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Patient Voice

963 **Functioning on Dialysis: An Oxymoron?**

Daniel L. Abel

See related article on page 1039.

Editorials

965 **Targeting Fall Risk in CKD**

Nancy G. Kutner and C. Barrett Bowling

See related article on page 983.

967 **Treatment of Relapses in ANCA-Associated Vasculitis**

Mark McClure and Rachel Jones

See related article on page 1021.

970 **ESKD Risk in Living Kidney Donors “Like Me”**

Kenneth A. Newell and Richard N. Formica

See related article on page 1048.

972 **Clinical and Public Policy Implications of Pre-Formed DSA and Transplant Outcomes**

Edmund Huang and Stanley C. Jordan

See related article on page 1056.

Original Articles

Acid/Base and Electrolyte Disorders

975 **Derivation and Validation of a Novel Risk Score to Predict Overcorrection of Severe Hyponatremia: The Severe Hyponatremia Overcorrection Risk (SHOR) Score**

Jason D. Woodfine, Manish M. Sood, Thomas E. MacMillan, Rodrigo B. Cavalcanti, and Carl van Walraven

Chronic Kidney Disease

983 **Gait Abnormalities and the Risk of Falls in CKD**

Jeannie Tran, Emmeline Ayers, Joe Verghese, and Matthew K. Abramowitz

See related editorial on page 965.

994 **Use of a Medical-Alert Accessory in CKD: A Pilot Study**

Eli Farhy, Clarissa Jonas Diamantidis, Rebecca M. Doerfler, Wanda J. Fink, Min Zhan, and Jeffrey C. Fink

1002 **Association of CKD with Incident Tuberculosis**

Sehoon Park, Soojin Lee, Yaerim Kim, Yeonhee Lee, Min Woo Kang, Semin Cho, Kyungdo Han, Seoung Seok Han, Hajeong Lee, Jung Pyo Lee, Kwon Wook Joo, Chun Soo Lim, Yon Su Kim, and Dong Ki Kim

1011 **Effects of Treatment of Metabolic Acidosis in CKD: A Systematic Review and Meta-Analysis**

Sankar D. Navaneethan, Jun Shao, Jerry Buysse, and David A. Bushinsky

Glomerular and Tubulointerstitial Diseases

1021 Mycophenolate Mofetil Versus Cyclophosphamide for the Induction of Remission in Nonlife-Threatening Relapses of Antineutrophil Cytoplasmic Antibody–Associated Vasculitis: Randomized, Controlled Trial

Janneke Tuin, Patricia M. Stassen, Daria I. Bogdan, Jan Broekroelofs, Pieter van Paassen, Jan Willem Cohen Tervaert, Jan-Stephan Sanders, and Coen A. Stegeman
See related editorial on page 967.

Maintenance Dialysis

1029 Blood Pressure and Incident Atrial Fibrillation in Older Patients Initiating Hemodialysis

Tara I-Hsin Chang, Sai Liu, Medha Airy, Jingbo Niu, Mintu P. Turakhia, Jennifer E. Flythe, Maria E. Montez-Rath, and Wolfgang C. Winkelmayr

1039 Association of Initiation of Maintenance Dialysis with Functional Status and Caregiver Burden

Namiko A. Goto, Ismay N. van Loon, Franciscus T.J. Boereboom, Marielle H. Emmelot-Vonk, Hanna C. Willems, Michiel L. Bots, Laila E. Gamadia, Eric F.H. van Bommel, Peter J.G. Van de Ven, Caroline E. Douma, Hieronymus H. Vincent, Yvonne C. Schrama, Joy Lips, Ellen K. Hoogeveen, Machiel A. Siezenga, Alferso C. Abrahams, Marianne C. Verhaar, and Marije E. Hamaker
See related Patient Voice on page 963.

Transplantation

1048 Risk of ESKD in Older Live Kidney Donors with Hypertension

Fawaz Al Ammary, Xun Luo, Abimereki D. Muzaale, Allan B. Massie, Deidra C. Crews, Madeleine M. Waldram, Mohamud A. Qadi, Jacqueline Garonzik-Wang, Macey L. Henderson, Daniel C. Brennan, Alexander C. Wiseman, Richard C. Lindrooth, Jon J. Snyder, Josef Coresh, and Dorry L. Segev
See related editorial on page 970.

1056 Preformed Donor-Specific HLA Antibodies in Living and Deceased Donor Transplantation: A Multicenter Study

Malte Ziemann, Wolfgang Altermann, Katharina Angert, Wolfgang Arns, Anette Bachmann, Tamam Bakchoul, Bernhard Banas, Annette von Borstel, Klemens Budde, Vanessa Ditt, Gunilla Einecke, Ute Eisenberger, Thorsten Feldkamp, Siegfried Görg, Martina Guthoff, Antje Habicht, Michael Hallensleben, Falko M. Heinemann, Nicole Hessler, Christian Hugo, Matthias Kaufmann, Teresa Kauke, Martina Koch, Inke R. König, Christine Kurschat, Claudia Lehmann, Matthias Marget, Anja Mühlfeld, Martin Nitschke, Luiza Pego da Silva, Carmen Quick, Axel Rahmel, Thomas Rath, Petra Reinke, Lutz Renders, Florian Sommer, Bernd Spriewald, Oliver Staeck, Dirk Stippel, Caner Süsal, Bernhard Thiele, Daniel Zecher, and Nils Lachmann
See related editorial on page 972.

Research Letter

1067 Attitudes toward Peritoneal Dialysis among Peritoneal Dialysis and Hemodialysis Medical Directors: Are We Preaching to the Right Choir?

Jenny I. Shen, Martin J. Schreiber, Junhui Zhao, Bruce M. Robinson, Ronald L. Pisoni, Rajnish Mehrotra, Matthew J. Oliver, Tadashi Tomo, Kriang Tungsanga, Isaac Teitelbaum, Arshia Ghaffari, Mark Lambie, and Jeffrey Perl

Expressions of Concern

1071 Expression of Concern: Circulating Anti-endothelial Cell Antibodies Are Associated with Poor Outcome in Renal Allograft Recipients with Acute Rejection

Qiquan Sun, Zhihong Liu, Jinsong Chen, Huiping Chen, Jiqiu Wen, Dongrui Cheng, and Leishi Li

1072 Expression of Concern: Re-Establishing Brain Networks in Patients with ESRD after Successful Kidney Transplantation

Hui Juan Chen, Jiqiu Wen, Rongfeng Qi, Jianhui Zhong, U. Joseph Schoepf, Akos Varga-Szemes, Virginia W. Lesslie, Xiang Kong, Yun Fei Wang, Qiang Xu, Zhe Zhang, Xue Li, Guang Ming Lu, and Long Jiang Zhang

Statement of Clarification

1073 Statement of Clarification: Drug Coated Balloon Angioplasty in Failing AV Fistulas

Scott O. Trerotola, Jeffrey Lawson, Prabir Roy-Chaudhury and Theodore F. Saad; for the Lutonix AV Clinical Trial Investigators

Kidney Case Conferences: How I Treat

1074 The Hypertensive Adolescent

Joseph T. Flynn

1077 AKI in Patients Receiving Immune Checkpoint Inhibitors

Mark A. Perazella and Ben Sprangers

Nephro pharmacology for the Clinician

1080 Clinical Pharmacology of Antibiotics

Rachel F. Eyler and Kristina Shvets

Perspectives

1091 Geriatric Assessment in Advanced Kidney Disease

Edwina Anne Brown and Ken Farrington

1094 Advancing Equity in Nephrology: Enhancing Care for LGBTQ+ Patients and Our Workforce

Dinushika Mohottige and Mitchell R. Lunn

1097 Burosumab Therapy for X-Linked Hypophosphatemia and Therapeutic Implications for CKD

Farzana Perwad and Anthony A. Portale

Reviews

1100 Peritoneal Dialysis–Associated Peritonitis

Cheuk-Chun Szeto and Philip Kam-Tao Li

1106 AKI Associated with Acute Pancreatitis

Tareq I. Nassar and Wajeh Y. Qunibi

On the Cover

What's the diagnosis?

Case description:

The patient is a 61-year-old man with a history of hypertension and ESKD on hemodialysis and Sevelamer who presented with nausea and vomiting. He was found to have an acutely obstructing type IV paraesophageal hernia, with intrathoracic herniation of stomach and transverse colon, and underwent repair. One week later, he developed severe abdominal pain and hypotension; laparotomy revealed transverse colonic volvulus, severe colonic distention, and possible rupture. A right hemicolectomy was performed.

Images:

Left: Yellow-magenta crystal with “fish scale” texture and injured colonic mucosa (600X)

Middle: Yellow crystal (arrow) within submucosa of colon wall. Ischemic colonic mucosa on left; muscularis propria on right (40X)

Right: Purple crystal with “fish scale” texture in serosal exudate (200X)

Teaching points:

These features are characteristic of Sevelamer crystals. This is an unusual case of colonic perforation associated with embedded Sevelamer crystals.

- Sevelamer consists of a non-absorbable hydrogel with ammonia (NH₃) on a carbon backbone; its anion is either carbonate (Renvela) or hydrochloride (Renagel). The acidity of the stomach dissociates the polymer from its anion and protonates it to NH₄⁺, allowing it to bind phosphate (PO₄⁻) within the intestine resulting in lower serum phosphate levels.
- Sevelamer crystals within the gastrointestinal tract have been associated with gastrointestinal mucosal injury, ulceration and necrosis (PMID: 24061514).
- The relationship between Sevelamer crystals and colon perforation is uncertain in this and other cases. The mechanism or causation for bowel injury has yet to be demonstrated.

Risk factors for gastrointestinal sevelamer crystals or bowel injury have not been identified; there is no apparent association with dose or formulation (PMID: 28852493).

(Images and text provided by Erik Handberg MD¹; Arlette Habashi MD¹; Abdallah Alali MD²; Jessica Weiss MD²; Nicole K. Andeen MD; and Jessica L. Davis MD¹. ¹Department of Pathology and ²Division of Nephrology, Department of Medicine, Oregon Health & Science University, Portland, Oregon)