Myanmar Multi-Specialty Physicians Global Alliance

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Common Kidney Issues in General Practice

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Interactive session

Serum Creatinine – 2.0 (n - <1.2)

1. AKI
2. CKD?
3. AKI on CKD?
4. Could be any of the above

General management of CKD

- Treatment of reversible causes of renal dysfunction
- Treatment of the complications of CKD
- Slowing the progression of CKD
- Preparation for renal replacement therapy

Treatment of reversible causes

- Prerenal state – reduced renal perfusion
- Renal causes – GNs, Cardio-renal, nephrotoxic drugs-aminoglycosides, IV contrast, NSAIDs, Oral Phospho Soda, certain Herbal medicines
- Post renal obstruction – Renal USG

Summary

- S – Smoking cessation, Staging of CKD
- H – Hypertension, Hyperkalemia, Hyperphosphatemia, Hyperglycemia,
- A – Anemia, Acidosis
- P – Protein intake, PTH
- E – Edema, Exercise

- U – Undo nephrotoxins
- P – Preparation for RRT

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Common Kidney Issues in GP

#1

60 yr old woman with Hx HTN, Obesity, OA knees on Lisinopril 20 mg BID and Amlodipine 10 mg QD. She takes Ibuprofen 800 mg twice daily to be able to walk.

Vitals – 130/60, 90

Labs – BUN/Creat 40/1.8, CO_2 20, UA – no RBCs, no WBCs, no casts. SG 1.020, Urine ACR – 50 mg/g.

NSAIDs can cause

1. **AKI**
2. **CKD**
3. **Nephrotic range proteinuria**
4. **1 & 3**
5. **1,2 &3**

Common Kidney Issues in GP

#2

Ok. Ibuprofen is stopped. Repeat serum creatinine is still 1.8. Then what should be done next?

1. **Kidney biopsy to find out the etiology.**
2. **Replace Lisinopril with another BP med.**
3. **Replace Amlodipine with another BP med.**
4. **Replace both Lisinopril and Amlodipine with another BP med.**

ACEi/ARB and Kidney

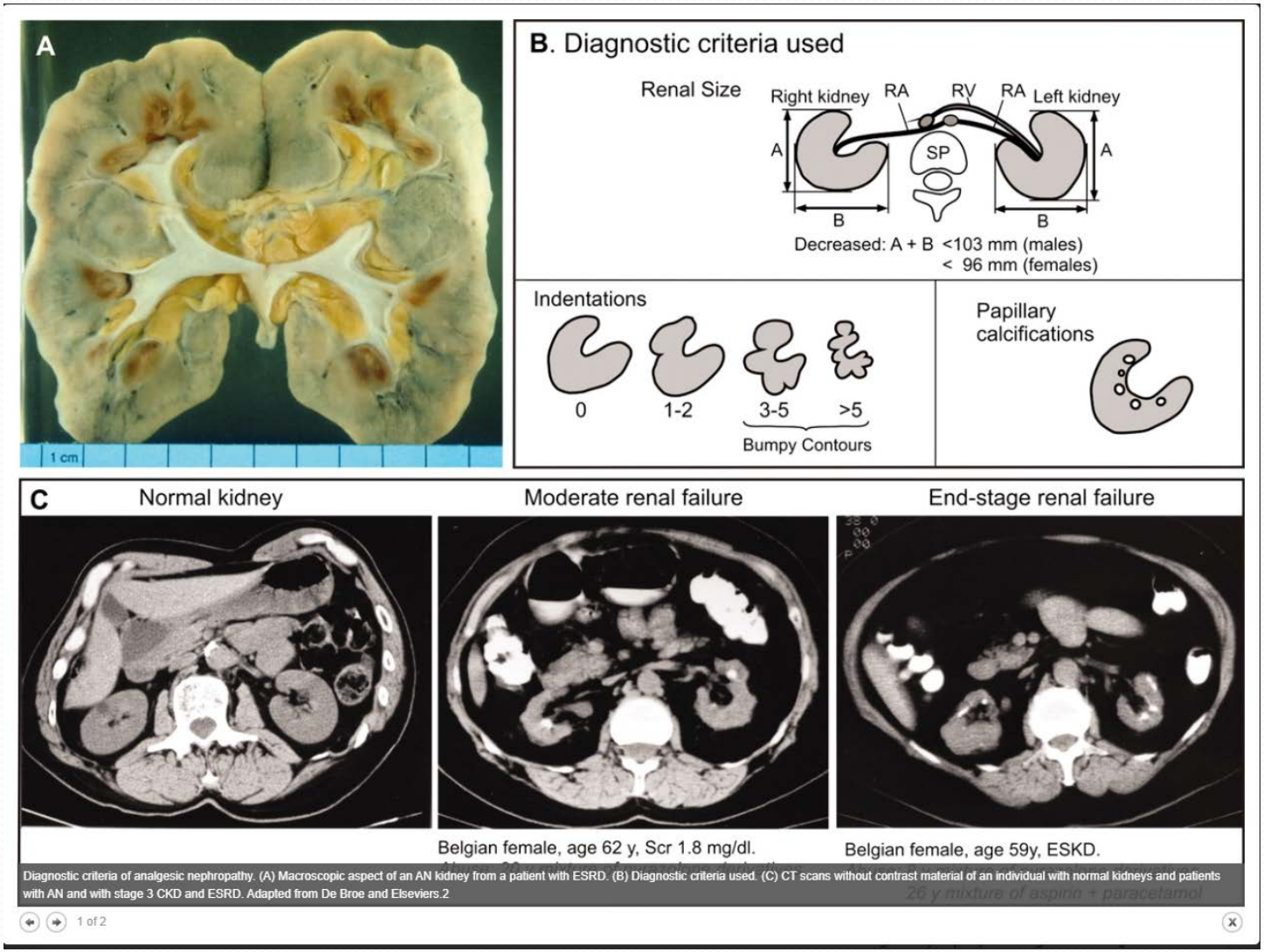
- Drugs of choice in DM nephropathy
- Drug of ~~choice~~ life for Nephrologists
- Great in lowering proteinuria to preserve renal function
- Be careful in certain patients especially elderly pts/vasculopathic patients
- Non-DM pts, ACR<300 mg/g → ACEi/ARB (2D)

NSAIDs and Kidney

- Hemodynamic effect – afferent arteriole vasoconstriction
- Analgesic Nephropathy – chronic interstitial nephritis
- Papillary Necrosis (esp. in DM)
- Minimal Change Disease/Membranous GN (Nephrotic proteinuria)
- Salt/water retention, Hyponatremia, Hyperkalemia, Acidosis

NSAIDs and Kidney

Marc E. De Broe and Monique M. Elseviers
JASN October 2009, 20 (10) 2098-2103; DOI: https://doi.org/10.1681/ASN.2008101097



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#3
60 yr old woman with Hx HTN, Obesity, DM2
CKD 3 with GFR 33 ml/min 4 months ago with gradual downward trending.
Meds - Lisinopril 20 mg BID, Amlodipine 10 mg QD, Metformin 500 mg BID.

New labs – GFR declined to 28 ml/min

1. Lisinopril dose should be reduced.
2. Metformin dose should be reduced.
3. Lisinopril should be discontinued.
4. Metformin should be discontinued.

Metformin and Kidney

- GFR <45 → reduced dose, max 500 mg x 2/day.
- GFR <30 → contraindicated.
- Do not base the dosing on serum creatinine level.
- Hold Metformin if CKD patient undergoing CT with IV contrast.

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#4

60 yr old woman with HTN, DM2, CKD 3 with GFR 35 ml/min 6 months ago with gradual decline, HA1C >9.0 historically.

Meds – Lisinopril 20 mg BID, Amlodipine 10 mg daily, NPH Insulin 15 unit twice daily.

Recent labs – HA1C 7.5, GFR 25 ml/min

1. She is doing a great job controlling blood sugar!
2. She must be taking more Insulin than she should.
3. She must be eating bitter melon all day long daily.
4. Better HA1C was due to lower GFR.

Insulin and Kidney

- Insulin requirement decreases as CKD progresses
- Risk of hypoglycemia rises
- FYI - HA1C target in ESRD patients → higher

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#5

60 yr old woman with HTN, DM2, CHF (HFrEF), CKD 3 with GFR 35 ml/min with gradual decline..

Meds – Lisinopril 20 mg BID, Lasix 40 mg daily, NPH Insulin 15 unit twice daily.

Recent labs – GFR 25 ml/min

Her CHF is getting worse on current regimen.

1. Should switch Lasix to Thiazide diuretics
2. Should add Thiazide to Lasix
3. Should raise Lasix dose to 40 mg twice daily
4. Should raise Lasix dose to 80 mg once daily

Insulin and Kidney

- Diuretic Therapy
  - Review Article

- List of authors.D. Craig Brater, M.D.
- August 6, 1998
  N Engl J Med 1998; 339:387-395
  DOI: 10.1056/NEJM199808063390607

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Diuretics and Kidney

- Thiazide diuretics
  - Efficacy declines as CKD progresses
- Loop diuretics
  - Main stay diuretics in advanced CKD
  - Minimum effective dose needed
  - Sequential blockage along with Thiazide
- Potassium sparing diuretics (e.g. Aldosterone antagonist)
  - Risk of hyperkalemia high in advanced CKD

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#6

Contd. – you raised Lasix dose to 80 mg daily with no response. She also continues to worsen on Lasix 120 mg once daily dose.

The following step should be considered.

1. Should add Thiazide to Lasix
2. Should switch Lasix to Torsemide or Bumetanide
3. Should add Spironolactone to Lasix
4. Should raise Lasix dose to 200 mg once daily

Diuretics and Kidney

- Loop diuretics
  - Bioavailability varies with different loop diuretics.
  - Variation is less with Torsemide and Bumetanide.
  - “ceiling dose”
  - Albumin bound → ascending loop of Henle →inhibit Na-K-2CL transporter.
  - Efficacy reduced in severe hypoalbuminemia.

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#7

60 yr old woman with HTN, DM2, CHF (HFrEF), CKD 3 with GFR 32 ml/min 1 year ago with gradual decline.

Meds – Lisinopril 20 mg BID, Lasix 40 mg daily, NPH Insulin 15 unit twice daily.

Recent labs – GFR 29 ml/min, K – 4.5, UPCR – 0.5

1. Lisinopril dose should be raised for further renal protection
2. Lisinopril should be discontinued due to worsening renal function
3. Lisinopril dose should be reduced.
4. Keep Lisinopril dose unchanged.

Anti-hypertensives and Kidney

- ACEi/ARB (anti-proteinuric effect)
  - if GFR decline is gradual →do not stop
  - Hyperkalemia → usual limiting factor
  - Hold in any event with AKI risk e.g. IV contrast, Dehydration, Hypotension episodes
  - Can start in stable CKD 4 (GFR 15 – 30) with frequent monitor
  - Teratogenic – must discontinue for pregnancy or planned pregnancy

Common Kidney Issues in GP

#8

60 yr old woman with HTN, DM2, CAD with Hx MI, CKD 3 GFR 35 ml/min 1 year ago with gradual decline present with fatigue.

Meds – Lisinopril 20 mg BID, Atenolol 100 mg daily, NPH Insulin 15 unit twice daily.

Recent labs – GFR 26 ml/min

Vitals – BP 135/80, HR 50

1. Atenolol should be continued at the same dose.
2. Atenolol dose should be reduced.
3. Atenolol should be switched with Metoprolol Tartarate.
4. Neither Atenolol nor Metoprolol should be prescribed.

Anti-hypertensives and Kidney

- **Clinical Pharmacology of Antihypertensive Therapy for the Treatment of Hypertension in CKD**
- Arjun D. Sinha and Rajiv Agarwal
- CJASN May 2019, 14 (5) 757-764; DOI: https://doi.org/10.2215/CJN.04330418

- BABAs have a host of well described side effects, but bradycardia is the most common concern among patients with CKD and ESKD. Most BABAs are cleared by hepatic metabolism; however, atenolol has only limited hepatic clearance, and drug levels are dependent on kidney elimination, making acute deterioration in kidney function a risk for significant bradycardia. Surprisingly, however, a large retrospective cohort study found that, compared with those on metoprolol, patients prescribed atenolol had reduced mortality and no increased risk of hospitalization for bradycardia or hypotension (32).

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Anti-hypertensives and Kidney

- Beta blocker
  - Risk of bradycardia with long acting beta blockers rises in CKD 4
  - Switch Atenolol to Metoprolol Tartarate

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#9

60 yr old woman with Hx HTN, DM2, Obesity with baseline creatinine 1.1, UPCR 1.5, on Lisinopril 20 mg BID and Amlodipine 10 mg QD.

BP well controlled. Lasix 40 mg daily was added 2 months ago due to leg swelling.

Vitals – 130/60, 90

Labs – BUN/Creat 40/1.8, CO_2 20, UA – no RBCs, no WBCs, no casts. SG 1.020

1. Lisinopril dose should be reduced.
2. Lisnopril should be discontinued.
3. Lasix should be discontinued.
4. No changes should be done

Anti-hypertensives and Kidney

- Calcium Channel Blocker
  - Edema a VERY common side effect
  - Unintentional renal dysfunction if edema from CCB is treated with diuretic unnecessarily.
  - If edema is severe and troublesome for the patient, switch CCB to a different anti-hypertensive medicine.

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#10

60 yr old man with Hx HTN, DM2 with CKD 3 GFR 35 ml/min with gradual decline. Never had gouty arthritis

Meds - Lisinopril 20 mg BID, Metformin 1000 mg twice daily.

Recent labs – Uric acid 10 mg/dl,

The following should be done

1. **Should be treated with XO inhibitor (Allopurinol).**
2. **No, should be treated with uricosuric agents.**
3. **Can hold off the treatment of hyperuricemia.**

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#11

Contd. – he suffered an acute severe gout attack after 6 months.

The following are true except -

1. **Should be treated with XO inhibitor (Allopurinol) at this point.**
2. **Target uric acid level to be within normal range.**
3. **LFT, Renal panel, UA should be monitored closely.**
4. **Interstitial nephritis is a risk with Allopurinol.**

Uric acid and Kidney

- Beneficial effect on CKD from lowering uric acid is not proven.
- Asymptomatic hyperuricemia – can be observed.
- Allopurinol remains the main stay of treatment if treatment is considered. (in USA)
- Reduced uricosuric agents efficacy when GFR<45.
- Monitor LFT, RFT, UA with microscopy and escalate the dose to target uric acid <6.0

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Gout and Kidney

- Colchicine can be used at reduced dose for CKD 4
- Colchicine toxicity risk very high in ESRD patients. 0.6 mg single dose with no repeat for 7 days.
- Short course oral Steroid → excellent alternative
- Avoid NSAID as much as possible unless ESRD with very low/no residual renal function.

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#12

60 yr old man with Hx HTN, DM2 with CKD 3 GFR 35 ml/min at baseline is scheduled for CT chest with IV contrast for lung nodule work up.
Meds – Lisinopril 20 mg BID, Metformin 1000 mg BID.

The following should be done

1. **Hydration**
2. **To hold Metformin**
3. **Low dose IV contrast if possible**
4. **Recheck renal function 72 hrs post IV contrast**
5. **All of the above**

IV contrast and Kidney

- Is CT with IV contrast absolutely needed? Benefits vs. Risks (risk calculator – age, gender, race, DM, Hypotension, intra aortic balloon pump, CHF, creatinine, hematocrit, contrast volume)
- DM Nephropathy → risk highest
- IV hydration with NS 1 ml/Kg/hr 6 hrs before and 6 hrs after the CT → only proven way to reduce the risk.
- Hold certain meds – ACEi/ARB, Metformin
- Recheck renal function after 72 hours post IV contrast

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#13

60 yr old man with Hx HTN, DM2 with ESRD on hemodialysis is scheduled for MRI with contrast for suspected brain tumor.

The following are true except-

1. **Risk of NSF(Nephrogenic Systemic Fibrosis) should be considered.**
2. **Alternative test if available, to be considered.**
3. **NSF is similar to scleroderma**
4. **Certain contrast types for MRI carry less risk.**
5. **NSF is a readily treatable condition.**

Gadolinium and Kidney

- Nephrogenic Systemic Fibrosis risk in ESRD
- Similar to scleroderma.
- Fatal, no proven treatment.
- Group 2 gadolinium based contrast media - e.g. Gadavist → insignificant risk
- Consider alternative imaging technique if available.

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#14

60 yr old man with Hx HTN, DM2, Peripheral vascular disease, CKD 4 (GFR 28) was found to have Cholesterol - 250, LDL – 170, TG - 300

1. **Will start Statin due to high CVD risk**
2. **Will not start Statin due to CKD4**
3. **Will start both Statin and Fibrate due to high LDL and TG**
4. **Will not start either Statin or Fibrate due to CKD4.**

Statin and Kidney

- Can be used in CKD
- Myalgia common but true rhabdomyolysis rare
- Drug-drug interaction between certain statins and CCBs (Simvastatin and Amlodipine).
- Fibrate → contraindicated in CKD 4

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#15

60 yr old woman with HTN, DM2, CKD 3a with chronic Constipation with regular use of an unknown oral drug for bowel movement.

Recent labs – GFR progressively declines to 30, PO_4 – 8.5, Calcium 8.3

What advice should be given for constipation?

Constipation and Kidney

- Phosphate Nephropathy
- Oral phosphate → avoid
- Phosphate Enema → avoid
- Soap/Mineral oil enema → Ok
- High fiber + Hydration

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Herbal Drugs and Kidney

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Herbal Drugs and Kidney

- Not regulated by FDA
- Risk of drugs being tainted by impurities like lead, mercury, Arsenic, NSAIDs, Phosphodiesterase, Thyroid hormone etc.
- Some herbal treatments are known to be nephrotoxic and should be avoided (see "Nephropathy induced by aristolochic acid (AA) containing herbs") [78]. Aristolochia is a Chinese herb included in weight-loss herbal formulas associated with over 100 cases of nephropathy [79]. It is also a probable human carcinogen associated with urothelial cancers [80].

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Diet and Kidney

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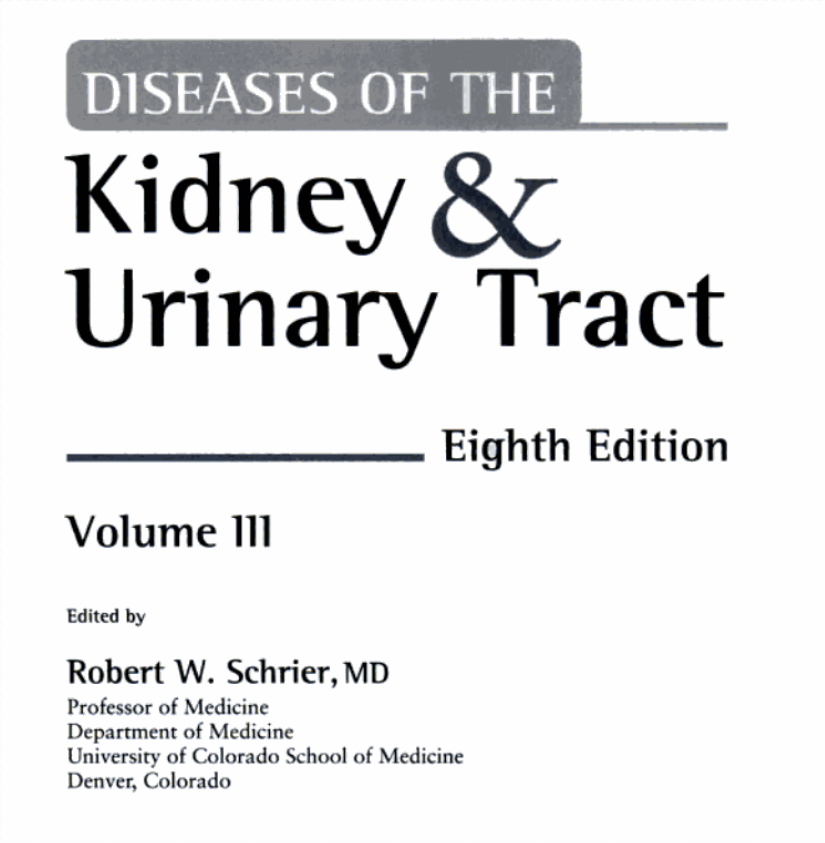
Diet and Kidney


DISEASES OF THE

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Diet and Kidney

Plant Toxins

Several kinds of plants exert pharmacologic effects on the body. Certain effects are harmful and may directly or indirectly cause nephropathy. The subject has recently been reviewed (577).

Djenkol Bean. Djenkol beans (Pithecolobium lobatum, Pithecolobium jiringa) are consumed by people in Indonesia, Malaysia, and southern Thailand (578–583). The beans are eaten as food: raw, fried, or roasted. Toxicity follows ingestion of the raw bean in large amounts (>5 beans) although there are different susceptibilities among individuals. Poisoning may be caused by a single bean in some individuals, whereas it may take 20 beans to cause toxicity in others (581). Ingestion of the boiled beans does not cause toxicity because the toxic substance, djenkolic acid, is removed from the bean. The amount of djenkolic acid may vary among beans from various sources. Poisoning is characterized by abdominal discomfort, loin pains, severe colic, nausea, vomiting, dysuria, gross hematuria, and oliguria, occurring 2 to 6 hours after the beans were ingested (582). The patient may be anuric. Hypertension may be present. In a recent report of 22 patients with djenkol bean poisoning, dysuria was noted in 17 (77%), hematuria in 15 (68%), proteinuria in 10 (45%), hypertension in 8 (36%), and renal failure in 12 (55%) patients (580).

Urine analysis reveals erythrocytes, epithelial cells, protein, and the needle-like crystals of djenkolic acid. The symptoms are caused by mechanical irritation of the renal tubules and urinary tract by the djenkolic acid crystals. Precipitation of djenkolic acid causing tubular obstruction occurs in acid and concentrated urine. Urolithiasis has been reported, with djenkolic acid as the nucleus (579). The majority of patients recover within a few days.

Diagnosis can easily be made by the history of bean ingestion and occasional sulfurous fetor in the breath. Treatment requires hydration to increase urine flow and alkalinization of urine by sodium bicarbonate (583). When the urine pH is increased from 5.0 to 7.4, the solubility of djenkolic acid is increased by 43%, and at a pH of 8.1 the solubility increases to 92% (578).

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- Toxicity follows ingestion of a large quantity of raw bean – >5 beans, but individual susceptibility may vary from 1 – 20
- Ingestion of boiled beans does not cause toxicity because toxic djenkolic acid is removed.
- The amount of djenkolic acid may vary among beans from various sources.

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- Abdominal discomfort, colic, N/V, dysuria, gross hematuria, oliguria, anuria 2- 3 hours after ingestion.
- Urinalysis showed RBCs, needle shape djenkolic acid crystals
- Treament – Hydration, alkalinization of urine with Sodium Bicarbonate, higher pH → less crystalization.

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Diet and Kidney

- Int Med Case Rep J. 2014; 7: 79–84.
- Published online 2014 Apr 16. doi: 10.2147/IMCRJ.S58379
- PMCID: PMC3998865
- PMID: 24790471
- Djenkolism: case report and literature review
- Nur C Bunawan,[1] Asghar Rastegar,[2] Kathleen P White,[3] and Nancy E Wang[4]

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- Our systematic literature review identified 96 reported cases of djenkolism. The majority of patients recovered with hydration, bicarbonate therapy, and pain medication. Three patients required surgical intervention; one patient required ureteral stenting for the obstructing djenkolic acid stones. Four of the 96 reported patients died from acute kidney failure.

Diet and Kidney

Star Fruit. Star fruit (Averrhoa carambola) is a popular fruit among Asians. The fruit has high oxalate content. Ingestion of large quantities of pure fresh juice can cause within hours nausea, vomiting, abdominal pain, and backache followed by acute oliguric renal failure, due to acute oxalate nephropathy (589,590). Pure fresh star fruit juice should not be consumed in large amount, especially on an empty stomach or in a state of dehydration.

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