

Renal Unilateral Partial Ureteral Obstruction (PUO) Research LiteraturesMa Hongbao ¹, Margaret Ma ², Yang Yan ¹¹ Brookdale Hospital, Brooklyn, New York 11212, USA; ² Cambridge, MA 02138, USA
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Abstract: Obstructive uropathy is a condition in which the flow of urine is blocked. This causes the urine to back up and injure one or both kidneys. Obstructive uropathy occurs when urine cannot drain through a ureter. Urine backs up into the kidney and causes it to become hydronephrosis. This article introduces recent research reports as references in the renal unilateral partial ureteral obstruction (PUO) related studies.

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Key words: renal; kidney; partial ureteral obstruction (PUO); life; cell; research; literature

1. Introduction

Obstructive uropathy is a condition in which the flow of urine is blocked. This causes the urine to back up and injure one or both kidneys. Obstructive uropathy occurs when urine cannot drain through a ureter. Urine backs up into the kidney and causes it to become hydronephrosis. This article introduces recent research reports as references in the renal unilateral partial ureteral obstruction (PUO) related studies.

The following introduces recent reports as references in the related studies.

Ahlatwari, R., G. Gautam, et al. "Laparoscopic pyeloplasty using the postanastomotic dismemberment method: technique and results." *J Endourol.* 2009 Jan;23(1):89-96. doi: 10.1089/end.2008.0285.

BACKGROUND AND PURPOSE: Despite excellent results, widespread acceptance of the laparoscopic dismembered Anderson-Hynes pyeloplasty (AH) is hampered by its steep learning curve. Laparoscopic nondismembered pyeloplasty techniques, although simpler, have not matched the results of AH. We have been using a technical modification of AH to combine its excellent outcome with technical ease of nondismembered pyeloplasties. We describe the procedure and results of laparoscopic postanastomotic dismemberment (PAD) pyeloplasty for primary ureteropelvic junction (UPJ) obstruction. **PATIENTS AND METHODS:** PAD technique involves an initial partial division of the dilated pelvis and ureteral spatulation without dismembering the UPJ. Both layers of ureteropelvic anastomosis are completed before dismemberment and pelvic reduction. Forty-one PAD procedures in 40 patients with UPJ obstruction and follow-up of at least 3 months were evaluated. Mean age was 37.2 years (range 2-82 years) with 22 patients younger than 15 years. The UPJ was dependent in 31 and had high insertion in 10 (24.4%). The stenotic segment was

long (> or =1.5 cm) in 18 (43.9%). Crossing vessels and secondary calculi were observed in six (14.6%) and seven (17.1%) units. **RESULTS:** Mean (+/- SD) blood loss, hospital stay, convalescence, and analgesia requirement were 68.1 +/- 37.6 mL, 3.8 +/- 1.1 days, 11.4 +/- 3.9 days, and 204.8 +/- 60.5 mg diclofenac, respectively. The mean operative time was 97.6 +/- 22.1 minutes. There was one intraoperative complication in the form of injury to a renal vein tributary, with no transfusions or conversions. Postoperative complications included pain after stent removal, persistent drainage, and pyelonephritis in 1, 2, and 4 patients, respectively. Mean follow-up was 19.5 months (range 3-58 months), with a success rate of 95.1%. Failures were not attributable to UPJ configuration, length of stenosis, or age. **CONCLUSIONS:** The PAD technique has several practical advantages with a shorter operative time compared with other historical series of laparoscopic pyeloplasty (LP). It combines the ease of nondismembered LP with the excellent outcome of dismembered techniques.

Akgul, T., E. Huri, et al. "Phosphodiesterase 5 inhibitors attenuate renal tubular apoptosis after partial unilateral ureteral obstruction: an experimental study." *Kaohsiung J Med Sci.* 2011 Jan;27(1):15-9. doi: 10.1016/j.kjms.2010.03.001. Epub 2011 Jan 28.

The aim of the present study was to evaluate the effects of phosphodiesterase 5 inhibitors on renal tubular apoptosis and also on expressions of endothelial and inducible nitric oxide synthases (eNOS and iNOS) in the ipsilateral kidney after partial unilateral ureteral obstruction (PUUO) in a rat model. Forty Wistar albino rats were divided into five groups. In Groups 1-4, left experimental PUUO was created. Sildenafil, vardenafil, and tadalafil were administered to the rats of Groups 2-4, respectively. The pills were orally given to the rats for 30 days. Group 5 was defined as sham. After 30 days, all rats were

sacrificed, and nephrectomy was performed. The renal specimens were examined histopathologically. Left hydronephrosis was observed in Groups 1-4. Mean apoptotic cell count and eNOS and iNOS levels were significantly increased in Group 1 when compared with the other groups. The rats in Groups 2-4 showed significantly decreased apoptotic cell count and eNOS and iNOS values in the renal tubular tissue in accordance with Group 1 ($p < 0.05$). There were significant differences in apoptotic cell counts between sildenafil group and the other two study groups. The sildenafil group demonstrated lesser apoptotic cell count than the vardenafil ($p = 0.021$) and tadalafil ($p = 0.009$) groups. PUUO increases the renal tubular apoptosis and elevates NOS concentrations in renal tubular tissue after PUUO. Phosphodiesterase 5 inhibitors have a protective effect against the tubular apoptosis.

Akin, M., S. Demirbilek, et al. "Attenuation of ureteral obstruction-induced renal injury by polyenylphosphatidylcholine." *Int J Urol.* 2007 Apr;14(4):350-6.

BACKGROUND: The cytoprotective, antioxidant and antifibrotic effects of polyenylphosphatidylcholine (lecithin, PPC) have been demonstrated both experimentally and clinically. The present study investigated whether PPC treatment has any beneficial effect on renal injury in unilateral partial ureteral obstruction (UUO) in rats. **METHODS:** Forty Wistar-Albino rats were split into three groups (sham-operated controls, untreated and treated rats). Rats of the untreated and treated groups ($n = 15$) underwent UUO with two-thirds of the left ureter embedded in the psoas muscle. In group 3, PPC was given orally at a dose of 100 mg/day for 30 days. At the end of the 30th day of the experimental period, obstructed kidneys and blood samples were harvested. To investigate the therapeutic efficacy of PPC treatment in UUO kidneys, oxidant and antioxidant enzyme levels, lipid peroxidation, proinflammatory cytokines (interleukin-1, interleukin-6, tumor necrosis factor alpha), transforming growth factor beta-1 (TGFbeta-1), alpha smooth muscle actin (alpha-SMA) and nuclear factor kappa beta (NF-kappabeta) expression, leukocyte infiltration (ED1, ED2, CD4 and CD8 immunohistochemistry), and tubulointerstitial damage in the obstructed kidneys were studied. **RESULTS:** Oxidative stress, neutrophil infiltration, release of cytotoxic mediators, TGFbeta-1 levels, tubulointerstitial damage, alpha-SMA and NF-KB expressions in kidney tissue were significantly increased in the UUO rats. PPC treatment attenuated oxidative stress, leukocyte infiltration, cytotoxic mediator, and TGFbeta-1 levels and also decreased expressions of alpha-SMA and NF-kappabeta. It was

associated with decreased tubulointerstitial damage, compared with UUO alone. **CONCLUSIONS:** These results indicate that PPC treatment protects against UUO-induced renal injury in rats possibly through its antioxidant, anti-inflammatory and antifibrotic actions.

Al-Bashir, A., D. Rohrmann, et al. "Early Detection of Tubulo-Interstitial Kidney Disease in Children Using Highly Discriminating SDS-Gel Electrophoresis." *Saudi J Kidney Dis Transpl.* 2001 Oct-Dec;12(4):503-10.

Tubulo-interstitial kidney disease is characterized by moderate proteinuria < 1 g/day of low molecular weight proteins in range of MW 10.000-50.000. Even in the physiological proteinuria of < 150 mg/day, tubulo-interstitial kidney disease may exist. Using optimized sodium dodecyl sulfate polyacrylamid gel electrophoresis (SDS-PAGE) according to the method of Melzer, even in proteinuria of less than 150 mg/day all relevant proteins for diagnosis of glomerular or tubulo-interstitial kidney disease can be detected. This study evaluates the tubulo-interstitial kidney disease due to polychemotherapy for different types of cancer in 115 children and in 16 children with pyelo-ureteral junction obstruction. Fifty-two and 63 children were followed up during and after chemotherapy, respectively. During therapy, renal damage was recorded in 43% of patients with leukemia, 56% with nephroblastoma, and 79% with other tumors. Tubular protein patterns were seen up to three years after termination of chemotherapy (25% in acute lymphoplastic leukemia, 35% in nephroblastoma and 62% in other tumors). Patients with persistent complete tubular proteinuria or mixed glomerular/tubular proteinuria were found to have a high risk for irreversible renal failure. Children with congenital pyelo-ureteral junction obstruction could also be classified according to SDS-PAGE protein patterns. Patients without parenchymal lesions did not need surgery. Most of those with pathologic findings in SDS-PAGE exhibited partial or complete remission after surgery. The highly discriminating SDS-PAGE permits a rapid, sensitive, reproducible, and reliable analysis of urine proteins for diagnosis and follow-up of all kinds of congenital or acquired renal parenchymal kidney diseases.

Antonelli, A., C. Simeone, et al. "Clinical aspects and surgical treatment of urinary tract endometriosis: our experience with 31 cases." *Eur Urol.* 2006 Jun;49(6):1093-7; discussion 1097-8. Epub 2006 Apr 4.

OBJECTIVES: To present and discuss clinical and surgical management of urologic endometriosis. **METHODS:** Retrospective review of a

database on surgical patients with endometriosis. RESULTS: Thirty-one patients (incidence, 2.6%; mean age, 33.1 yr) were affected by urologic endometriosis (bladder, 12; ureter, 15; both, 4). Bladder endometriosis was revealed by symptoms related to menses and showed a typical endoscopic picture, whereas ureteral involvement had a nonspecific or silent symptomatology. All patients affected by bladder endometriosis and undergoing transurethral resection (2 cases) developed a bladder recurrence; a ureteral recurrence was observed in two of six patients submitted to laparoscopic ureterolysis and in one of two patients submitted to ureterectomy with ureteroureterostomy. Conversely, no relapses were observed among the 14 patients who had partial cystectomy or the 9 who had ureterectomy and ureterocystoneostomy. Finally, two patients underwent nephrectomy due to end-stage renal atrophy. CONCLUSIONS: Cystoscopy is advisable in women with pelvic endometriosis with lower urinary tract symptoms; the upper urinary tract should be evaluated in all patients with pelvic endometriosis to exclude asymptomatic ureteral involvement. Partial cystectomy gives the best results when used to treat bladder endometriosis. Ureterolysis can be successful only in case of limited ureteral involvement with no urinary obstruction, whereas terminal ureterectomy and ureterocystoneostomy should be preferred in case of obstructive ureteral endometriosis.

Arrabal-Martin, M., M. Pareja-Vilches, et al. "Therapeutic options in lithiasis of the lumbar ureter." Eur Urol. 2003 May;43(5):556-63.

INTRODUCTION: In the past 25 years, the treatment of lithiasis of the lumbar ureter has evolved from ureterolithotomy to extracorporeal shockwave lithotripsy and/or endoscopic lithotripsy. Our objective has been to analyse the results of extracorporeal lithotripsy and endoscopic surgery in lithiasis of the lumbar ureter. MATERIALS AND METHODS: We have analysed 734 single calculi of the lumbar ureter treated during the decade 1990-2000, excluding patients with lithiasis in other locations in order to avoid bias in the assessment of the results. Extracorporeal shockwave lithotripsy (ESWL) was carried out using a Siemens Lithostar, urinary diversion with a double pigtail ureteric catheter or percutaneous nephrostomy, semi-rigid ureteroscopy and electrokinetic contact lithotripsy. The patient were divided into six groups. We assessed complete and partial success, the fragmentation index, and complications, analysing the results using a test for the comparison of proportions. RESULTS: In group A, non-obstructive lithiasis treated by in situ ESWL, complete success was achieved in 95.5%. In group B, obstructed lithiasis treated by in situ ESWL, 93.15%.

In group C, obstructive lithiasis treated with a double pigtail catheter and ESWL, 81.11%. In group D, obstructive lithiasis treated with percutaneous nephrostomy and ESWL, 93.75%. In group E, ureteric lithiasis <1cm, treated by retrograde displacement to the renal cavities and ESWL, 82.3%. In group F, lithiasis of the lumbar ureter treated by ureteroscopy, 91%. CONCLUSIONS: The primary therapeutic option for the treatment lithiasis of the lumbar ureter, in the absence of criteria for urinary diversion, is in situ ESWL. We consider the criteria for urinary diversion prior to ESWL to be severe obstruction, obstruction associated with urinary tract infection, and obstruction caused by a proximal ureteric calculus adjacent to the inferior renal pole. Ureteroscopy and/or contact lithotripsy is the technique of choice in lithiasis of the lumbar ureter resistant to ESWL due to non-fragmentation or to the persistence of impacted fragments. Ureteroscopy may be the first choice of therapy in obstructive lithiasis, substituting urinary diversion plus ESWL.

Atilgan, D., B. S. Parlaktas, et al. "Effects of melatonin on partial unilateral ureteral obstruction induced oxidative injury in rat kidney." Urol Ann. 2012 May;4(2):89-93. doi: 10.4103/0974-7796.95552.

AIM: This experimental study was designed to produce ischemia-reperfusion injury in rat kidney by performing partial unilateral ureteral obstruction (PUUO) and investigated the effects of melatonin on the levels of oxidative injury parameters. MATERIALS AND METHODS: Twenty-four adult male rats were randomly divided into three groups as follows; control group (Group 1); only nephrectomy and blood (5 ml) drawn from vena cava inferior, PUUO group (Group 2); PUUO (10 days)+ipsilateral nephrectomy after recovery of PUUO+blood from vena cava inferior VCI, melatonin treated group (Group 3); PUUO (10 days)+melatonin (1/2 hr before release, 50 mg/kg, ip)+ipsilateral nephrectomy after recovery of PUUO+blood from VCI. The left ureter was embedded into the psoas muscle to create PUUO. After 10 days, PUUO was recovered and ipsilateral nephrectomies were performed for biochemical analysis of superoxide dismutase (SOD), catalase (CAT), malondialdehyde (MDA), glutathione peroxidase (GSH-Px), and protein carbonyl (PC) in the tissues and blood was drawn from inferior vena cava to study the same parameters in systemic circulation. The results were compared statistically. RESULTS: The blood levels of MDA, NO, and PC were increased in the PUUO group in comparison to the sham-operated group (P<0.05). Melatonin treatment reduced MDA, NO, and PC levels in blood after PUUO recovery, but statistically significance consisted only for MDA and NO (P<0.05). The antioxidant enzyme

activities (SOD, GSH-Px) were increased in the PUUO group ($P < 0.05$). Melatonin treatment reduced SOD and GSH-Px activities in comparison with the sham-operated control group ($P < 0.05$). Similarly, renal tissue levels of MDA, NO, and PC were increased in the PUUO group in comparison with the sham-operated group ($P < 0.05$). Melatonin treatment ameliorated MDA, NO, and PC levels in renal tissue after PUUO recovery only MDA was statistically significant ($P < 0.05$). Antioxidant enzyme activities (SOD, CAT, and GSH-Px) were increased in the PUUO group. Melatonin treatment caused reduction in SOD, CAT, and GSH-Px activities in comparison to the sham-operated control group ($P < 0.05$). CONCLUSION: The results of this study showed that experimentally induced PUUO caused oxidative stress in rat kidney and melatonin treatment reduced oxidative stress and therefore may have a preventive effect on PUUO induced oxidative kidney damage in rats.

Ayan, S., J. A. Roth, et al. "Partial ureteral obstruction dysregulates the renal renin-angiotensin system in the fetal sheep kidney." *Urology*. 2001 Aug;58(2):301-6.

OBJECTIVES: To investigate whether partial ureteral obstruction (PUO) in the fetus induces dysregulation of the renin-angiotensin system (RAS) and of transforming growth factor-beta 1 (TGF-beta1) and tissue inhibitors of metalloproteinase (TIMP1) expression. Previous studies have indicated that renal and urinary tract development depend on an intact renal RAS. Fetal urinary obstruction is distinct from postnatal obstruction. It has been suggested in postnatal animal studies that dysregulation of the RAS, and subsequent increased expression of TGF-beta1 and TIMP1, leads to changes in extracellular matrix composition. METHODS: Bilateral PUO was created in 4 fetal sheep. Seven animals (four obstructed and three controls) were killed at birth and their kidneys removed. Semiquantitative reverse transcriptase-polymerase chain reaction was used to quantify the levels of renin, angiotensinogen, angiotensin receptor type 1 (AT1 receptor), angiotensin receptor type 2 (AT2 receptor), TGF-beta1, and TIMP1. These messages were normalized to glyceraldehyde-3-phosphate dehydrogenase mRNA. RESULTS: All obstructed animals had moderate to severe hydronephrosis with enlarged kidneys (mean weight 22.0 g versus 9.4 g for the control animals; $P < 0.05$). The increase in the levels of renin, angiotensinogen, AT1 receptor, TGF-beta1, and TIMP1 mRNA was significant in the PUO group compared with the control group ($P < 0.05$). AT2 receptor levels did not increase, but the AT1/AT2 mRNA ratio was significantly increased over normal ($P < 0.005$). Also, a significant linear correlation was found between the

increased renal weight and increased TGF-beta1 mRNA levels ($P < 0.005$). CONCLUSIONS: Our findings suggest that fetal PUO can cause upregulation of the renal RAS and increased expression of TGF-beta1 and TIMP1, which may alter the balance between the generation and degradation of the extracellular matrix. The coordinate increases in renin, angiotensinogen, and AT1 receptor mRNA levels in chronic fetal PUO may represent a maladaptive response that contributes to interstitial fibrosis and prolonged vasoconstriction. RAS components and growth factors, particularly TGF-beta1, may be considered relevant targets in the prevention and treatment of congenital obstructive nephropathy.

Ayyildiz, A., M. Kaya, et al. "Effect of tadalafil on renal resistivity and pulsatility index in partial ureteral obstruction." *Urol Int*. 2009;83(1):75-9. doi: 10.1159/000224873. Epub 2009 Jul 27.

INTRODUCTION: To investigate the effect of tadalafil on Resistivity Index (RI) and Pulsatility Index (PI) in partial unilateral ureteral obstruction (PUUO). METHODS: Twelve New Zealand rabbits were assigned into two groups. Baseline renal Doppler ultrasonography (USG) was performed in all rabbits. The rabbits in group 1 received tadalafil for a month (10 mg/72 h) and group 2 was defined as sham. After 1 month, in both groups left PUUO was created. Renal Doppler USG was performed to measure RI and PI parameters of both kidneys on the 4th hour and 1st and 3rd days postoperatively. RESULTS: Baseline renal Doppler USG revealed that there was no difference between two kidneys in both groups. The differences in mean RI and PI values of the kidneys between the sham and tadalafil groups were not statistically significant. Compared with the preoperative values, postoperative RI and PI values for the left kidneys were significantly increased in the period from 4 h to 3 days postoperatively in the sham group ($p < 0.05$). However, mean RI and PI values were not increased in the tadalafil group when compared with the sham group and this difference between the two groups was significant ($p < 0.05$). CONCLUSIONS: Tadalafil has a lowering affect on RI and PI in experimentally created PUUO.

Baccala, A., U. Lee, et al. "Laparoscopic partial nephrectomy for tumour in the presence of nephrolithiasis or pelvi-ureteric junction obstruction." *BJU Int*. 2009 Mar;103(5):660-2. doi: 10.1111/j.1464-410X.2008.08068.x. Epub 2008 Oct 6.

OBJECTIVE: To report on patients with a small renal mass and concomitant calculus or pelvi-ureteric junction obstruction (PUJO), and to propose an algorithm for minimally invasive management when these conditions coexist, as the success of

laparoscopic partial nephrectomy (LPN) depends greatly on the absence after surgery of ureteric obstruction. PATIENTS AND METHODS: Fifteen (3%) of 548 patients undergoing LPN (November 1999 to May 2005) had concomitant calculus/PUJO; the calculus/PUJO was treated in six, either before (one), during (three) or after (two) LPN, depending on the presence of obstruction. The remaining nine patients were monitored as they had a punctate and unobstructing stone burden. RESULTS: The mean (range) tumour size was 2.7 (1.4-4) cm, the operative duration 3.8 (2-6) h, the warm ischaemia time 34.8 (22-53) min, and blood loss 237 (50-600) mL. Two patients with concomitant PUJO had a single-session dismantled Anderson-Hynes pyeloplasty and LPN. Three patients with smaller stones (5-12 mm) had extracorporeal shock wave lithotripsy, percutaneous nephrolithotomy or or ureteroscopic removal before (one) or after (two) LPN. One patient with a larger 1.6 cm obstructing renal pelvic calculus had laparoscopic flexible pyeloscopy, but the stone was not visualized. At the end of all treatments, the 6-month tumour-free and stone-free rates were 15/15 and 11/13, respectively. CONCLUSION: Patients with a concomitant small renal mass and calculus/PUJO can be successfully managed in a simultaneous or staged manner using minimally invasive techniques. A management algorithm is presented.

Barthez, P. Y., D. D. Smeak, et al. "Ureteral obstruction after ureteroneocystostomy in dogs assessed by technetium TC 99m diethylenetriamine pentaacetic acid (DTPA) scintigraphy." *Vet Surg.* 2000 Nov-Dec;29(6):499-506.

OBJECTIVE: To use technetium Tc 99m diethylenetriamine pentaacetic acid (99mTc-DTPA) renal scintigraphy to monitor ureteral obstruction after ureteroneocystostomy in a canine model of partial ureteral obstruction. STUDY DESIGN: Experimental study. ANIMALS: Eight normal adult dogs. METHODS: Partial ureteral obstruction was created in 8 dogs by incomplete ligation of the terminal right ureter. Two weeks later, ureteroneocystostomy was performed in 7 dogs with unilateral partial ureteral obstruction and in 1 dog that had developed bilateral partial ureteral obstruction. 99mTc-DTPA scintigraphy was performed intermittently for 2 weeks after ureteroneocystostomy. Renal transit time of each kidney, as assessed by the time to maximal uptake (time of peak), and glomerular filtration rate, as assessed by percentage of kidney uptake of the radiopharmaceutical between 1 and 3 minutes, were estimated. Comparison between affected and nonaffected kidneys was performed with the Wilcoxon rank sum test. RESULTS: Unilateral partial ureteral obstruction was induced successfully in 7 dogs. In 1

dog, bilateral partial obstruction was induced inadvertently. After ureteroneocystostomy, percentage of kidney uptake of 99mTc-DTPA was low in 4 affected kidneys. The uptake returned to within normal limits in 2 of the kidneys during the observation period. The time activity curve had a more rounded appearance or was increasing continuously for all affected kidneys. A significant increase in renal transit time was observed 2 and 4 days after ureteroneocystostomy. Transit time progressively returned to normal by 4 to 11 days for all affected kidneys except 1. CONCLUSION: Ureteroneocystostomy resulted in persistent partial ureteral obstruction for 4 to 11 days as determined by 99mTc-DTPA scintigraphy. CLINICAL RELEVANCE: 99mTc-DTPA scintigraphy may be a useful procedure for monitoring renal function and ureteral obstruction after ureteroneocystostomy. Persistent partial ureteral obstruction may be seen 1 to 2 weeks after ureteral reimplantation in dogs with previously existing dilated ureters.

Barthez, P. Y., D. D. Smeak, et al. "Effect of partial ureteral obstruction on results of renal scintigraphy in dogs." *Am J Vet Res.* 1999 Nov;60(11):1383-9.

OBJECTIVE: To use scintigraphy to determine the effects of partial ureteral obstruction on renal transit time and induction of diuresis in dogs. ANIMALS: 8 adult dogs. PROCEDURE: Scintigraphy was performed, using technetium Tc 99m diethylenetriaminepentaacetic acid (Tc 99m-DTPA), before and within 2 weeks after surgical induction of unilateral partial ureteral obstruction. Time of peak (TOP) for the parenchyma (pTOP) and whole kidney (wTOP) and mean-transit time (MTT) for the parenchyma (pMTT) and whole kidney (wMTT) were determined by evaluation of renal time-activity curves before and after deconvolution analysis. Percentage uptake for each kidney between 1 and 3 minutes after injection of Tc 99m-DTPA was determined and used to indicate glomerular filtration rate. The effect of diuresis was determined by measuring the slope of decrease in activity after i.v. administration of furosemide. Obstruction was documented by direct inspection of the ureter. RESULTS: There was a concomitant increase in pTOP, wTOP, pMTT, and wMTT of the kidney with the partially obstructed ureter in all dogs at various times between 2 and 9 days after surgery. Concurrently, renal time-activity curves changed shape. Percentage renal uptake of the affected kidney was decreased in 2 dogs. Response to furosemide injection was inconsistent for kidneys before surgery and for kidneys with obstructed and nonobstructed ureters after surgery. CONCLUSIONS AND CLINICAL RELEVANCE: Scintigraphy may be a useful procedure for the evaluation of renal function

in dogs with ureteral obstruction. Induction of diuresis appears to be of little value for differentiating renal function in dogs with obstructed and nonobstructed ureters.

Beharrie, A., J. Franc-Guimond, et al. "A functional immature model of chronic partial ureteral obstruction." *Kidney Int.* 2004 Apr;65(4):1155-61.

BACKGROUND: The most common nonlethal congenital anomaly of the urinary tract is ureteral obstruction without dysplasia. Although rarely progressive, the morbidity associated with metabolic and surgical management is considerable. Our study was designed to measure local and systemic pathophysiologic mechanisms in an immature model of chronic partial unilateral ureteral obstruction (UO) after completion of glomerulogenesis. **METHODS:** A partial UO was created by the method of "psoas wrap" in young male weanling rats. Control animals were sham operated. Three groups were divided as follows: sham (N= 15), UO (N= 18), and UO + angiotensin-converting enzyme (ACE) (N= 16) inhibitor, enalapril. Renal glomerular and tubular functions were determined by creatinine and uric acid clearances. Diuresis was assessed by urine volume, osmolality, and fractional solute excretions from samples above and below the obstruction. Proteinuria was determined by the urine protein/creatinine ratio (Up/c). **RESULTS:** Proteinuria was attenuated in UO + ACE-treated animals. The hyperuricemia of the immature UO animals was avoided by an increase in the clearance of uric acid in the UO + ACE-treated group. Fractional solute excretions suggested a diversion of diuresis to the contralateral unobstructed kidney. **CONCLUSION:** Angiotensin blockade during chronic UO in young rats affords protection by attenuating proteinuria, promoting uricosuria, and diverting solute diuresis. These data suggest a complex interaction of local and systemic mechanisms unique to the maturing kidney.

Beilan, J., R. Strakosha, et al. "The Postoperative Morbidity Index: a quantitative weighing of postoperative complications applied to urological procedures." *BMC Urol.* 2014 Jan 3;14:1. doi: [10.1186/1471-2490-14-1](https://doi.org/10.1186/1471-2490-14-1).

BACKGROUND: The reporting of post-operative complications in the urological field is lacking of a uniform quantitative measure to assess severity, which is essential in the analysis of surgical outcomes. The purpose of this study was to evaluate the feasibility of estimating quantitative severity weighing of post-operative complications after common urologic procedures. **METHODS:** Using a large healthcare system's quality database, complications were identified in eleven common

urologic procedures (e.g., insertion or replacement of inflatable penile prosthesis, nephroureterectomy, partial nephrectomy, percutaneous nephrostomy tube placement, radical cystectomy, radical prostatectomy, renal/ureteral/bladder extracorporeal shockwave lithotripsy (ESWL), transurethral destruction of bladder lesion, transurethral prostatectomy, transurethral removal of ureteral obstruction, and ureteral catheterization) from January 1, 2011 to December 31, 2011. Complications were classified by the Expanded Accordion Severity Grading System, which was then quantified by validated severity weighting scores. The Postoperative Morbidity Index (PMI) for each procedure was calculated where an index of 0 would indicate no complication in any patient and an index of 1 would indicate that all patients died. **RESULTS:** This study included 654 procedures of which 148 (22%) had one or more complications. As would be expected, a more complex procedure like radical cystectomy possessed a higher PMI (0.267), while a simpler procedure like percutaneous nephrostomy tube placement possessed a lower PMI (0.011). The PMI of the additional nine procedures fell within the range of these PMIs. These PMIs could be used to compare surgeons, hospitals or procedures. **CONCLUSIONS:** Quantitative severity weighing of post-operative complications for urologic procedures is feasible and may provide exceptionally informative data related to outcomes.

Furtado, C. D., C. Sirlin, et al. "Unusual cause of ureteral obstruction in transplant kidney." *Abdom Imaging.* 2006 May-Jun;31(3):379-82.

Ultrasound and computed tomographic images are described in a patient who underwent renal transplantation and presented with hydronephrosis and partial ureteral obstruction secondary to herniation of the transplant ureter into a left inguinal hernia. To our knowledge, this is the first report of herniation of a transplanted ureter in the inguinal canal resulting in or exacerbating ureteral obstruction.

Gandolpho, L., M. Sevillano, et al. "Scintigraphy and Doppler ultrasonography for the evaluation of obstructive urinary calculi." *Braz J Med Biol Res.* 2001 Jun;34(6):745-51.

Forty-seven patients with unilateral obstructive calculi (12 males and 35 females) were submitted to ^{99m}Tc-diethylene triamine pentaacetic acid (DTPA) or ^{99m}Tc-dimercaptosuccinic acid (DMSA) scans for assessment of renal function. The scans revealed unilateral functional deficit in 68 and 66% of the patients, respectively. A calculus size of 1.1 to 2.0 cm was significantly associated with deficit detected by DTPA, but duration of obstruction and calculus localization were not. After relief of the

obstruction, the mean percent renal function of the affected kidney was found to be significantly increased from 25 +/- 12% to 29 +/- 12% in DTPA and from 21 +/- 15% to 24 +/- 12% in DMSA. Initial Doppler ultrasonography performed in 35 patients detected an increased resistive index in 10 (29%). In the remaining patients with a normal resistive index, ureteral urinary jet was observed, indicating partial obstruction. The high frequency of renal function impairment detected by DTPA and of tubulointerstitial damage detected by DMSA as well as the slight amelioration of unilateral renal function after relief of obstruction suggest that scintigraphy assessment may help evaluate the unilateral percentage of renal function and monitor renal function recovery when it occurs. The presence of a urinary jet detected by Doppler ultrasonography further indicates the severity of obstruction and the recovery prognosis.

Grattan-Smith, J. D., S. B. Little, et al. "MR urography evaluation of obstructive uropathy." Pediatr Radiol. 2008 Jan;38 Suppl 1:S49-69. Epub 2007 Dec 11.

Hydronephrosis and the evaluation of obstructive uropathy are the most common indications for MR urography in our practice. Typically our patients fall into one of two groups: infants with antenatal hydronephrosis and older children who present with abdominal pain, hematuria or urinary tract infection. Obstruction in children is usually chronic and partial. Intermittent episodes of increased pressure occur when the urine production exceeds the capacity for drainage. MR urography uses a fluid and diuretic challenge to assess the hydronephrotic kidney. High-quality anatomic images provide a morphologic assessment of the hydronephrotic system. Although it is relatively straightforward to determine if a system is not obstructed on the basis of the renal transit time (RTT), no single parameter is adequate to fully characterize obstruction. By evaluating the changes in signal intensity in the renal parenchyma following contrast administration, the hydronephrotic systems are classified as compensated or decompensated. Delayed RTT and the presence of urine-contrast levels indicate stasis. Calyceal transit time and the difference between the volumetric and the Patlak differential renal function (vDRF-pDRF) are measures of the physiologic changes within the kidney. Additionally, MR urography provides prognostic information by assessing the quality of the renal parenchyma and identifying uropathy preoperatively. MR urography combines both anatomic and functional information in a single test and is capable of providing a comprehensive evaluation of obstructive uropathy that could ultimately help select those patients most likely to benefit from surgical intervention.

Haas, C. A., M. D. Reigle, et al. "Use of ureteral stents in the management of major renal trauma with urinary extravasation: is there a role?" J Endourol. 1998 Dec;12(6):545-9.

Five patients with major (Grade IV) renal trauma required ureteral stent placement to facilitate urinary drainage. Three of these patients had stents placed for recurrent gross hematuria with flank pain. All three had obstructing blood clots present at the time of stent placement. The fourth patient had a stent placed because of persistent extravasation at 2 weeks postinjury. The last patient was considered at risk for persistent urinary extravasation because of a partial ureteropelvic junction obstruction and had a ureteral stent placed as part of the initial management. All patients were followed radiographically for resolution of extravasation. Long-term clinical follow-up consisted of serum creatinine evaluation and blood pressure monitoring. Urinary extravasation resolved in all five patients, as determined by radiologic evaluation, at a mean of 8 days after stent placement. Ureteral stents were left indwelling an average of 4 weeks. No patient developed hypertension, and all serum creatinine values were normal at a mean 26 months' follow-up. No patient developed urinoma or abscess, and none required open surgical exploration. Ureteral stents may be used safely and effectively to treat persistent or recurrent urinary extravasation resulting from major blunt renal trauma in appropriately selected patients. In addition, ureteral stents may avoid the need for surgical exploration in patients with Grade IV renal trauma who develop recurrent gross hematuria, flank pain, and persistent or recurrent extravasation secondary to clot obstruction.

Hansen, M. H., B. Y. Wang, et al. "Effect of urinary tract infection on ureteropelvic junction obstruction in a rat model." Urology. 2003 Apr;61(4):858-63.

OBJECTIVES: When a partially obstructed kidney becomes infected, more rapid and extreme renal parenchymal damage appears to occur than might result from either infection or obstruction alone. Previously, we showed that either bacteriuria or partial obstruction in congenital unilateral hydronephrosis causes elevated renal pelvic pressures in a rat model. In this same model, we examined the combined effects of partial upper tract obstruction and bacteriuria on renal pelvic and bladder pressures. **METHODS:** Female rats from an inbred colony in which more than one half are born with unilateral obstructive hydronephrosis were studied. Type 1 pilated *Escherichia coli* was instilled into the bladder. Two to 6 days later, the bladder and renal pelvic pressures were measured during varying urinary flows (less than 2 to more than 30 mL/kg/hr). All animals were killed and the kidneys and bladder grossly and histologically

assessed. Hydronephrosis was determined at pathologic examination. RESULTS: Eight rats had congenital unilateral hydronephrosis; five were normal. Acute inflammation was found in all bladder and renal specimens. In hydronephrotic, infected kidneys, the renal pelvic pressures exceeded those in nonhydronephrotic, infected kidneys at all urinary flow rates. Bladder capacity and pressures did not differ between the two groups. CONCLUSIONS: This model demonstrates that the combination of infection and obstructive hydronephrosis in this model causes renal pelvic pressure elevation that is higher than that associated with either infection or obstructive hydronephrosis alone. These data demonstrate the compound effect that infection and obstruction may have on the kidney and offers an explanation for why this clinical situation is more likely to be associated with greater renal parenchymal injury than either alone.

Harabayashi, T., N. Shinohara, et al. "Ureteral stricture developing after partial nephrectomy with a microwave tissue coagulator: case report." J Endourol. 2003 Dec;17(10):919-21.

A 32-year-old man with a 1.7-cm tumor in the left kidney underwent laparoscopy-assisted partial nephrectomy. Although his postoperative course was uneventful, a 6-month postoperative CT scan showed hydronephrosis secondary to a severe stricture at the ureteropelvic junction. Heat injury to the urinary tract was strongly suspected. The use of microwave tissue coagulator for the tumor close to the renal sinus and excessive coagulation should be avoided to prevent heat-related complications.

Hecht, S., S. M. Lawson, et al. "(99m)Tc-DTPA diuretic renal scintigraphy in cats with nephroureterolithiasis." J Feline Med Surg. 2010 Jun;12(6):423-30. doi: 10.1016/j.jfms.2009.09.015. Epub 2010 Mar 29.

The purpose of this study was to evaluate results of diuretic renal scintigraphy in 32 feline kidneys with nephroureterolithiasis and variable degrees of renal pelvis/ureteral dilation. Six kidneys showed a non-obstructive scintigraphic pattern, with a downward slope of time-activity curves (TAC) and a median excretion half-time of radiopharmaceutical ($T((1/2))$) of 6.09 (5.08-8.43) min. Eight kidneys showed an obstructive pattern, with a continuous rise of TAC and median $T((1/2))$ of -7.91 (-43.13-0.00) min. In one kidney with presumptive partial obstruction scintigraphic results were equivocal. Seventeen kidneys, most of which had an individual kidney glomerular filtration rate below 0.5ml/min/kg, had non-diagnostic studies. Diuretic renal scintigraphy may be a useful adjunct modality in the diagnosis of

ureteral obstruction in some cats if renal function is maintained. However, the large number of non-diagnostic studies in animals with decreased renal function represents a clear limitation of the technique.

Hilgers, K. F., S. K. Nagaraj, et al. "Molecular cloning of KS, a novel rat gene expressed exclusively in the kidney." Kidney Int. 1998 Nov;54(5):1444-54.

BACKGROUND: We aimed to identify genes with kidney specific, developmentally regulated expression. Here we report the cDNA sequence and expression pattern of KS, a novel kidney-specific rat gene. METHODS: A partial cDNA was identified by differential display polymerase chain reaction (PCR) of a renal cell fraction enriched for proximal tubular and renin-expressing cells. Using the partial cDNA as a probe, a rat kidney cDNA library was screened. The full-length KS sequence was obtained by PCR amplification of cDNA ends. The expression pattern of KS was investigated by Northern blot. RNA was extracted from several organs of newborn and adult rats, as well as from the kidneys of rats with altered tubular function, that is, rats that had undergone unilateral nephrectomy, unilateral ureteral obstruction, neonatal losartan treatment, and the appropriate control animals. The expression of KS was also investigated in the kidneys of rats with spontaneous or renovascular hypertension. RESULTS: The KS cDNA (2426 bp) contained one open reading frame encoding a predicted 572 amino acid protein. The derived peptide sequence displayed approximately 70% similarity to the hypertension-related SA gene product and approximately 50% similarity to prokaryotic and eukaryotic acetyl-CoA synthases (EC 6. 2.1.1). KS was expressed in the kidney and not in any other organ assayed. KS RNA was not detected in fetal and newborn rat kidney but became apparent after one week of postnatal life. Gene expression was downregulated in rat models of altered tubular function. KS expression was decreased in spontaneously hypertensive rats but not in renovascular hypertension. CONCLUSION: KS, a novel rat gene, exhibits a unique tissue-specific expression exclusively in mature kidneys. The data suggest KS may encode an adenosine monophosphate binding enzyme.

Holmes, N. M., S. McBroom, et al. "Renal imaging with spiral CT scan: clinical applications." Tech Urol. 1997 Winter;3(4):202-8.

Spiral computed tomography (CT) is an imaging modality that utilizes the rapid acquisition of cross-sectional data that can be reconstructed in a number of useful ways. We briefly describe the technology of spiral CT and recent advancements that have made spiral CT feasible. The advantages over

conventional CT and angiography are reviewed. Urologic clinical applications are discussed including: detection of a crossing vessel prior to endopyelotomy for ureteropelvic junction (UPJ) obstruction, evaluating renal vascular anomalies preoperatively, and assistance in preoperative planning prior to partial nephrectomy in benign and malignant disease. Spiral CT has numerous advantages over conventional CT and angiography, and will likely have a notable role in future renal imaging.

Homayoon, K., J. L. Pippi Salle, et al. "Relative accuracy of renal scan in estimation of renal function during partial ureteral obstruction." Can J Urol. 1998 Oct;5(4):611-619.

This study is designed to evaluate the relative ability of DMSA and DTPA renal scans to accurately reflect differential renal function (DRF) compared with inulin clearance in the presence of partial unilateral ureteral obstruction. DRF was determined in 29 young rabbits by both renal scans. In the experimental group (n=21), left partial ureteral obstruction was created. Following 8 to 24 weeks, individual renal function in the obstructed animals were assessed by both renal scans and clearance of inulin. Eight animals were used as control. In the control group, DRF measured by DMSA, but not DTPA, correlated well with inulin clearance. Both scans documented a significant change in the DRF of the obstructed group ($p < 0.001$). In the partially obstructed kidneys DRF derived by inulin was significantly lower than that measured by DMSA or DTPA scans ($p < 0.001$ and $p < 0.0001$). DRF measured by DMSA correlates well with inulin clearance in the control group. A similar correlation was not obtained by DMSA in the presence of obstruction. DTPA does not correlate with inulin clearance either in the control or the obstructed group.

Hsieh, L. T., M. V. Nastase, et al. "Soluble biglycan as a biomarker of inflammatory renal diseases." Int J Biochem Cell Biol. 2014 Sep;54:223-35. doi: 10.1016/j.biocel.2014.07.020. Epub 2014 Aug 1.

Chronic renal inflammation is often associated with a progressive accumulation of various extracellular matrix constituents, including several members of the small leucine-rich proteoglycan (SLRP) gene family. It is becoming increasingly evident that the matrix-unbound SLRPs strongly regulate the progression of inflammation and fibrosis. Soluble SLRPs are generated either via partial proteolytic processing of collagenous matrices or by de novo synthesis evoked by stress or injury. Liberated SLRPs can then bind to and activate Toll-like receptors, thus modulating downstream inflammatory signaling. Preclinical animal models and human

studies have recently identified soluble biglycan as a key initiator and regulator of various inflammatory renal diseases. Biglycan, generated by activated macrophages, can enter the circulation and its elevated levels in plasma and renal parenchyma correlate with unfavorable renal function and outcome. In this review, we will focus on the critical role of soluble biglycan in inflammatory signaling in various renal disorders. Moreover, we will provide new data implicating proinflammatory effects of soluble decorin in unilateral ureteral obstruction. Finally, we will critically evaluate the potential application of soluble biglycan vis-a-vis other SLRPs (decorin, lumican and fibromodulin) as a promising target and novel biomarker of inflammatory renal diseases.

Hughes, J. and R. J. Johnson "Role of Fas (CD95) in tubulointerstitial disease induced by unilateral ureteric obstruction." Am J Physiol. 1999 Jul;277(1 Pt 2):F26-32.

Murine renal tubular epithelial cells and interstitial fibroblasts may express both Fas (CD95) death receptor and Fas ligand and are vulnerable to Fas-mediated death in vitro. We therefore hypothesized that an absence of renal Fas may protect resident cells from undergoing apoptosis. We performed unilateral ureteric ligation [producing unilateral ureteral obstruction (UUO)] in 6-wk-old normal control mice and C57Bl6/lpr mice, which express a nonfunctional Fas receptor. Obstructed kidneys were removed at days 3, 7, and 14 (n = 6 per group). Tubular cell apoptosis at day 7 was significantly reduced in lpr mice [21.8 +/- 5.8 vs. 45.7 +/- 7.6 cells/10 high-power fields (hpf), $P < 0.02$]. Importantly, there was no difference in tubular cell proliferation between normal and lpr mice at any time point studied. Interestingly, double labeling with terminal deoxynucleotidyl transferase-mediated dUTP-biotin nick end labeling (TUNEL) and the proximal tubule-specific antibody Fx1A indicated that the absence of Fas reduced distal but not proximal tubular death at day 7. In addition, there was no difference in interstitial cell apoptosis or proliferation, suggesting that Fas does not play a significant role in interstitial cell death. Importantly, inflammatory macrophage infiltration and ultimate collagen I deposition was unchanged in lpr mice. In conclusion, the absence of functional cell surface Fas in UUO provides distal tubular cells with partial protection from apoptosis but does not affect interstitial cell fate in this model of tubulointerstitial injury.

Ikeda, A., K. Kawai, et al. "Management of ureteral obstruction in advanced testicular tumor with lymph node metastasis." Jpn J Clin Oncol. 2012

Aug;42(8):748-52. doi: 10.1093/jjco/hys094. Epub 2012 Jul 10.

OBJECTIVE: Ureteral obstruction is one of the complications of testicular tumor with retroperitoneal lymph node metastasis that requires ureteral stenting for management. We elucidated the clinical courses of ureteral obstructions and changes in renal functions in patients with indwelling ureteral stenting. **METHODS:** The medical records of 56 patients who were treated for metastatic testicular tumors by chemotherapy at a single institute between 2002 and 2010 were retrospectively reviewed. **RESULTS:** Among 56 patients, 12 patients needed ureteral stenting before chemotherapy. The proportion of patients requiring ureteral stenting was significantly higher in seminoma than non-seminoma (47 and 12%, respectively, $P < 0.05$). The ureteral stent was removed after chemotherapy or retroperitoneal lymph node dissection in all patients, except for one patient who died of cancer during chemotherapy. At retroperitoneal lymph node dissection, ureters were spared in three patients, a partial ureterectomy was needed in one patient, and no case underwent adjunctive nephrectomy. These 11 patients presented no local and distant recurrence at median follow-up of 44 months. Ureteral stenting increased the estimated glomerular filtration rate to more than 60 ml/min before chemotherapy in all patients, but it decreased to < 60 ml/min in 6 of 11 patients after chemotherapy. **CONCLUSIONS:** Ureteral obstruction due to testicular tumor was relieved after chemotherapy or retroperitoneal lymph node dissection. Ureteral stenting was effective to improve renal function before chemotherapy, although we should pay special attention to deterioration of renal function during or after chemotherapy.

Itano, N. B., L. E. Sherrill, et al. "Electron beam computerized tomography assessment of in vivo single kidney glomerular filtration rate and tubular dynamics during chronic partial unilateral ureteral obstruction in the pig." J Urol. 2001 Dec;166(6):2530-5.

PURPOSE: The assessment of hydronephrosis due to chronic partial ureteral obstruction is controversial. We determined whether a new radiographic technique for assessing kidney function, electron beam computerized tomography (CT), can detect altered renal physiology due to chronic partial ureteral obstruction. We also compared and contrasted electron beam CT with standard well tempered diuretic mercaptoacetyl triglycine (MAG-3) urography. **MATERIALS AND METHODS:** Six pigs underwent creation of unilateral partial ureteral occlusion or sham operation. Three weeks after surgery diuretic enhanced MAG-3 renal scan was done and 48 hours later contrast enhanced electron beam CT

was performed. **RESULTS:** Mean differential function plus or minus standard error of mean of the obstructed kidney was 5.6% \pm 2.4% on MAG-3 renography. In contrast, electron beam CT revealed significantly preserved mean renal function at 24.5% \pm 2.7% ($p < 0.01$). Electron beam CT analysis of tubular function revealed persistent glomerular filtration and filtrate flow through the proximal tubules and loop of Henle with a selective decrease in distal tubular flow, which were findings suggestive of proximal tubular sparing that were not demonstrated by nuclear renography. **CONCLUSIONS:** Renal function on MAG-3 renography is primarily determined by measuring kidney perfusion and tubular secretion of the isotope. In contrast, electron beam CT determines renal function via quantifying the in vivo single kidney glomerular filtration rate and by assessing renal tubular function. This study documents that electron beam CT of differential renal function is significantly different from that of MAG-3 renography. To our knowledge which of these 2 radiographic studies is most clinically applicable is unknown to date.

Josephson, S., E. Jacobsson, et al. "Experimental partial ureteric obstruction in newborn rats. X. Renal function and morphology after unobstruction." Urol Int. 1998;60(2):74-9.

Partial obstruction of the left ureter was created in newborn rats. Unobstruction was performed after 2 or 7 days. The investigations were carried out at 9 weeks of age—under slight hydropenia to institute an element of stress. Unobstruction was successful. On the unobstructed side, there were nevertheless impairments as compared to controls: urine osmolality (-32%), free water reabsorption (-44%), potassium excretion (-34%), renal blood flow (-36%) and glomerular filtration (-36%). On the intact contralateral side, tubular changes were the only signs of an attempt to compensate. Thus, consistent renal damage remained despite a very early unobstruction. Furthermore, the changes were similar to those we observed during long-term permanent obstruction. The injury seems to be established within a very short time and imitates the probable development seen in the affected fetus: after start of production, the urine is confronted by the preformed obstruction at the pyeloureteral junction. A high-pressure-prone system is built up and is not reversed, until the pelvis has become dilated and thus capable to buffer urinary flow peaks. Thereafter, no further deterioration occurs except in specific conditions. If clinically applicable, these observations implicate that there is no advantage with surgical intervention, even when performed early in fetal life, and there is no need for swift intervention, as the damage does not progress after its establishment. Most of the cases probably do not

require surgery at all, unless pain, obvious functional impairment or urinary tract infection supervene.

Kaneto, H., A. Fukuzaki, et al. "[mRNA expression of chemokines in rat kidneys with ureteral obstruction]." *Nihon Hinyokika Gakkai Zasshi*. 2000 Feb;91(2):69-74.

BACKGROUND: It has been demonstrated that leukocyte infiltration, mainly of macrophages and lymphocytes, into obstructed kidneys (OBK) of rats during unilateral ureteral obstruction (UO). Chemokines (C-C subfamily) may be involved in this mechanisms. Thus, we accessed the gene expression of chemokines in renal cortex of rats with UO. **MATERIALS AND METHODS:** Female SD rats were sacrificed at various time points after UO. mRNA expression of MCP-1, RANTES and MIP-1 alpha was determined by semi-quantitative RT-PCR. **RESULTS:** Control kidneys (CNK) showed a weak mRNA expression of MCP-1, RANTES and MIP-1 alpha. OBKs showed an increase in MCP-1 at 2 hours of UO and a significant increase at 4 hours of UO as compared with CNKs or contralateral unobstructed kidneys (CLK). The mRNA levels of RANTES and MIP-1 alpha were not increased until 72 hours of UO in CLKs or OBKs. There were slight, but significant, differences of RANTES and MIP-1 alpha expression between OBKs and CNKs at 120 hours of UO. **CONCLUSIONS:** We suggest that the early increase in MCP-1 contributes to the leukocyte infiltration and that RANTES and MIP-1 alpha plays a partial role in a late increases.

Karabulut, N., A. Baki Yagci, et al. "Renal vein Doppler ultrasound of maternal kidneys in normal second and third trimester pregnancy." *Br J Radiol*. 2003 Jul;76(907):444-7.

The flow pattern in intrarenal veins depends on renal parenchymal histology and cardiac physiology. The intrarenal venous impedance index obtained by Doppler ultrasound is related to compliance in vein, and can be helpful in the assessment of renal parenchymal compliance. The purpose of this study was to determine whether normal pregnancy has a significant effect on intrarenal venous blood flow, and assess if the physiological pyelocaliectasis causes a measurable reduction in venous impedance indexes in pregnant women. Doppler ultrasound of intrarenal veins was performed in 35 asymptomatic pregnant women in the second and third trimester of gestation, and in 24 non-pregnant healthy women. After grading the degree of hydronephrosis, venous impedance index was obtained from the interlobar veins. The venous waveforms in pregnant women showed diminished phasic oscillations owing to elevated pre-systolic flow. The

mean venous impedance indexes in pregnant women were significantly lower than the values in non-pregnant subjects, 0.30 ± 0.10 versus 0.44 ± 0.06 in the right ($p < 0.001$), and 0.36 ± 0.11 versus 0.41 ± 0.07 in the left kidney ($p = 0.03$). There was an inverse correlation between the grade of pelvicalyceal dilatation and the venous impedance indexes in both kidneys in pregnant women ($r = -0.62$, $p < 0.001$ for the right kidney, and $r = -0.38$, $p = 0.05$ for the left kidney). An abnormally reduced venous impedance index in pregnant women can at least in part be explained by reduced vascular compliance from increased interstitial pressure subsequent to partial obstruction of ureters by the gravid uterus, and caution should be exercised in interpreting it as a sign of pathological ureteral obstruction.

Koff, S. A. "Requirements for accurately diagnosing chronic partial upper urinary tract obstruction in children with hydronephrosis." *Pediatr Radiol*. 2008 Jan;38 Suppl 1:S41-8. Epub 2007 Dec 11.

Successful management of hydronephrosis in the newborn requires early accurate diagnosis to identify or exclude ureteropelvic junction obstruction. However, the presence of hydronephrosis does not define obstruction and displays unique behavior in the newborn. The hydronephrotic kidney usually has nearly normal differential renal function at birth, has not been subjected to progressive dilation and except for pelvocaliectasis does not often show signs of high-grade obstruction. Furthermore, severe hydronephrosis resolves spontaneously in more than 65% of newborns with differential renal function stable or improving. The diagnosis of obstruction in newborn hydronephrosis is challenging because the currently available diagnostic tests, ultrasonography and diuretic renography have demonstrated inaccuracy in diagnosing obstruction and predicting which hydronephrotic kidney will undergo deterioration if untreated. Accurate diagnosis of obstruction is possible but it requires an understanding of the uniqueness of both the pathophysiology of obstruction and the biology of the kidney and renal collecting system in this age group. We examine here the requirements for making an accurate diagnosis of obstruction in the young child with hydronephrosis.

Konishi, K., N. Hasegawa, et al. "[A case of stage IV breast cancer with large cancer ulcer responding to combination therapy of capecitabine and medroxyprogesterone acetate and cyclophosphamide]." *Gan To Kagaku Ryoho*. 2009 Sep;36(9):1525-8.

A 53-year-old woman suffering from nausea and vomiting was admitted to our hospital. There was a large ulcer from her left anterior chest to her right

side chest. After pathological examination from the ulcer, she was diagnosed as breast cancer, scirrhous carcinoma. The estrogen and progesterone receptors were positive in the tumor. HER2 score was 1+ in the tumor. The stage was T4bNxM1(OTH). Uterine metastases of the breast cancer caused obstructive nephropathy. Ureteral obstruction was treated by urinary tract catheter. After improvement of renal failure, chemotherapy with 5-FU+epirubicin+cyclophosphamide (FEC) and docetaxel was performed. The efficacy was judged as stable disease (SD). For third-line chemotherapy, she was then treated with oral combination chemoendocrine therapy with capecitabine and medroxyprogesterone acetate. After the combination chemoendocrine therapy, the local tumor was remarkably reduced. With added cyclophosphamide, the partial response (PR) continued for 19 months. She died of peritonitis carcinomatosa and pleuritis carcinomatosa. No adverse reactions occurred with the combination chemoendocrine therapy. It is suggested that this oral combination chemoendocrine therapy may be useful with consideration for treatment effectiveness and the quality of life of the patient.

Lopes, R. I., F. T. Denes, et al. "Serum and Urinary Values of CA 19-9 and TGF β 1 in a Rat Model of Partial or Complete Ureteral Obstruction." Eur J Pediatr Surg. 2015 Jan 5.

Introduction Abnormal levels of serum and urinary markers occur in the presence of renal damage associated to obstructive uropathy. Urinary and serum transforming growth factor beta 1 (TGF β 1) and carbohydrate antigen (CA 19-9) have not yet been evaluated in an experimental model of obstructive uropathy. **Material and Methods** Rats were divided into seven groups: reference, sham operation, unilateral nephrectomy, complete unilateral ureteral obstruction, partial unilateral ureteral obstruction, partial bilateral ureteral obstruction, and unilateral nephrectomy with contralateral partial ureteral obstruction. Kidney and ureter morphometry, TGF β 1 and CA 19-9 serum and urinary concentrations and CA 19-9 renal tissue expression were analyzed. Correlation of these markers to complete, partial obstruction, or unobstructed groups was performed. **Results** Pathological findings correlated positively with the degree of ureteral obstruction, but negatively with urinary CA 19-9 levels. Marked underexpression of CA 19-9 was observed in kidneys with complete ureteral obstruction. No statistically significant differences were found for urinary and serum TGF β 1 and also for serum CA 19-9. **Conclusion** Urinary CA 19-9 correlated negatively with ureteral obstruction grade. Immunohistochemistry depicted CA 19-9 expression on epithelial tubular cells cytoplasm,

suggesting renal origin. Serum and urinary TGF β 1 did not show alterations in response to severity and length of urinary obstruction, which might be associated with less intense renal remodeling.

Lopez-Guisa, J. M., R. Howsmon, et al. "Chimeric maternal cells in offspring do not respond to renal injury, inflammatory or repair signals." Chimerism. 2011 Apr;2(2):42-49.

Maternal microchimerism (MMc) can persist for years in a child, and has been implicated in the pathogenesis of chronic inflammatory autoimmune diseases. Chimeric cells may either contribute to disease by acting as immune targets or expand in response to signals of injury, inflammation or repair. We investigated the role of maternal cells in tissue injury in the absence of autoimmunity by quantifying MMc by quantitative PCR in acute and chronic models of renal injury: (1) reversible acute renal injury, inflammation and regeneration induced by rhabdomyolysis and (2) chronic injury leading to fibrosis after unilateral ureteral obstruction. We found that MMc is common in the mouse kidney. In mice congenic with their mothers neither acute nor chronic renal injury with fibrosis influenced the levels or prevalence of MMc. Maternal cells expressing MHC antigens not shared by offspring (H2(b/d)) were detected at lower levels in all groups of homozygous H2(b/b) or H2(d/d) offspring, with or without renal injury, suggesting that partial tolerance to low levels of alloantigens may regulate the homeostatic levels of maternal cells within tissues. Maternal cells homozygous for H2(b) were lost in H2(b/d) offspring only after acute renal failure, suggesting that an inflammatory stimulus led to loss of tolerance to homozygous maternal cells. The study suggests that elevated MMc previously found in association with human autoimmune diseases may not be a response to non-specific injury or inflammatory signals, but rather a primary event integral to the pathogenesis of autoimmunity.

Lumiahio, J., A. Heino, et al. "Drainage and antireflux characteristics of a biodegradable self-reinforced, self-expanding X-ray-positive poly-L,D-lactide spiral partial ureteral stent: an experimental study." J Endourol. 2007 Dec;21(12):1559-64. doi: 10.1089/end.2005.0085.

PURPOSE: To evaluate the drainage and antireflux characteristics of a new self-expandable self-reinforced poly-L,D-lactide partial ureteral stent (SR-PLA 96) in an experimental model. **MATERIALS AND METHODS:** Twelve dogs were used as experimental animals. A low-midline laparotomy and cystotomy were performed on all animals. In group A (six animals), 50-mm long SR-PLA 96 ureteral stents

with a double-helical spiral design were inserted into both ureters, leaving the lower ends 2 cm above the ureterovesical junction. In group B (six animals), both ureters were stented with traditional pigtail stents (C-Flex) Double-J; Cook Urological), which were removed 8 weeks after surgery. Renal function and ureteral patency were evaluated by dynamic kidney imaging and urography examinations at 6 and 12 weeks postoperatively. The degrees of vesicoureteral reflux at two levels of the ureters and at the level of the renal pelvis were evaluated by nuclear voiding cystograms at 6 weeks. RESULTS: The partial SR-PLA 96 stent design showed more favorable antireflux properties than the Double-J stent design. The degree of vesicoureteral reflux, reflected in an increase of nuclear enhancement at 6 weeks, was lower in the distal (7.9% +/- 14.7% v 63.2% +/- 17.3%; $P < 0.05$) and middle (6.1% +/- 8.1% v. 45.5% +/- 19.5%; $P = 0.15$) levels of the ureters as well as at the level of the renal pelvis (-3.4% +/- 3.6% v 6.2% +/- 3.9%; $P = 0.65$) than in the Double-J-stented ureters. No significant differences in renal function or ureteral patency were observed at 12 weeks after the Double-J stents had been removed and the SR-PLA 96 stents had fragmented. CONCLUSION: A self-expandable, self-reinforced SR-PLA 96 partial ureteral stent showed more favorable antireflux properties than a Double-J stent.

MacLellan, D. L., D. Mataija, et al. "Alterations in urinary metabolites due to unilateral ureteral obstruction in a rodent model." Mol Biosyst. 2011 Jul;7(7):2181-8. doi: 10.1039/c1mb05080j. Epub 2011 May 6.

Urinary tract obstruction (UTO) results in renal compensatory mechanisms and may progress to irrecoverable functional loss and histologic alterations. The pathophysiology of this progression is poorly understood. We identified urinary metabolite alterations in a rodent model of partial and complete UTO using (1)H nuclear magnetic resonance ((1)H-NMR) spectroscopy. Principal component analysis (PCA) was used for classification and discovery of differentiating metabolites. UTO was associated with elevated urinary levels of alanine, succinate, dimethylglycine (DMG), creatinine, taurine, choline-like compounds, hippurate, and lactate. Decreased urinary levels of 2-oxoglutarate and citrate were noted. The patterns of alteration in partial and complete UTO were similar except that an absence of elevated urinary osmolytes (DMG and hippurate) was noted in complete UTO. This pattern of metabolite alteration indicates impaired oxidative metabolism of the mitochondria in renal proximal tubules and production of renal protective osmolytes by the medulla. Decreased production of osmolytes in complete

obstruction better elucidates the pathophysiology of progression from renal compensatory mechanisms to irrecoverable changes. Further confirmation of these potential biomarkers in children with UTO is necessary.

Merguerian, P. A., E. Byun, et al. "Lower urinary tract reconstruction for duplicated renal units with ureterocele. Is excision of the ureterocele with reconstruction of the bladder base necessary?" J Urol. 2003 Oct;170(4 Pt 2):1510-3; discussion 1513.

PURPOSE: Current practice in reconstruction of the lower urinary tract for duplicated renal systems with an associated ureterocele is excision of the ureterocele with reconstruction of the bladder and a common sheath ureteroneocystostomy. For a nonfunctioning upper pole treatment is partial nephroureterectomy. We postulate that lower urinary tract reconstruction can be performed successfully through an extravesical approach without excision of the ureterocele or reconstruction of the bladder base. We present our experience with that approach. MATERIALS AND METHODS: Between 1996 and 2001, 60 patients presented with the diagnosis of ureterocele and obstruction of the upper pole ureter. Partial nephrectomy was performed in 12 cases of which 4 had reflux to the lower pole moiety. Upper pole only dismembered ureteroneocystostomy was performed in 7 of 15 cases reconstructed using the extravesical approach. RESULTS: Average postoperative stay was 3.7 days. The Foley catheter was removed within 24 to 48 hours. Postoperative ultrasound showed decompression of the obstructed system and the ureterocele. Reflux was corrected in all patients. Flow rate with measurement of post-void residual 6 weeks postoperatively in toilet trained children showed complete bladder emptying. CONCLUSIONS: Lower urinary tract reconstruction for duplicated renal systems with obstruction of the upper pole can be accomplished safely with decreased morbidity through the extravesical approach without excision of the ureterocele or reconstruction of the bladder base. Moreover, in instances when there is no reflux to the lower pole moiety, upper pole only extravesical ureteroneocystostomy can be performed.

Merguerian, P. A., A. Taenzer, et al. "Variation in management of duplex system intravesical ureteroceles: a survey of pediatric urologists." J Urol. 2010 Oct;184(4 Suppl):1625-30. doi: 10.1016/j.juro.2010.03.113. Epub 2010 Aug 21.

PURPOSE: Controversy exists in ureterocele management and the literature lacks clear management guidelines. We surveyed pediatric urologists to understand practice patterns and perceptions of managing duplicated system intravesical ureterocele.

MATERIALS AND METHODS: The survey consisted of 3 case scenarios, including upper pole obstruction without reflux, ureterocele without hydronephrosis and reflux after incision. The survey evaluated management at patient age 3 months and used a Likert scale to evaluate management strategies later in life. **RESULTS:** We analyzed 233 responses. There was agreement in prophylactic antibiotic use and diagnostic evaluation. When managing a duplicated system intravesical ureterocele with poor upper pole function, 50.6% of respondents advocated puncture at age 3 months. However, when followed conservatively for 18 months, the preference changed to surgical management with partial nephrectomy preferred by 61.8% of respondents. When managing the condition without hydronephrosis, watchful waiting was preferred by 47.2% of respondents while 35.6% chose puncture and another 16.3% chose partial nephrectomy. Most respondents advocated ureteral reimplantation to manage reflux to the upper pole after puncture while some preferred endoscopic Deflux(R) injection. Continued nonoperative management while off prophylaxis was not preferred. Most respondents viewed the risks of surgery and anesthesia as important factors when weighing options in children younger than 3 months. Preventing symptoms and preserving function of the renal units were significant factors guiding surgical intervention. **CONCLUSIONS:** We found significant variation in management of duplicated system intravesical ureterocele. Most pediatric urologists see fewer than 10 cases per year, stressing the need for multi-institutional, randomized, controlled studies to evaluate management and long-term outcomes.

Montini, G., E. Sacchetto, et al. "Renal glomerular response to the inhibition of prostaglandin E2 synthesis and protein loading after the relief of unilateral ureteropelvic junction obstruction." *J Urol.* 2000 Feb;163(2):556-60.

PURPOSE: We investigated glomerular filtration rate and renal function reserve after the surgical relief of partial obstruction. **MATERIALS AND METHODS:** We evaluated 4 boys and 1 girl 9 to 14 years old who underwent pyeloplasty because of unilateral ureteropelvic junction obstruction. Contralateral normal kidneys served as controls. The glomerular filtration rate (inulin clearance), and urinary excretion of prostaglandin E2, thromboxane B2 and endothelin were determined at baseline and after a meal of 4 gm./kg. cooked unsalted red meat on day 4 postoperatively. Tests were repeated the following day 1 hour after the oral administration of 20 mg./kg. aspirin, an inhibitor of prostaglandin E2 synthesis. Urine was collected separately through a bladder catheter and another catheter placed in the

upper renal pelvis at surgery. **RESULTS:** Glomerular filtration rate at baseline was significantly greater in normal than in surgically treated kidneys (77.2 ml. per minute, range 60 to 98 versus 63.6, range 43 to 78, $p = 0.04$). Aspirin did not change baseline inulin clearance in normal kidneys but it significantly decreased the glomerular filtration rate in operated renal units (-4% versus -26.4%, $p = 0.04$). The concentration of all vasoactive compounds was not significantly different in the urine specimens of normal and operated kidneys. The administration of aspirin resulted in a significant decrease in mean urinary prostaglandin E2 excretion plus or minus standard error in operated but not in normal renal units (0.64+/-0.12 ng. per minute versus 0.27+/-0.06, $p = 0.04$). When expressed as mean versus baseline values, protein induced glomerular hyperfiltration seemed lower in operated than in contralateral intact kidneys (6.9% and 12.4%, respectively). **CONCLUSIONS:** In the immediate postoperative period previously obstructed kidneys maintain renal function via mechanisms that depend on the activation of prostaglandin, mimicking normal renal function. This effect is decreased by drugs that inhibit prostaglandin E2 production. Therefore, renal damage may be present when the glomerular filtration rate appears normal.

Mues, A. C., J. Landman, et al. "Endoscopic management of completely excluded calices: a single institution experience." *J Endourol.* 2010 Aug;24(8):1241-5. doi: 10.1089/end.2009.0663.

BACKGROUND AND PURPOSE: Excluded calices refer to a single calix or multiple calices that are completely isolated from the collecting system. The etiology is a result of infection, malignancy, or inflammation that is secondary to endoscopic renal surgery. We report our experience with the endoscopic management of excluded calices. **PATIENTS AND METHODS:** We retrospectively reviewed the data for our patients with a diagnosis of excluded calices. Patients were treated with various endoscopic techniques, all necessitating the formation of a neoinfundibulum. Patients were evaluated for symptomatic and radiographic evidence of resolution. **RESULTS:** Eight patients were found to have excluded calices. Seven patients had a history of urolithiasis and previous endoscopic renal surgery. One patient had undergone a laparoscopic partial nephrectomy with a postoperative urinary fistula. Six of eight patients were treated with a percutaneous approach followed by laser incision, balloon dilatation, or nephroureteral stent placement. Two objective failures occurred. One patient received re-treatment and has not demonstrated persistence or recurrence since the second procedure. No complications occurred as a result of endoscopic management.

CONCLUSION: Excluded calices commonly result from inflammation from previous renal surgery. Goals of management include relief of obstruction, management of stones, and regaining continuity with the remaining collecting system. Successful treatment with endoscopic management involves creation of a neoinfundibulum and placement of a temporary ureteral stent.

Nieto, B., O. Manrique, et al. "[Congenital hydronephrosis. An evolutionary study of renal function]." Cir Pediatr. 1999 Oct;12(4):140-3.

Between 1986 and 1995, 24 newborn and young infants underwent to surgical repair of 32 renal units affected by congenital hydronephrosis in spite of their levels of renal function and dilation. 22 renal units were pelviureteral junction obstruction and 10 were vesico-ureteral obstruction. Isotopic studies were made pre- and post-operatively, resulting in a high percentage of kidneys with the highest values of relative renal function showing a downward after surgery, and a general improvement among the renal units with previously moderate function. Drainage slope curves showed an improvement of its partial obstruction, and no change when dilation without obstruction. The clearance half-time showed a reduction in the slower renal units. We conclude that the natural evolution of these age-group kidneys is a counterbalance with the healthy contralateral renal unit.

Obaidah, A., S. B. Mane, et al. "Our experience of ureteral substitution in pediatric age group." Urology. 2010 Jun;75(6):1476-80. doi: 10.1016/j.urology.2009.07.1327. Epub 2009 Nov 13.

OBJECTIVES: To find appropriate ureteric substitute in the pediatric age group. **METHODS:** Retrospective analysis was done from 2003 to 2008 of all patients operated in our hospital who had undergone ureteric replacement. All cases were followed up to find conduit patency, renal function, and any related complication. **RESULTS:** Ureteric replacement was performed in 5 cases. Age of the patients ranged from 6 months to 9 years. Three cases were of obstructive megaureter; 1 of redo-pyeloplasty and 1 of iatrogenic injury of the ureter. Three patients underwent partial ureteric substitution of the right ureter, and complete replacement of the left ureter with appendix was performed in 1 patient. In 1 case small bowel was used as Monti tube to substitute the ureter. At median follow-up of 23 months (14-66 months) all patients were well except 1 whose kidney function had deteriorated. **CONCLUSIONS:** We believe that our small series supports that either appendix or small bowel should be considered as Monti's tube for

ureteric replacement when confronting with short ureter in pediatric age group.

Ogihara, K., S. Yazawa, et al. "[Clinical characteristics and outcomes of congenital midureteral stricture detected by fetal ultrasonography]." Nihon Hinyokika Gakkai Zasshi. 2014 Jul;105(3):122-8.

OBJECTIVES: Congenital midureteral stricture (CMS), which develops from obstructive lesion between pyeloureteral junction and ureterovesical junction, is relatively rare and its clinical condition and therapeutic strategy have not yet been established. We analyzed the clinical characteristics and surgical outcomes of CMS. **PATIENTS AND METHODS:** From November 2006 to December 2012, out of 137 patients presented with congenital hydrohephrosis, we identified 4 pediatric patients diagnosed with CMS at our institutions. We retrospectively investigated clinical characteristics and surgical outcomes in these 4 patients. **RESULTS:** Three boys and one girl were identified in this study. All patients were detected hydronephrosis by fetal ultrasonography. The median age at the diagnosis of CMS was 1 year and 11 months. Three patients had obstructive lesion in left side and 1 patient in right. CMSs were located at the level of L4 in 2 patients, and at the level of L5 and S1 in each 1. Split renal function was decreased less than 45% in 3 of 4 patients. Ipsilateral pyeloureteral junction obstruction and ipsilateral hypoplastic kidney were identified in 2 and 1 patient, respectively. One patient developed urosepsis and underwent nephrostomy. Partial ureterectomy and ureteroureterostomy, pyeloplasty were performed in 3 and 1 patient, respectively. Extrinsic obstruction was detected in just 1 patient intraoperatively. In all patients, there were no protruded lesion and atrophied, fibrotic and ischemic muscles were not detected in pathological finding. Neither urinary tract infection nor recurrence of obstructive lesion was detected in all patients at the mean follow-up period of 3 years and 1 month. **CONCLUSION:** We analyzed the clinical characteristics of 4 pediatric patients with CMS. In order to prevent critical infection and maintain renal function, it could be considered that surgical intervention is undertaken just after making the diagnosis of CMS.

Oguzkurt, P., S. Oz, et al. "An unusual cause of complete distal ureteral obstruction: giant fibroepithelial polyp." J Pediatr Surg. 2004 Nov;39(11):1733-4.

Fibroepithelial polyp of the ureter is a rare benign neoplasm of mesodermal origin. It is an extremely rare cause of hydronephrosis in children. It usually causes partial ureteral obstruction without loss

of renal function. The preferred treatment is endoscopic or surgical resection of the polyp with preservation of the renal unit. The authors present an adolescent patient with a nonfunctioning left hydronephrotic kidney caused by complete ureteral obstruction caused by a giant fibroepithelial polyp of the distal ureter. This is an extremely rare presentation and outcome of this benign ureteral neoplasm with resultant loss of renal unit.

Oostergo, T., J. B. Rietbergen, et al. "[Refractory urinary tract infections: diagnosis and treatment of xanthogranulomatous pyelonephritis]." Ned Tijdschr Geneeskd. 2013;157(11):A5328.

BACKGROUND: Xanthogranulomatous pyelonephritis (XGP) is a rare inflammatory condition of the renal parenchyma that is associated with long-term partial obstruction and infections of the urinary tract. Because its symptoms can be non-specific, a diagnosis is often made with delay. **CASE DESCRIPTION:** We describe 2 patients with frequently recurring urinary tract infections and urinary tract infections that were difficult to treat. Imaging studies unmasked a diffusely enlarged kidney and renal stones, leading to the diagnosis of xanthogranulomatous pyelonephritis. Both female patients were treated successfully by draining the affected kidney by means of a ureteral double-J catheter along with antibiotic treatment. **CONCLUSION:** Imaging studies are important in patients with recurrent pyelonephritis or persistent pyelonephritis despite adequate antibiotic treatment; urinary tract obstructions and complications of pyelonephritis such as XGP can then be identified. When XGP is adequately treated by antibiotics and drainage of the affected kidney this can sometimes prevent having to perform a nephrectomy.

Ozturk, H., A. I. Dokucu, et al. "The protective effects of captopril and nitric oxide on solitary kidney after chronic partial ureteric obstruction." BJU Int. 2001 Jul;88(1):93-9.

OBJECTIVE: To determine whether vasodilator agents (captopril and nitric oxide) change the morphological and functional effects of chronic partial ureteric obstruction in solitary kidney tissue in unilaterally nephrectomized rats. **MATERIALS AND METHODS:** Each of 50 prepubertal Wistar albino rats underwent right nephrectomy and were then assigned to one of five groups. Rats in group 1 underwent a sham operation (control) and in the other groups the ureter of the remaining kidney was partially obstructed by surgery. In group 2, no drug treatments were given; in groups 3, 4 and 5 captopril, L-arginine methyl ester (L-Arg) or NG-nitro-L-arginine-methyl ester, respectively, were given for 3 weeks. In all rats,

diuretic scintigraphy was used to measure kidney perfusion, glomerular filtration rate (GFR) and concentration. Blood urea nitrogen (BUN), serum creatinine levels, kidney parenchymal weight and pelvic volume were measured and the kidneys evaluated histopathologically. **RESULTS:** Renal perfusion was significantly greater in both group 3 and 4 than in group 2. The GFR was 18% greater in group 3 and 22.3% greater in group 4 than in group 2. The GFR was decreased by 67% in group 5 compared with the control group. The mean parenchymal weight, mean pelvic volume, BUN and serum creatinine in the four groups with a partially obstructed ureter were significantly different from the control group. There also were significant differences between group 2 and groups 3--5, and between group 2 and group 3. Histological damage was severe in all four groups with partial ureteric obstruction, but in the drug-treated groups, medullary fibrosis was less frequent. **CONCLUSION:** After 3 weeks of treatment, captopril and L-Arg both improved kidney perfusion, GFR, BUN and serum creatinine levels, but were less effective in preventing parenchymal atrophy and changes in pelvic volume.

Palascak, P., M. Bouchareb, et al. "Treatment of benign ureterointestinal anastomotic strictures with permanent ureteral Wallstent after Camey and Wallace urinary diversion: long-term follow-up." J Endourol. 2001 Aug;15(6):575-80.

BACKGROUND AND PURPOSE: Ureterointestinal anastomotic stricture follows urinary diversion in 4% to 8% of patients and may lead to a progressive deterioration of renal function. There are problems with all current management techniques: surgical revision, endourologic incision, nephrostomy drainage, external ureteral stents, and dilation with a high-pressure angioplasty balloon. The authors present their long-term results with permanent ureteral Wallstents for the treatment of benign ureterointestinal stricture. **PATIENTS AND METHODS:** Eight patients with 10 strictures were treated by placement of self-expanding permanent indwelling stents via percutaneous nephrostomy between September 1993 and January 1998. The mean age of the group was 59.2 years. Development of strictures occurred a mean of 20.9 months after urinary diversion. There were seven complete and three partial strictures. Of 49 patients treated by the Camey procedure, 7 patients (14%) developed 9 (18%) strictures. Of 28 patients having the Wallace procedure, 1 patient (3.5%) developed one stricture. After recanalization of the distal ureter by a Terumo guidewire and dilation with a high-pressure angioplasty balloon, a Wallstent was placed across the stricture via a percutaneous approach. **RESULTS:** The endourologic placement of

the Wallstent was well tolerated by all patients. The hospital stay averaged 2 days. Seven patients with nine strictures after the Camey procedure are doing well with a follow-up of 7 to 68 months (mean 22.4 months). One major complication was observed in one patient necessitating an additional procedure (lithotripsy) because of stone formation at the lower part of the stent extending into the neobladder in order to maintain patency after 68 months. The other patient, who had a Wallace procedure, is doing well 1 year 8 months afterward. CONCLUSION: An endourologic ureteral Wallstent approach to ureterointestinal stricture is a successful alternative, providing satisfactory management of the problem in most patients. No complication such as stent migration, hematuria, pain, or recurrent stricture was observed.

Ramakrishnan, P. A., M. Medhat, et al. "Extracorporeal shockwave lithotripsy in infants." *Can J Urol.* 2007 Oct;14(5):3684-91.

INTRODUCTION: Pediatric urolithiasis is relatively uncommon and limited information is available on the application of minimally invasive management modalities in young children. We present a single centre experience with extracorporeal shockwave lithotripsy (ESWL) for infants with upper urinary tract calculi. MATERIAL AND METHODS: A total of 74 infants aged 3 months to 24 months with upper urinary tract calculi were treated with ESWL under general anesthesia using the Wolf 2500 and the 2501 Piezolith lithotriptors over a 14 and a half-year period. Patient and stone characteristics, risk factors for urolithiasis, treatment parameters, clinical outcomes and long-term follow-up were assessed and recorded. RESULTS: The mean patient age was 14.5 (range 3 to 24) months. The mean renal stone size was 18.2 (range 7 to 32) mm while the mean ureteral stone size was 9.4 (range 5 to 14) mm. Metabolic abnormalities, structural anomalies and urinary tract infections were identified as contributory factors for stone formation in 34% of the infants.

Rawashdeh, Y. F., A. Horlyck, et al. "The role of renal resistive index measures in the diagnostic work up of congenital hydronephrosis." *J Pediatr Urol.* 2006 Aug;2(4):316-22. doi: 10.1016/j.jpuro.2006.01.016. Epub 2006 Mar 31.

OBJECTIVE: To evaluate the role of renal resistive index (RI) measures in the diagnostic work up of congenital hydronephrosis. METHODS AND MATERIALS: Seventeen neonatal pigs were randomized to either left-sided partial unilateral ureteral obstruction (n=12) or sham operation (n=5) at 2 weeks of age. Serial investigations including B-mode ultrasound, RI measures and combined clearance/renographic evaluations were performed at

4, 12 and 24 weeks of age under light sedation. Results were analysed statistically, and receiver operating characteristic (ROC) curves were generated in order to evaluate the diagnostic efficacy of RI. RESULTS: In all, 15 animals completed the study protocol. In the obstructed group, hydronephrosis and significant compromise of renal function developed on the subject side, whereas sham-operated pigs had stable renal morphology and function throughout the study. There were however no significant differences in RI or DeltaRI between the two groups at any age, or between right and left RIs in the obstructed group at any point. RI and DeltaRI had no prognostic or diagnostic value as judged by ROC curve analysis.

Reyes, J. M., D. J. Canter, et al. "Delayed proximal ureteric stricture formation after complex partial nephrectomy." *BJU Int.* 2012 Feb;109(4):539-43. doi: 10.1111/j.1464-410X.2011.10395.x. Epub 2011 Jul 6.

OBJECTIVE: * To report and review our incidence of delayed ureteric stricture (US) after complex nephron-sparing surgery (NSS). PATIENTS AND METHODS: * Using our institutional kidney cancer database, we identified 720 patients who underwent NSS from 1 January 2000 until 31 December 2010 and identified eleven (1.5%) patients with a delayed US. * Patient and tumour characteristics were reviewed. RESULTS: * Median (range) tumour size and RENAL nephrometry score was 4.1 (2-7.2) cm and 10p (4-11p), respectively. * There were eight of 10 solitary tumours (80%) located in the lower or mid-pole of the kidney. * There were eight of 11 patients with delayed US (72.7%) who experienced a postoperative urinary leak. * There were two of 11 (18.2%) patients who experienced a postoperative retroperitoneal haemorrhage, with one of these patients requiring selective embolization. * All US were in the upper third of the ureter and were diagnosed at a minimum of 10 weeks postoperatively (median 154 days, range 70-400 days). CONCLUSIONS: * US formation is an uncommon and under-reported event after complex NSS. * Risk factors appear to include tumour complexity, imperative indications, mid- or lower pole location, postoperative urinary leak and haemorrhage.

Rowe, C. K., F. B. Franco, et al. "A novel method of evaluating ureteropelvic junction obstruction: dynamic near infrared fluorescence imaging compared to standard modalities to assess urinary obstruction in a swine model." *J Urol.* 2012 Nov;188(5):1978-85. doi: 10.1016/j.juro.2012.07.002. Epub 2012 Sep 20.

PURPOSE: Dynamic near infrared fluorescence imaging of the urinary tract provides a promising way to diagnose ureteropelvic junction obstruction. Initial studies demonstrated the ability to

visualize urine flow and peristalsis in great detail. We analyzed the efficacy of near infrared imaging in evaluating ureteropelvic junction obstruction, renal involvement and the anatomical detail provided compared to conventional imaging modalities. MATERIALS AND METHODS: Ten swine underwent partial or complete unilateral ureteral obstruction. Groups were survived for the short or the long term. Imaging was performed with mercaptoacetyl triglycine diuretic renogram, magnetic resonance urogram, excretory urogram, ultrasound and near infrared imaging. Scoring systems for ureteropelvic junction obstruction were developed for magnetic resonance urogram and near infrared imaging. Physicians and medical students graded ureteropelvic junction obstruction based on magnetic resonance urogram and near infrared imaging results. RESULTS: Markers of vascular and urinary dynamics were quantitatively consistent among control renal units. The same markers were abnormal in obstructed renal units with significantly different times of renal phase peak, start of pelvic phase and start of renal uptake.

Soria-Galvez, F., F. M. Sanchez-Margallo, et al. "Laparoscopic sonography in the urinary system." *Vet Radiol Ultrasound*. 2002 Sep-Oct;43(5):465-71.

This work reports the use of laparoscopic-transducer sonography for the examination of the urinary system in a swine model. Animals underwent a two-phase study. In the first phase, the urinary system was examined using laparoscopic sonography. In the second a partial ureteral obstruction was induced, and sonographic changes were recorded and evaluated. Sonography was used to evaluate kidneys, ureters, and bladder. Anatomic structures were evaluated and the following pathological findings were identified: renal cysts, one polycystic kidney, dilation of the renal pelvis, hydronephrosis, and one perirenal pseudocyst. Where necessary, contrast digital fluoroscopy (excretory urography and retrograde ureteropyelography) was also performed. Laparoscopic sonography mainly is used for evaluation prior to laparoscopic surgery to guide decisions relating to surgery. The quality of the images obtained laparoscopically is superior to that of percutaneous or transabdominal images, because artifacts are reduced and the contact surface of the transducer is placed directly over the study area. Laparoscopic sonography proved highly effective for studying renal and ureteral disorders prior to minimally invasive surgery.

Steffens, J. A., P. Anheuser, et al. "[Ureteric reconstruction with reconfigured ileal segments according to Yang-Monti. A 4-year prospective

report]." *Urologe A*. 2010 Feb;49(2):262-7. doi: 10.1007/s00120-009-2177-z.

BACKGROUND: We report on 4 years experience with ileal ureteric replacement using the Yang-Monti procedure. PATIENTS AND METHODS: From April 2001 to January 2009 reconfigured ileal segments were used for total (in 16) or partial (in 2) substitution of the ureter in 18 patients (mean age 47.4 years) with functional ureteric loss secondary to radiogenic or iatrogenic conditions. An antireflux implantation into the native bladder was done in 16 patients. All patients were followed prospectively according to a standardized protocol. RESULTS: The mean follow-up was 4.2 years (0.5-8 years).

Stehr, M., R. Metzger, et al. "Management of the primary obstructed megaureter (POM) and indication for operative treatment." *Eur J Pediatr Surg*. 2002 Feb;12(1):32-7.

Presented is the diagnostic and therapeutic management of the primary obstructed megaureter (POM). 42 patients presented with 53 ureteral units (UU) of POM (5 females, 37 males, 36 neonates and 6 children aged 3 to 8 years). Of the 53 megaureters 10 UU (19%) were on the right and 27 UU (51%) were on the left. 8 patients (19%) with 16 UU (30%) showed a bilateral abnormality. In 41% of the patients, hydronephrosis had been discovered by prenatal ultrasound. All patients were evaluated postnatally by ultrasound (US), voiding cysturethrogram (VCUG), intravenous pyelogram (IVP) and diuresis renogram (MAG-3) (DR). Due to the percentage of urinary drainage, the renogram results were classified into different categories: no obstruction, functional obstruction, equivocal and obstruction. A partial renal function was also calculated. Follow-up of the patients ranges between 5 to 48 months (mean: 22.1). All patients underwent serial US and serial DR were obtained in 36 patients. Initially, 9 (17%) UU showed a functional obstruction, 34 (64.2%) an equivocal and 10 (18.8%) an obstructive urinary drainage pattern. 2 kidneys showed a significant decreased partial function of 20, respectively 26%. Surgery was performed in an initial impaired renal function with an obstructive pattern or in cases with normal function and at least equivocal urinary drainage pattern with no improvement or deterioration of the urinary drainage and/or function in the follow-up. Considering these criteria, 5 (9.6%) patients needed surgery. No loss of kidney function has been observed in follow-up. DR is the most valuable diagnostic tool. Criteria interpreting the results are demonstrated in this article.

Stephan, M., S. Conrad, et al. "Urinary concentration and tissue messenger RNA expression of monocyte

chemoattractant protein-1 as an indicator of the degree of hydronephrotic atrophy in partial ureteral obstruction." *J Urol.* 2002 Mar;167(3):1497-502.

PURPOSE: To find a potential prognostic marker of the induction of hydronephrotic atrophy in congenital hydronephrosis we investigated whether the messenger (m)RNA expression and urinary concentration of monocyte chemoattractant protein-1 (MCP-1) correlated with the degree of partial ureteral obstruction, and subsequent hydronephrotic atrophy and interstitial fibrosis. **MATERIALS AND METHODS:** We created left partial ureteral obstruction in 96 juvenile Wistar rats and complete ureteral obstruction in 18, while 16 underwent sham operation. Depending on excretion of contrast medium into the renal pelvis after 3 days we defined 2 degrees of hydronephrosis. Renal mRNA expression of MCP-1, and renal pelvic and bladder urinary concentrations of MCP-1 were measured after 1, 2 and 3 weeks, and compared with the degree of hydronephrotic atrophy. **RESULTS:** Grade 1 partial ureteral obstruction resulted in mild histological changes. Grade 2 partial and complete obstruction resulted in significant hydronephrotic atrophy. MCP-1 mRNA expression in the kidney remained unchanged in grade 1 partial obstruction but was moderately increased in grade 2 partial obstruction and clearly over expressed in complete ureteral obstruction.

Stewart, A. F. and D. P. Smith "Performance of open renal and bladder surgery at a freestanding pediatric surgery center." *J Urol.* 2011 Jul;186(1):252-6. doi: 10.1016/j.juro.2011.03.050. Epub 2011 May 14.

PURPOSE: More ambulatory urological surgeries are being performed in children due to innovations in techniques and trends in medical care. Pediatric ambulatory surgery centers are seeing more complex procedures that were traditionally hospital based. **MATERIALS AND METHODS:** A total of 343 open renal and bladder procedures were performed by a single pediatric urologist at a freestanding pediatric surgery center (12 miles from a pediatric hospital) between July 2003 and October 2009. Charts were analyzed to determine the demographics and complications necessitating hospitalization within 48 hours of discharge home. **RESULTS:** During the study period 28 children (mean age 1.62 years, range 4 months to 6 years) underwent nephrectomy, 50 (2.92 years, 3 months to 12 years) underwent pyeloplasty, 216 (4.01 years, 8 months to 21 years) underwent simple ureteral reimplantation and 49 underwent complex ureteral reimplantation (2.79 years, 5 months to 12 years). Two children were acutely transferred to the hospital, 1 for pain management and 1 for respiratory distress. Two additional children were hospitalized within 48 hours,

1 due to partial ureteral obstruction, and 1 due to dehydration and urinary tract infection. All 4 of these patients underwent simple reimplantation surgery. **CONCLUSIONS:** Carefully selected children undergoing open renal and bladder procedures can be expected to be discharged home on the same day. Older children, those with significant comorbidities and those undergoing procedures later in the day may not be ideal outpatient candidates. Nephrectomy, pyeloplasty and ureteral reimplantation are excellent outpatient procedures for most children.

Sugandhi, N., M. Srinivas, et al. "Effect of stem cells on renal recovery in rat model of partial unilateral upper ureteric obstruction." *Pediatr Surg Int.* 2014 Feb;30(2):233-8. doi: 10.1007/s00383-013-3456-8.

BACKGROUND: Untreated obstructive uropathy produces irreversible renal damage and is an important cause of pediatric renal insufficiency. This study was designed to evaluate the effects of stem cell injection on morphological and pathological changes in the rat kidneys with partial unilateral upper ureteric obstruction (PUUUO). **METHODS:** Wistar rats (n = 30) were operated upon to create a PUUUO by the psoas hitch method and were randomized into Group I (control, n = 15) and Group II (stem cell, n = 15); at day 5, 10 and 15, a subgroup of rats (n = 5) from each group was killed and the kidneys harvested. Pathological and morphological changes in the harvested kidneys were studied and compared between the two groups. **RESULTS:** Morphologically, at day 15, Group II had significantly (p = 0.04) greater cortical thickness (0.48 +/- 0.17 vs. 0.38 +/- 0.09 mm). Histologically, at day 5, Group II had significantly (p = 0.032) lower peri-pelvic fibrosis. Group II group showed greater peri-pelvic inflammation as compared to Group I (p = 0.05). At day 10, lower grades of peri-pelvic fibrosis (p = 0.08), interstitial fibrosis (p = 0.037) and tubular atrophy (p = 0.05) were seen in the Group II. At day 15, Group II demonstrated significantly lower parenchymal loss (p = 0.037), glomerulosclerosis (p = 0.08), interstitial fibrosis (p = 0.08), tubular atrophy (p = 0.08) and peri-pelvic fibrosis (p = 0.08). **CONCLUSIONS:** In a rat model of PUUUO, stem cell injection prevented detrimental changes in renal pathology and preserved renal parenchymal mass.

Surendran, K., S. Schiavi, et al. "Wnt-dependent beta-catenin signaling is activated after unilateral ureteral obstruction, and recombinant secreted frizzled-related protein 4 alters the progression of renal fibrosis." *J Am Soc Nephrol.* 2005 Aug;16(8):2373-84. Epub 2005 Jun 8.

beta-Catenin functions as a transducer of Wnt signals to the nucleus, where it interacts with the T cell

factor (TCF) family of DNA binding proteins to regulate gene expression. On the basis of the genes regulated by beta-catenin and TCF in various biologic settings, two predicted functions of beta-catenin/TCF-dependent transcription are to mediate the loss of epithelial polarity and to promote fibroblast activities, such as the increased synthesis of fibronectin during chronic renal disease. These predictions were tested by determination of the expression and function of an inhibitor of Wnt signaling, secreted frizzled-related protein 4 (sFRP4), during renal tubular epithelial injury initiated by unilateral ureteral obstruction (UO). Despite increased sFRP4 gene expression in perivascular regions of injured kidneys, total sFRP4 protein levels decreased after injury. The decreased sFRP4 protein levels after UO accompanied increased Wnt-dependent beta-catenin signaling in tubular epithelial and interstitial cells, along with increased expression of markers of fibrosis. Administration of recombinant sFRP4 protein caused a reduction in tubular epithelial beta-catenin signaling and suppressed the progression of renal fibrosis, as evidenced by a partial maintenance of E-cadherin mRNA expression and a reduction in the amount of fibronectin and alpha-smooth muscle actin proteins.

Takenaka, M., N. Machida, et al. "Effect of beraprost sodium (BPS) in a new rat partial unilateral ureteral obstruction model." *Prostaglandins Leukot Essent Fatty Acids*. 2009 May-Jun;80(5-6):263-7. doi: 10.1016/j.plefa.2009.03.002. Epub 2009 May 23.

Unilateral ureteral obstruction (UO) is a representative model for investigating the common mechanism of decreasing renal function in chronic renal failure. In this study, we present a new partial UO model in adult rats and evaluated the effect of beraprost sodium (BPS: stable prostaglandin I₂ (PGI₂)) analog. We could make reproductive and uniform partial UO by ligating the left ureter together with a 0.5 mm diameter stainless steel wire with nylon thread, and withdrawing the stainless wire. One week later, the ureteral obstruction was released. After 3 weeks from the release of UO, all animals of control group, without BPS administration, developed basophilic degeneration of tubular epithelium, tubular dilatation and interstitial fibrosis. The areas of tubular degeneration and fibrosis were significantly reduced in the BPS group, orally administered BPS 300 microg/kg twice a day from the next day of the release of obstruction, than in control group. In conclusion, we can established the adult rat partial UO-release model and revealed that BPS can inhibit renal tubular damage and tubulointerstitial fibrosis.

Wahlin, N., A. Stenberg, et al. "Renal blood flow increase during volume expansion in hydronephrotic rats." *J Urol*. 2001 May;165(5):1696-9.

PURPOSE: We assessed the renal blood flow pattern in experimental hydronephrosis during normal hydration and extracellular volume expansion. **MATERIALS AND METHODS:** Partial obstruction of the left ureter was created in 3-week-old Sprague-Dawley rats by embedding the ureter in a psoas muscle groove. Moderate hydronephrosis without kidney weight reduction developed in all cases. The effects on renal hemodynamics were studied with real-time ultrasound flowmetry 3 weeks later during normal hydration and then during volume expansion. The degree of hydronephrosis was classified as mild, moderate or severe. **RESULTS:** Under baseline conditions renal blood flow was normal in mild and moderate hydronephrosis but low in severe hydronephrosis. During volume expansion renal blood flow increased significantly in all experimental animals (mean 14%) compared to that in controls, which remained unaffected or decreased (mean -3%). The flow increase was related to the degree of dilatation, which was 2% in mild, 13% in moderate and 44% in severe hydronephrosis when the groups were considered separately.

Zeman, L., M. Dusek, et al. "Multiple fibroepithelial polyps of the upper ureter in a 17-year-old boy--case report and review of the literature." *Eur J Pediatr Surg*. 2004 Oct;14(5):358-61.

Benign tumours and primary malignant tumours of the ureter are uncommon in adults and extremely rare in children. The clinical symptoms are flank pain, urinary tract infection, and macro/micro-haematuria. There is an incomplete ureteral obstruction and filling defect on intravenous urography (IVU). Optimum treatment of this lesion results in renal preservation. Uretero-renal surgery is currently the best method available for the identification and histological diagnosis of ureteral polyps. Recommended operative procedures are pyeloureteric junction (PUJ) resection with Anderson-Hynes pyeloplasty, ureteric resection with end-to-end anastomosis or with uretero-cysto-neoanastomosis (UCNA), ureteric resection with renal autotransplantation. Ureteronephrectomy is not indicated. A case of ureteral polyps in a 17-year-old boy with the chief complaint of left flank pain is reported here. The excretory urogram and renal scan showed left hydronephrosis. Resection of the pyeloureteral junction, partial resection of the upper ureter containing the lesions--multiple branching 30-40 mm long polyps with a common basis--and Anderson-Hynes pyeloplasty were performed. The pathological diagnosis was benign fibroepithelial

polyps of the ureter. Convalescence was uneventful and after 4 years of follow-up, excretory urogram and ultrasonography showed good renal function and improvement of hydronephrosis.

Zugor, V. and G. E. Schott "[Endometriosis involving the ureter. The Erlangen experience exemplified by two case reports]." *Aktuelle Urol.* 2007 Jan;38(1):55-8.

INTRODUCTION: Endometriosis is a benign proliferation of discarded or ectopic endometrial mucus membranes which retain the histological features and biological reactions of uterine mucus membranes. This tissue is not capable of independent proliferation but is subject to the influence of estrogen progesterone. In this report we describe the clinical course of two patients with histologically proven endometriosis with participation of the uterine region and uronephrosis. **CASE REPORT 1:** Left-sided uronephrosis was diagnosed in a 36-year-old female during a sonographic examination for hypertension. Our gynaecologists obtained histological proof of endometriosis by laparoscopy. Two days after the laparoscopic detection of foci of endometriosis in the intestine, Douglas' pouch, ovaries as well as in the region of the left terminal ureter, a left percutaneous renal fistula was created under sonographic and radiological control. After resection of the afflicted section of the ureter, implantation of a new left ureter was performed by means of a psoas-hitch plasty. **CASE REPORT 2:** A 30-year-old female presented with a months-long history of dyspareunia, pain on palpation of the Douglas' pouch, occasional pain on bowel movements and back pain. In addition she had been trying for years to become pregnant. On sonography renal congestion grade III was detected. After admission and appropriate preparation, one week later an open laparotomy with lysis of intestinal as well as uterine adhesions, salpingectomy and, by the urologist, partial left uterine resection with new implantation by the psoas-hitch technique. **CONCLUSIONS:** Endometriosis of the urinary tract is a rare occurrence affecting 1 - 2 % of all endometriosis patients with the urinary bladder being the most commonly affected site. Endometriosis with involvement of the ureter is often diagnosed very late because of the rareness of this situation and its asymptomatic course. An individual therapy plan depending first of all on the patient's age, desire for children, and the extent of the endometriosis foci should always be attempted.

The above contents are the collected information from Internet and public resources to offer to the people for the convenient reading and information disseminating and sharing.

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