesthesiology and Intensive Care, Uppsala University, Uppsala, Sweden

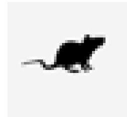
Function (Oxf) 2021 Vol. 2 Issue 6





Propofol Attenuated Acute Kidney Injury after Orthotopic Liver Transplantation *via* Inhibiting Gap Junction Composed of Connexin 32

Chenfang Luo, M.D., Dongdong Yuan, M.D., Xiaoyun Li, M.D., Weifeng Yao, M.D., Gangjian Luo, M.D., Xinjin Chi, M.D., Haobo Li, M.Sc., Michael G. Irwin, M.D., Zhengyuan Xia, M.D., Ph.D., Ziqing Hei, M.D., Ph.D.



Anesthesiology 2015; 122:72-86

ABSTRACT

Background: Postliver transplantation acute kidney injury (AKI) severely affects patient survival, whereas the mechanism is unclear and effective therapy is lacking. The authors postulated that reperfusion induced enhancement of connexin32 (Cx32) gap junction plays a critical role in mediating postliver transplantation AKI and that pretreatment/precondition with the anesthetic propofol, known to inhibit gap junction, can confer effective protection.

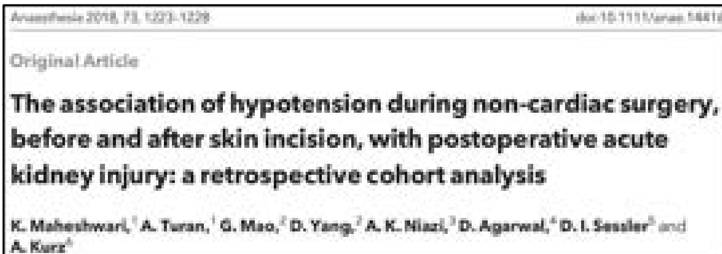
Methods: Male Sprague–Dawley rats underwent autologous orthotopic liver transplantation (AOLT) in the absence or presence of treatment with the selective Cx32 inhibitor, 2-aminoethoxydiphenyl borate or propofol (50 mg/kg) (n = 8 per group). Also, kidney tubular epithelial (NRK-52E) cells were subjected to hypoxia–reoxygenation and the function of Cx32 was manipulated by three distinct mechanisms: cell culture in different density; pretreatment with Cx32 inhibitors or enhancer; Cx32 gene knock-down (n = 4 to 5).

Results: AOLT resulted in significant increases of renal Cx32 protein expression and gap junction, which were coincident with increases in oxidative stress and impairment in renal function and tissue injury as compared to sham group. Similarly, hypoxia–reoxygenation resulted in significant cellular injury manifested as reduced cell growth and increased lactate dehydrogenase release, which was significantly attenuated by Cx32 gene knock-down but exacerbated by Cx32 enhancement. Propofol inhibited Cx32 function and attenuated post-AOLT AKI. In NRK-52E cells, propofol reduced posthypoxic reactive oxygen species production and attenuated cellular injury, and the cellular protective effects of propofol were reinforced by Cx32 inhibition but cancelled by Cx32 enhancement.

Conclusion: Cx32 plays a critical role in AOLT-induced AKI and that inhibition of Cx32 function may represent a new and major mechanism whereby propofol reduces oxidative stress and subsequently attenuates post-AOLT AKI. (ANESTHESIOLOGY 2015; 122:72-86)

Si le sujet vous intéresse…

- Hypotension artérielle et fonction rénale
  - Quelques diapositives complémentaires



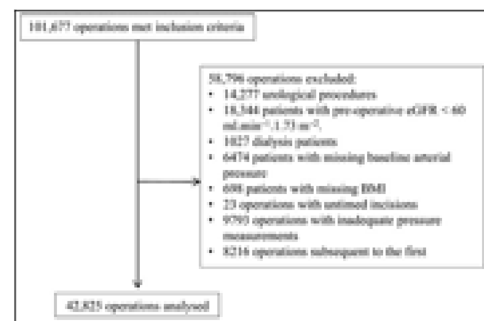
Anaesthesia 2018, 73, 1223-1229 doi:10.1111/anae.14416

Original Article

The association of hypotension during non-cardiac surgery, before and after skin incision, with postoperative acute kidney injury: a retrospective cohort analysis

K. Maheshwari,[1] A. Turan,[1] G. Mao,[2] D. Yang,[2] A. K. Niazi,[3] D. Agarwal,[4] D. I. Sessler[5] and A. Kurz[6]

- Cleveland Clinic, 2009-2015
- Inclusions
  - Patient ASA < 5
  - Chirurgie > 1h
  - Chirurgie non-cardiaque
  - > 42 000 patients



The association of hypotension during non-cardiac surgery, before and after skin incision, with postoperative acute kidney injury: a retrospective cohort analysis

PAM < 65 mmHg
Before incision = 43%

Proportion (%)
60
40
20
0
0 20 40 60 80 100 Cumulative duration (min)

PAM < 65 mmHg
After incision = 56 %

Proportion (%)
60
40
20
0
0 20 40 60 80 100

The association of hypotension during non-cardiac surgery, before and after skin incision, with postoperative acute kidney injury: a retrospective cohort analysis

2 328 kidney injury (5%)

	Odds ratio (95% CI)
Duration of MAP < 65 mmHg	
Before incision	1.04 (1.01–1.07)
After incision	1.03 (1.00–1.05)
Total	1.05 (1.02–1.07)
AUC of MAP < 65 mmHg	
Before incision	1.02 (1.01–1.04)
After incision	1.02 (1.00–1.04)
Total	1.03 (1.02–1.05)

0.95 1 1.05 1.1

Figure 3 The OR (95% CI) for the associations between doubling of the duration of hypotension (MAP < 65 mmHg) during anaesthesia and postoperative acute kidney injury, diagnosed in 2328 out of 42,825 patients after elective non-cardiac surgery. Circles (bars) are the OR (95%CI). AUC, area under the curve; MAP, mean arterial pressure.

OR = 1,04

Role of perioperative hypotension in postoperative acute kidney injury: a narrative review

Yugeesh R. Lankadeva[1,2,*], Clive N. May[1,2], Rinaldo Bellomo[2] and Roger G. Evans[1,3]

BJA

British Journal of Anaesthesia, 128 (6): 931–948 (2022)

doi: 10.1016/j.bja.2022.03.002
Advance Access Publication Date: 22 April 2022
Review Article

Conclusions

Perioperative hypotension is poorly defined but appears to be common and strongly associated with poor patient outcome, including acute kidney injury. The kidney is at risk because the lower limit of autoregulation of renal blood flow is higher than that of cerebral blood flow. Multiple mechanisms render the renal medulla particularly susceptible to ischaemia and hypoxia during the perioperative period. The susceptibility of the medulla to such injury probably makes a major contribution to incident postoperative acute kidney injury. Thus, a major barrier to progress is the lack of validated methods to monitor regional-kidney perfusion and oxygenation during the perioperative period. Uncertainty remains regarding (i) optimal targets for MAP in the perioperative period, (ii) whether intervening to increase MAP is actually beneficial, and (iii) the best therapeutic approach to prevent or treat perioperative hypotension. Adequately powered clinical trials are required to address this uncertainty. There is also an unmet need for pharmacological interventions to protect the kidney from the deleterious effects of perioperative ischaemia and hypoxia.

Si le sujet vous intéresse…

- Hémodynamique et transplantation rénale
  - Quelques diapositives complémentaires

Tableau 3. Utilisation de différentes valeurs de PVC lors de la greffe rénale

Étude	Année	Type d'étude	N	Comparaison de 2 niveaux de PVC ou objectif de PVC	Remplissage vasculaire	Résultats
Carlier [12]	1982	Rétrospective	120	Comparaison de 2 groupes / PAP au moment du déclampage des anastomoses. La PVC est différente dans les deux groupes : PVC 12±0,8 mmHg vs. 14,2±0,5 mmHg	Soluté salé 0.9%	Groupe « PVC 14.2 mmHg » = ↓ RDF
Carlier [13]	1983	Rétrospective	42	Concept d'hydratation maximale	Soluté salé 0.9%	Groupe hydratation maximale = ↓ RDF
Thomsen [53]	1987	Rétrospective	61	PVC > 3,7 mmHg	Soluté salé 0.9%	↑ Fonction rénale à J3
Ferris [55]	2003	Rétrospective	77	Niveau de PVC ou variation de PVC peropératoire	Non précisé	Pas d'effet sur la RDF
De Gasperi [17]	2006	Étude de cohorte	90	PVC = 7-9 mmHg	Soluté salé 0.9%	Pas plus de dysfonction rénale que dans les études publiées
Snoeijs [57]	2007	Rétrospective	177	PVC > 4,4 mmHg	Non précisé	↓ Dysfonction primaire du greffon
Othman [4]	2010	Prospective, randomisée	40	PVC = 15 mmHg	Soluté salé 0.9%	↓ éphédrine peropératoire ↑ Diurèse au premier jour
Bacchi [58]	2010	Rétrospective	155	PVC ≤ 8 mmHg après la greffe	Soluté salé 0.9% (et HEA)	↑ RDF (OR = 3.53 ; IC = 1.63-7.63)
Jazaerli [56]	2013	Prospective, observationnelle	40	Comparaison des niveaux de PVC peropératoires et du risque de RDF	Soluté salé 0.9%	PVC et RDF sont indépendants

PAP = pression artérielle pulmonaire
PVC = pression veineuse centrale
NTA = nécrose tubulaire aigue
HEA = hydroxyle éthyle amidon
RDF = reprise différée du greffon, OR = odds ratio, IC = intervalle de confiance