

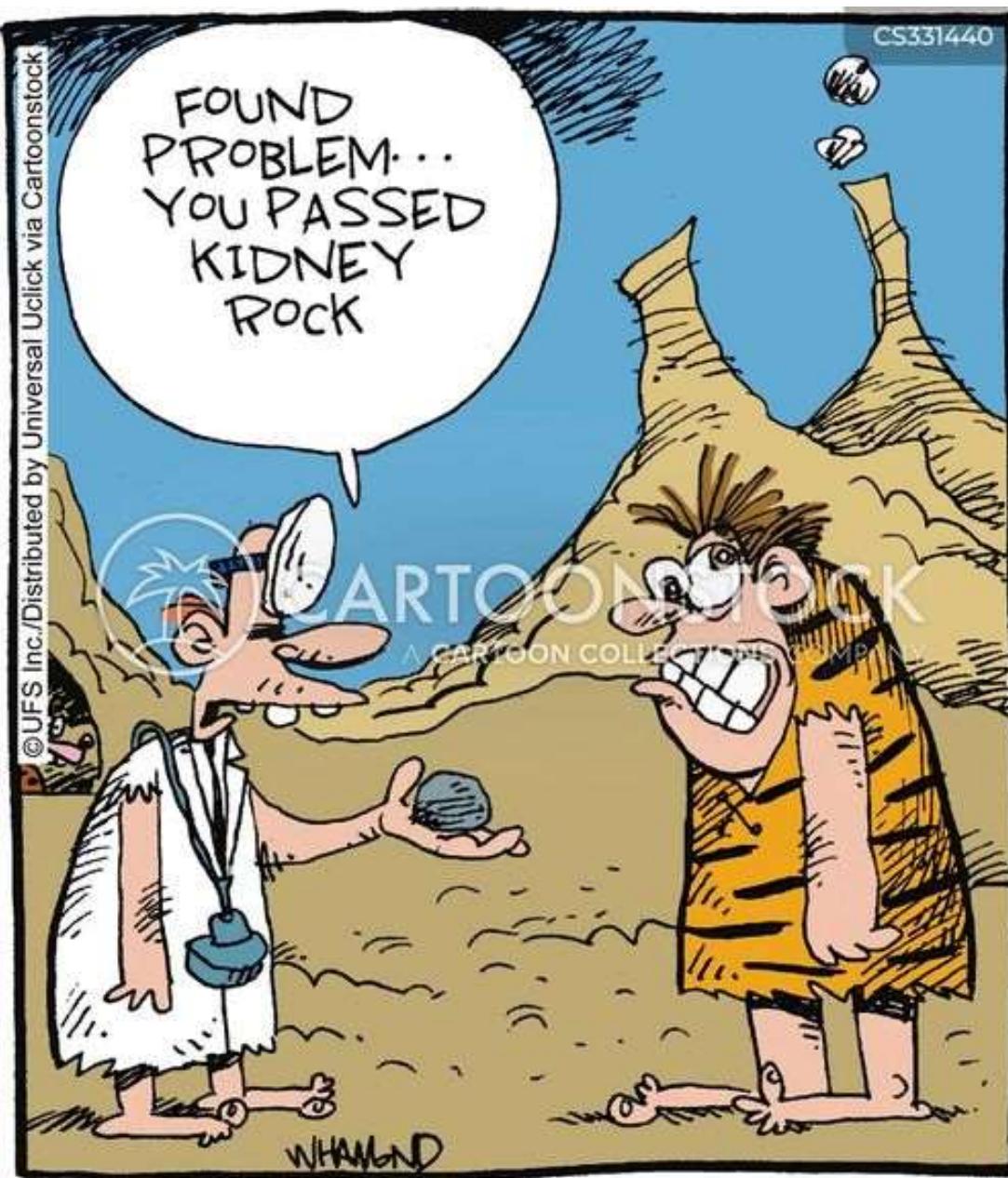
*In the name of  
God*





# *Kidney Stone in Children*

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## *Old Story of Stone Disease*

- Describing symptoms and prescribing treatments to dissolve the stone:
  - within the medical texts of **Asutu** in **Mesopotamia** (*historical region of Western Asia*)
- Between ٣٢٠٠ BC and ١٢٠٠ BC.

# Epidemiology

- **Prevalence of kidney stone:**
  - In the last three decades, the prevalence of kidney stone has increased worldwide.
    - Increased salt and protein intake, metabolic syndrome
  - Iran: ۲۱%
  - The USA: ۹%
  - The higher rate in children has been reported in pre-adolescents and adolescents and Whites



# Risk Factors

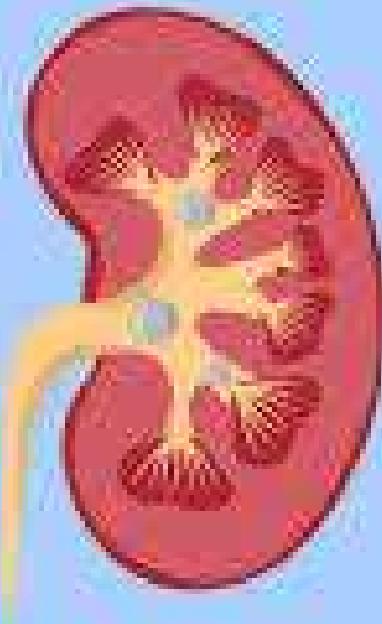
- **Race:** Non-Hispanic Whites
- **Occupation:**
  - Workers in hot climates
  - Workers exposed to renal toxins (cadmium, ethylene glycol,...)
- **Climate and Geography:** Stone Belt
- **Sex Differences:** higher in men
- **Systemic Diseases:**
  - Obesity, Metabolic Syndrome, Diabetes, HTN, CKD, CVD



# Stone Composition & Recurrence

- The most prevalent: Calcium- oxalate stone
- Calcium Phosphate
- Uric Acid
- Stuvite (mg-ammonium-ph): 1%-8%
- Cystein

# SYMPTOMS OF KIDNEY STONE



STOMACH PAIN      BACKACHE      VOMITING



DIZZINESS      FEVER      BLOOD IN THE URINE



# Evaluation of Acute Flank Pain

## Grade A (EAU)

- **I- U/A**
- **R- Biochemistry (BUN/Cr)**
- **R- CBC**
- **R- If febrile UC (we recommend UC in even afebrile children)**
- **S- If febrile CRP**
- **R- If intervention is planned: Coagulation Studies**



# Evaluation of Acute Flank Pain

## Grade A (Imaging methods, AUA)

- 1- *Ultrasound and KUB (opaque stones)*
- 2- *non-contrast CT (ureter stone and non-opaque stones)*

# TREATMENT



"When it comes to bustin' a kidney stone, the old methods are still the best."



## Surgical Treatment (AUA & EUA)

- 1- Obstructing stone and infection: Urology Emergency state
- 2- Urgent decompression of Collecting System
  - Percutaneous drainage
  - Ureteric Stent



# Ureteric Stone (AUA & EUA)

- 1- Extracorporeal Shockwave lithotripsy(SWL)
  - Proximal Ureteric Stone  $< 1 \cdot \text{mm}$
- 2- Ureteroscopy (URS)
  - Proximal ureteric Stone  $> 1 \cdot \text{mm}$
  - Mid-ureteric Stone ???
  - Distal Ureteric Stone (independent of size)
- 3- Alternative methods (Percutaneous antegrade URS, (laparoscopic or open surgery)



# Renal Stone

- **Staghorn Calculi: Complete Removal**
  - Percutaneous nephrolithotomy (PCNL): method of choice for stone  $>2 \cdot \text{mm}$
  - SWL
  - Open Surgery



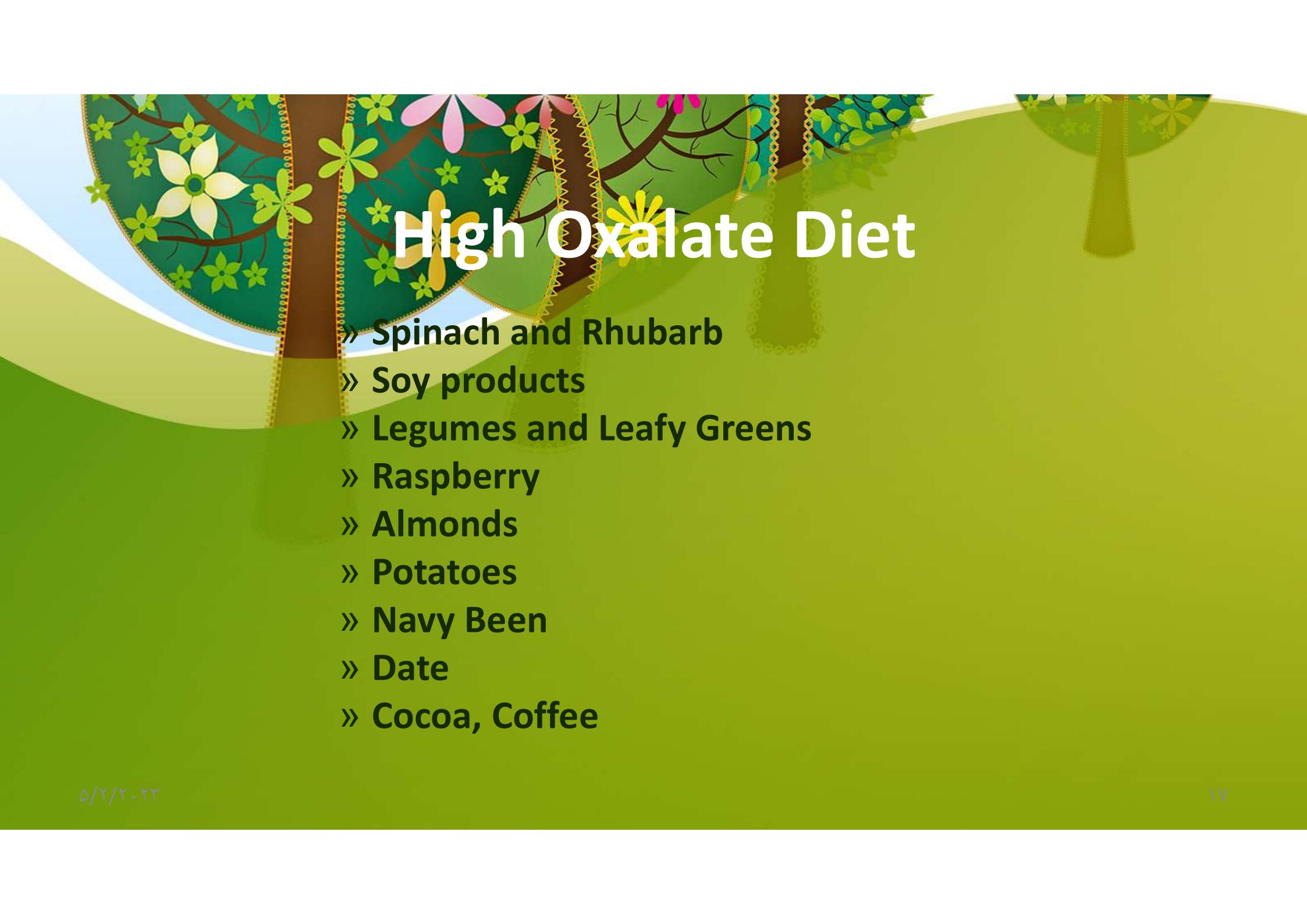
# Evaluation of Kidney Stone

- 1- 24h urine collection for:
  - calcium, sodium, cystein, oxalate, uric acid, potassium, citrate, magnesium, phosphore, creatinine
- F- VBG
- F- UA/UC
- F- PTH?
- M- serum calcium, phosphorus, magnesium?



# Medical Management

- *Diet:*
  - Low sodium intake
  - Enough fluid
  - Enough fruit in low urinary citrate cases
  - Low oxalate diet
  - RDA calcium intake



# High Oxalate Diet

- » Spinach and Rhubarb
- » Soy products
- » Legumes and Leafy Greens
- » Raspberry
- » Almonds
- » Potatoes
- » Navy Been
- » Date
- » Cocoa, Coffee



# Medical Management

- ***Medication:***
  - **Potassium Citrate**
    - Solution(poly-citrate K)
    - Urocitra
    - Alithoral
  - **Hydrochlorothiazide**
  - **Vitamin B<sub>6</sub>**
  - **Allopurinol**
  - **Cystone, Rowatinex**
  - **Tiopronin & Dipenicillamin (cysteine stone)**



# Remedies for Renal Stone

- **Lemon Juice**
- **Basil Juice**
- **Apple Cider Vinegar**
- **Celery Juice**
- **Pomegranate Juice**
- **Kidney Bean Broth**
- **Dandelion**
- **Wheatgrass Juice**
- **Horsetail**



## The Hounsfield Unit of various urinary calculi at 120 kV (non-contrast CT)

- Uric Acid - 200-450 HU;
- Struvite - 800-900 HU;
- Cysteine - 800-1100 HU;
- Calcium Phosphate - 1200 - 1800 HU;
- Calcium Oxalate Monohydrate;
- Brushite - 1700-2800 HU
- The stone-free rate for stones of <900 HU was 96% vs 38% for stones of ≥ 900 HU ( $P < .001$ ).

# Renal Stone

< 1cm		1-2cm		>2cm	
Upper or Middle pole	Lower pole	Upper or Middle pole	Lower pole	Upper or Middle pole	Lower pole
ESWL or URS	Non-Cystine/non brushite/ <70·HU:ESWL for children URS for others	Cystine/ Brushite/ >70·HU/high skin to stone distance: URS or ESWL	URS/ PCNL	PCNL	PCNL
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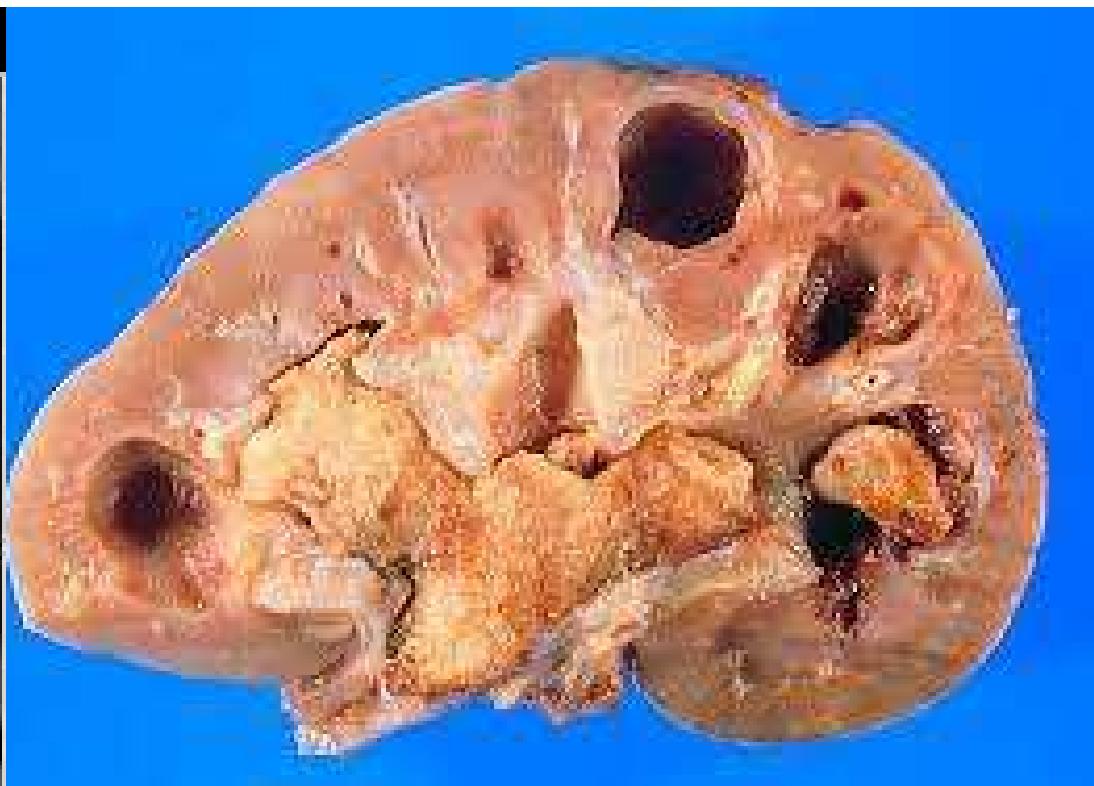
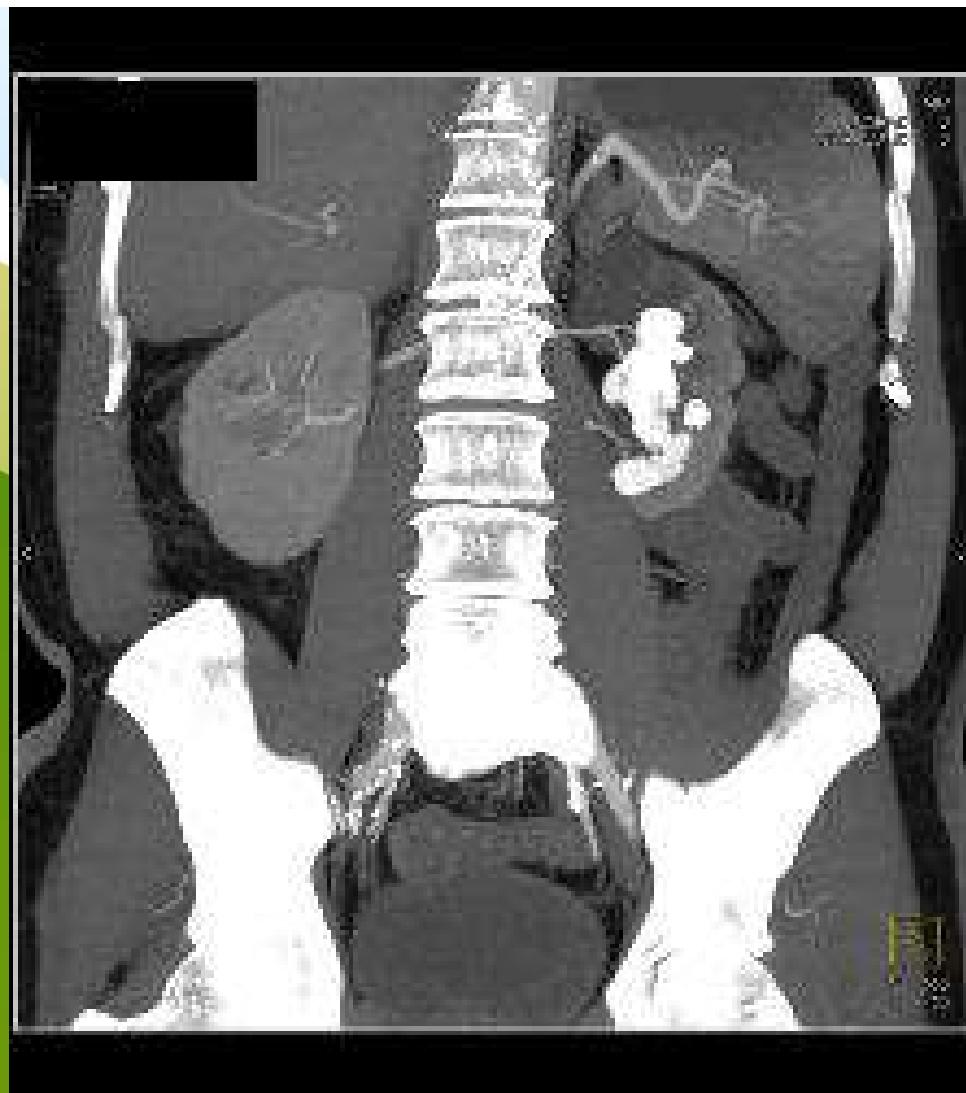
# Ureteral Stone

Proximal		Middle		Distal	
< 1·mm	> 1·mm	< 1·mm	> 1·mm	< 1·mm	> 1·mm
ESWL	URS	ESWL or URS In women URS is preferred	URS	ESWL or URS In women URS is preferred	URS
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*Thank you*