

Urinary tract Outlet Stasis Hydronephrosis

Aseptic Dilation of Renal pelvis
and calyceal system with
destruction of Renal
parenchyma.





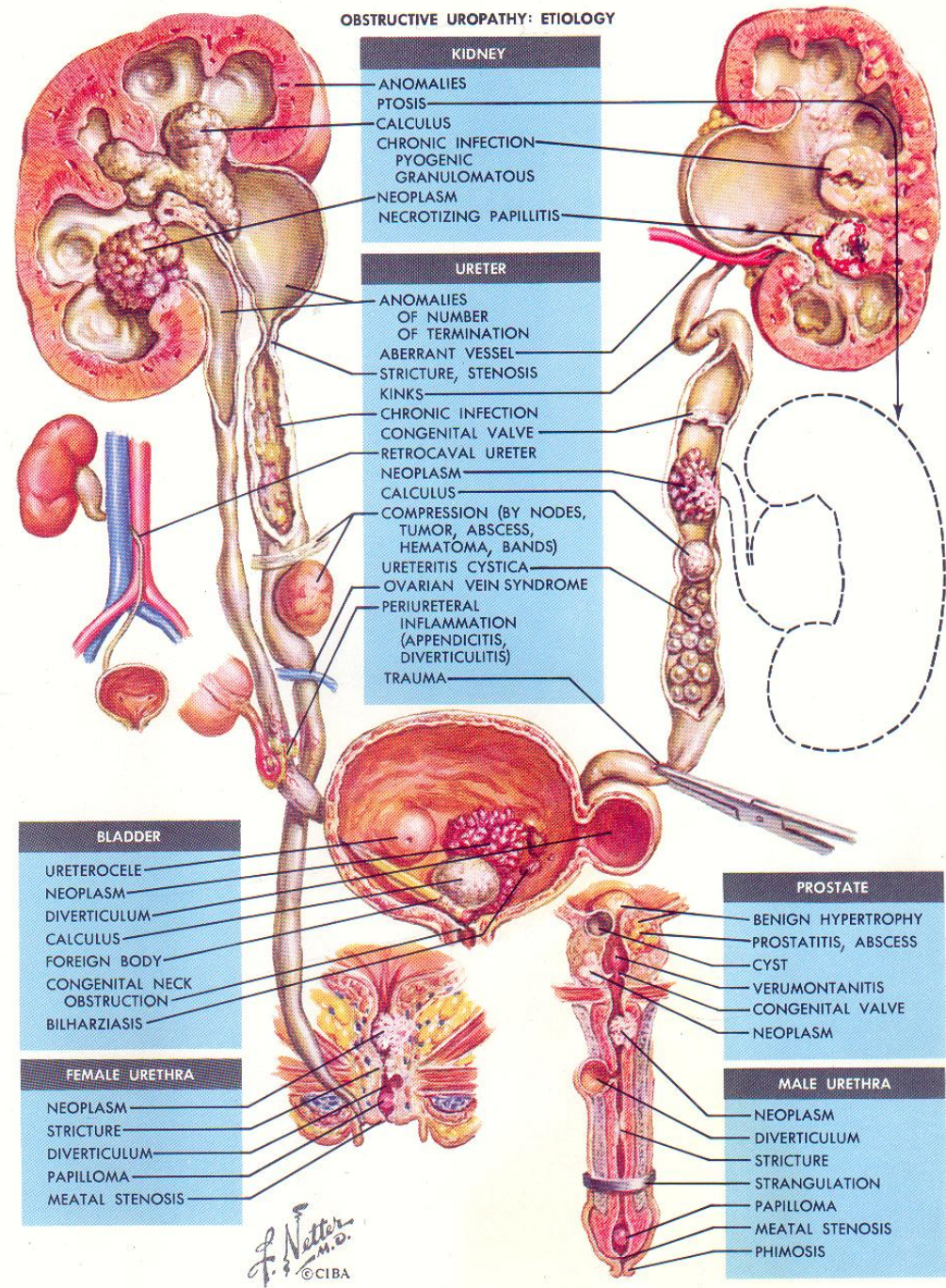
Persistent



॥वसुधैव कुटुम्बकम्॥

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Hydronephrosis. Aetiology



HYDRONEPHROSIS:Aetiology

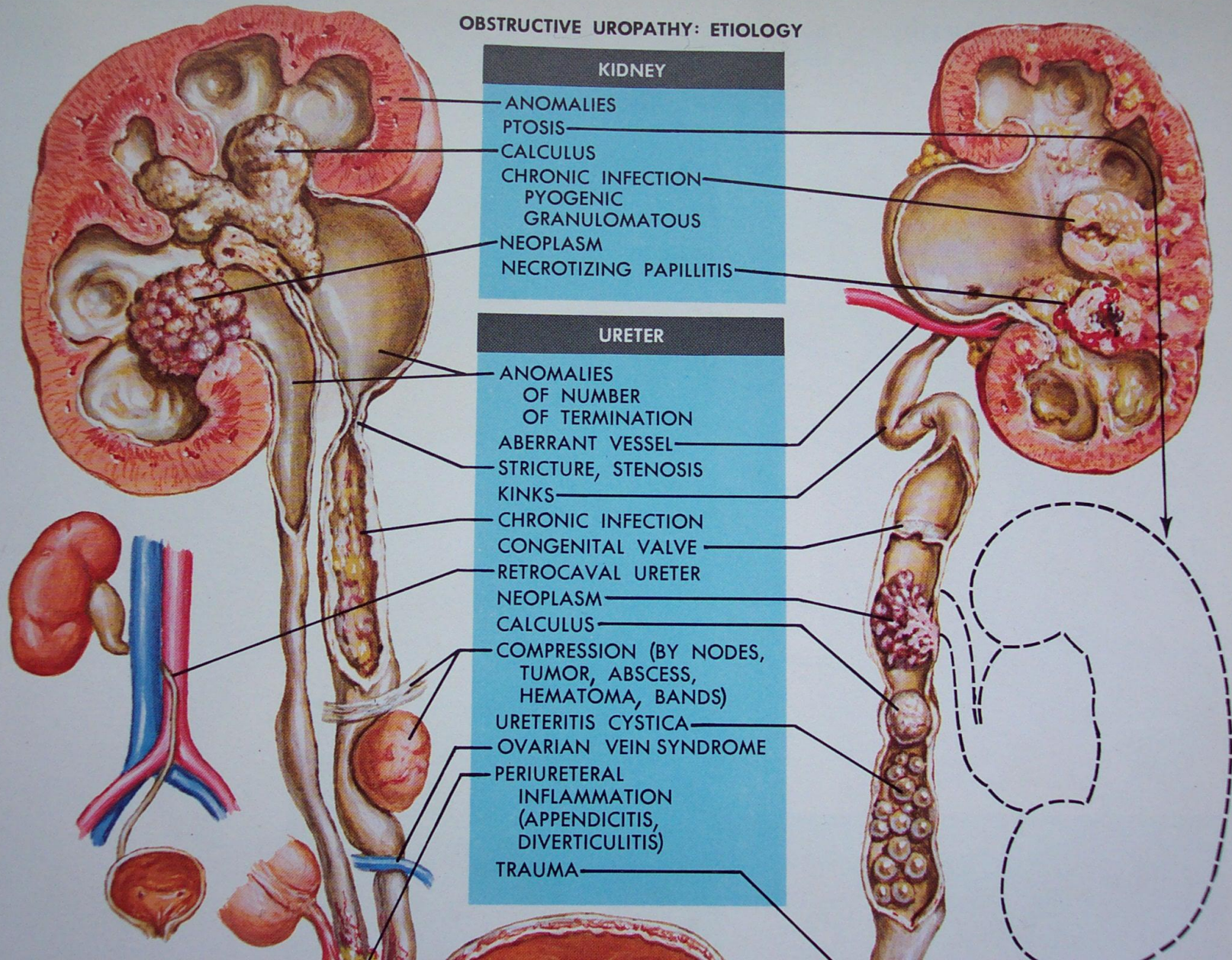
- ◆ UNILATERAL CONGENITAL
 - ◆ Folds, Valves, Twist of Ureter
 - ◆ Double Ureter
 - ◆ Adhasions,
 - ◆ Stenosis of Ureter
 - ◆ Vascular: Abberrent Vessel
 - Inf. Polar artery
 - Ovarian Artery
 - Retrocaval Ureter
 - ◆ Neuromuscular
 - In co-ordination, Achlasia,
 - P.U. Obstruction
 - ◆ Ectopic Kidney, Crossed ectopia.
 - ◆ Idiopathic.
- ◆ UNILATERAL ACQUIRED
 - ◆ Ureteric Stone
 - ◆ Ureteric Stricture
 - ◆ Extrinsic Compression
 - ◆ Secondaries
 - Traumatic Injury Iatrogenic
 - Retroperitoneal Fibrosis
 - Tuberculosis

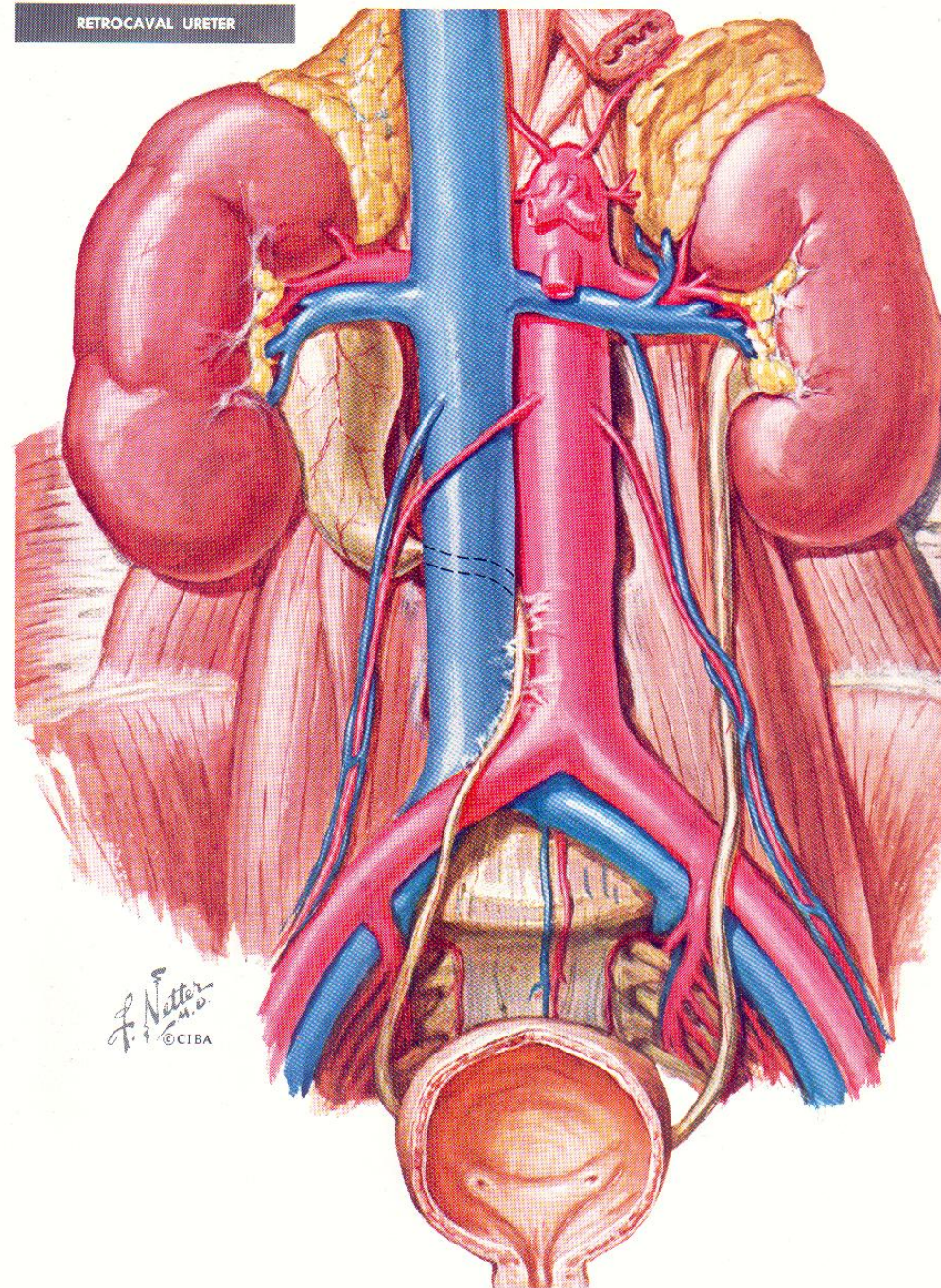
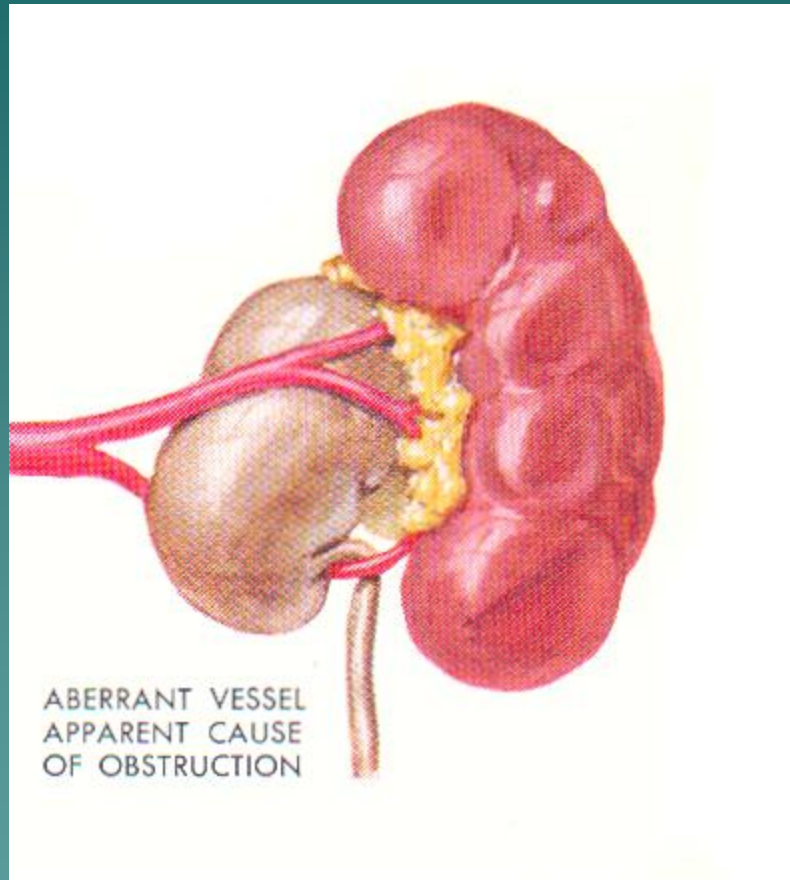
Obstructive uropathy: Unilateral causes

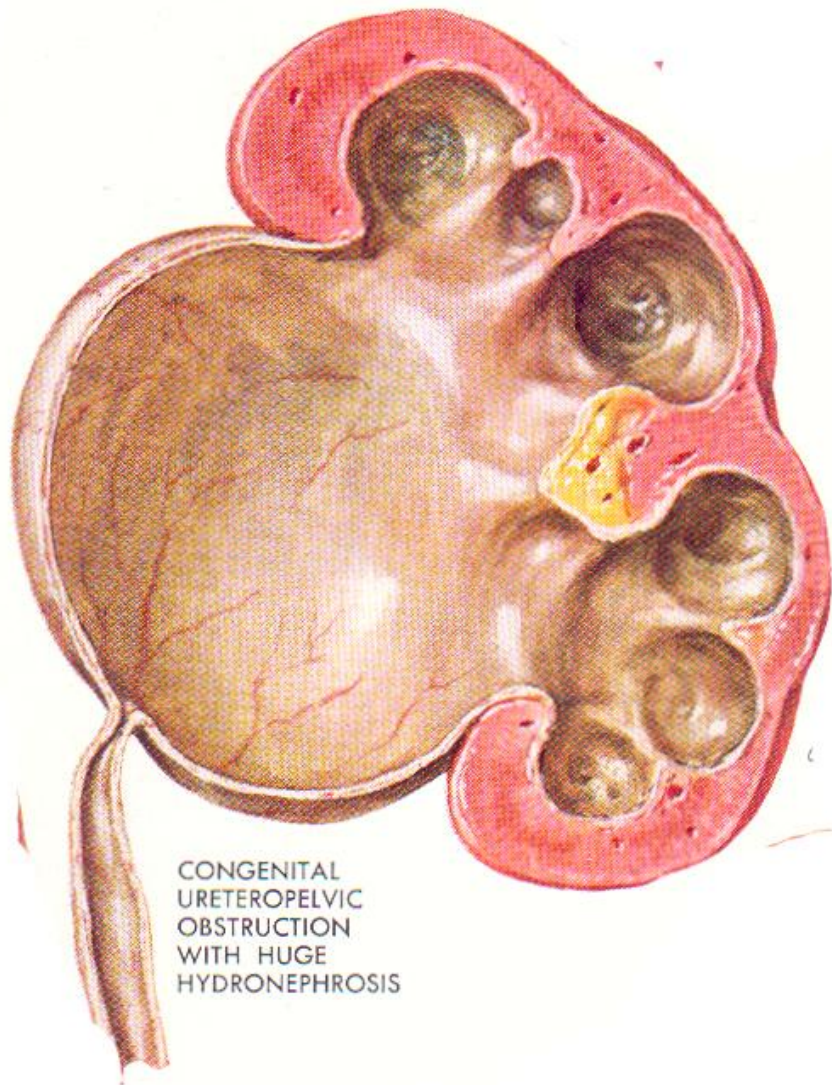
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CONGENITAL
URETEROPELVIC
OBSTRUCTION
WITH HUGE
HYDRONEPHROSIS

INCOMPLETE DUPLICATION OF URETER

URETER DUPLICATED AT LOWER END WITH ONE URETER ENDING BLINDLY OR CONTINUING AS SOLID CORD TO RENAL PELVIS

URETER BRANCHING AT LOWER END WITH ONE LIMB OF THE "Y" ENDING BLINDLY (URETERIC DIVERTICULUM)

DUPLICATED URETERS UNITING IN BLADDER WALL TO ENTER BLADDER BY A COMMON ORIFICE

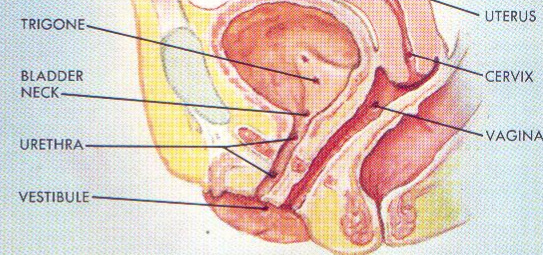
COMPLETE DUPLICATION OF THE URETER

THE URETER FROM THE RIGHT UPPER PELVIS IS DILATED AND OPENS ECTOPICALLY BELOW THAT FROM THE LOWER PELVIS (IN THE PROSTATIC URETHRA) ACCORDING TO THE WEIGERT-MEYER LAW

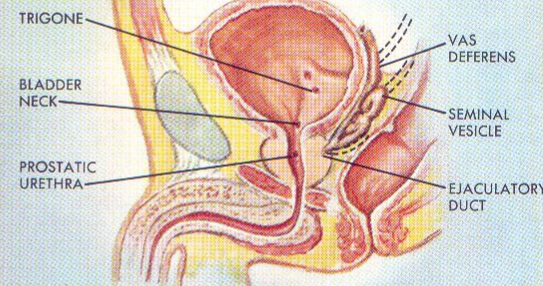
OBSERVED SITES OF ECTOPIC URETERAL ORIFICES

MORE COMMON

LESS COMMON



IN THE FEMALE



IN THE MALE

OPENING OF LEFT URETER

OPENING OF URETER FROM RIGHT INFERIOR RENAL PELVIS

OPENING OF URETER FROM RIGHT SUPERIOR RENAL PELVIS

BIFID URETER: DUPLICATED URETERS UNITE AT VARIABLE DISTANCE BETWEEN KIDNEY AND BLADDER

F. Netter M.D. © CIBA

F. Netter M.D. © CIBA

an ectopic ureter is less likely to be associated with du-

Hydronephrosis cont.

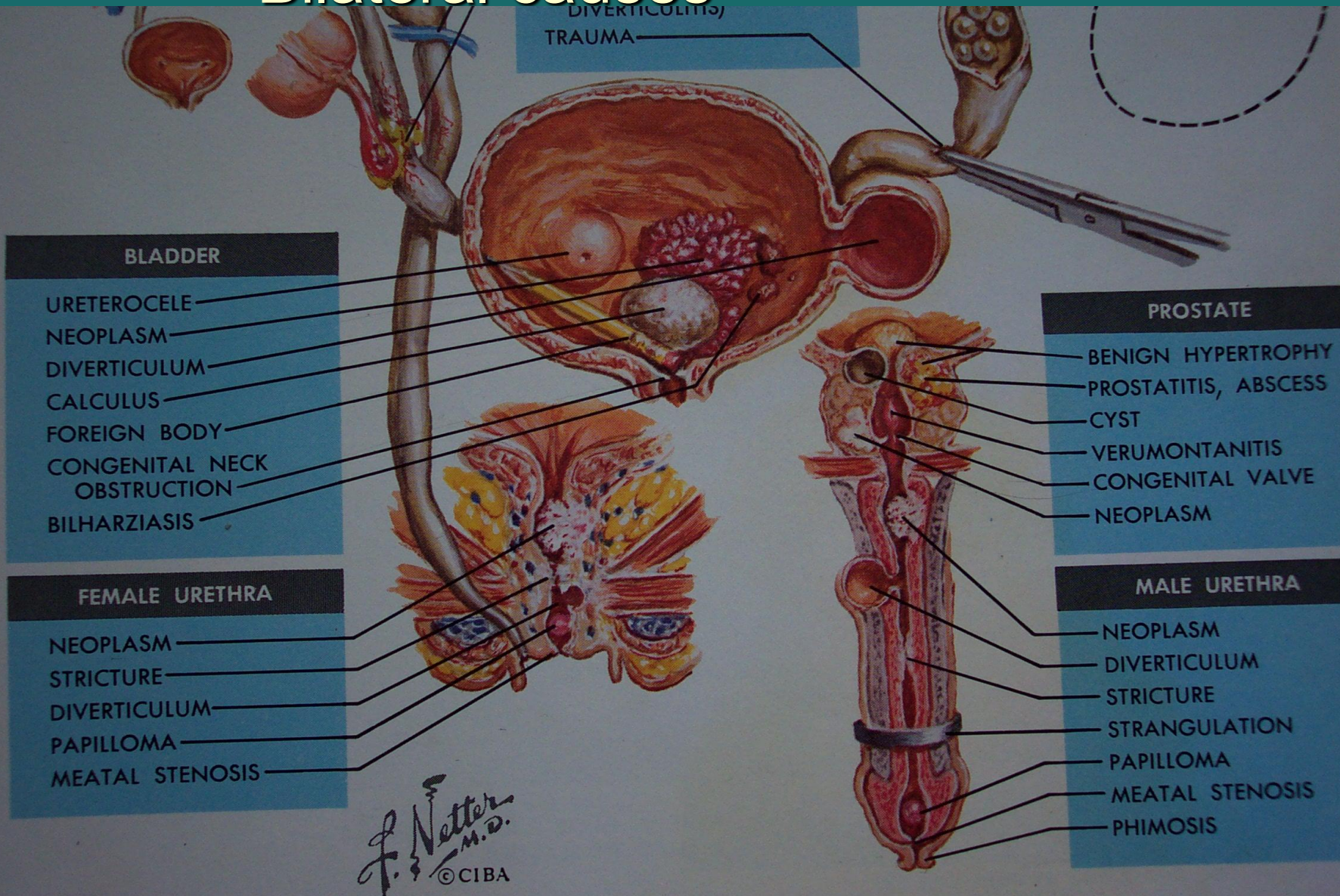
◆ BILATERAL CONGENITAL

- ◆ Phimosis
- ◆ Post urethral valves
- ◆ Horse shoe kidney
- ◆ Vesico-ureteric RE flux

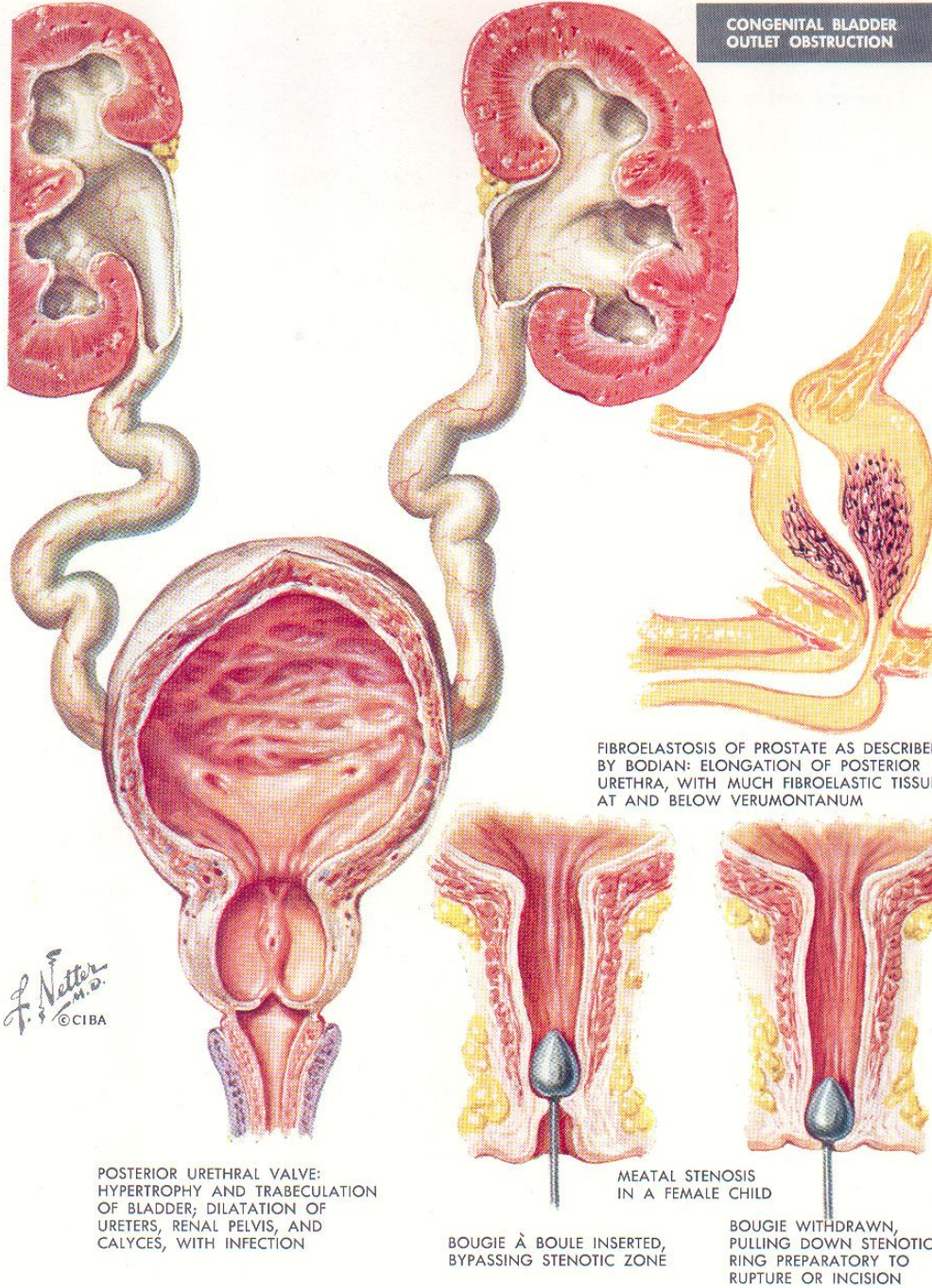
◆ BILATERAL ACQUIRED

- ◆ Stricture Urethra
- ◆ BEP
- ◆ Ca prostate
- ◆ carcinoma bladder
- ◆ carcinoma rectum
Uterus, Cervix
- ◆ Spinal Chord Injury.

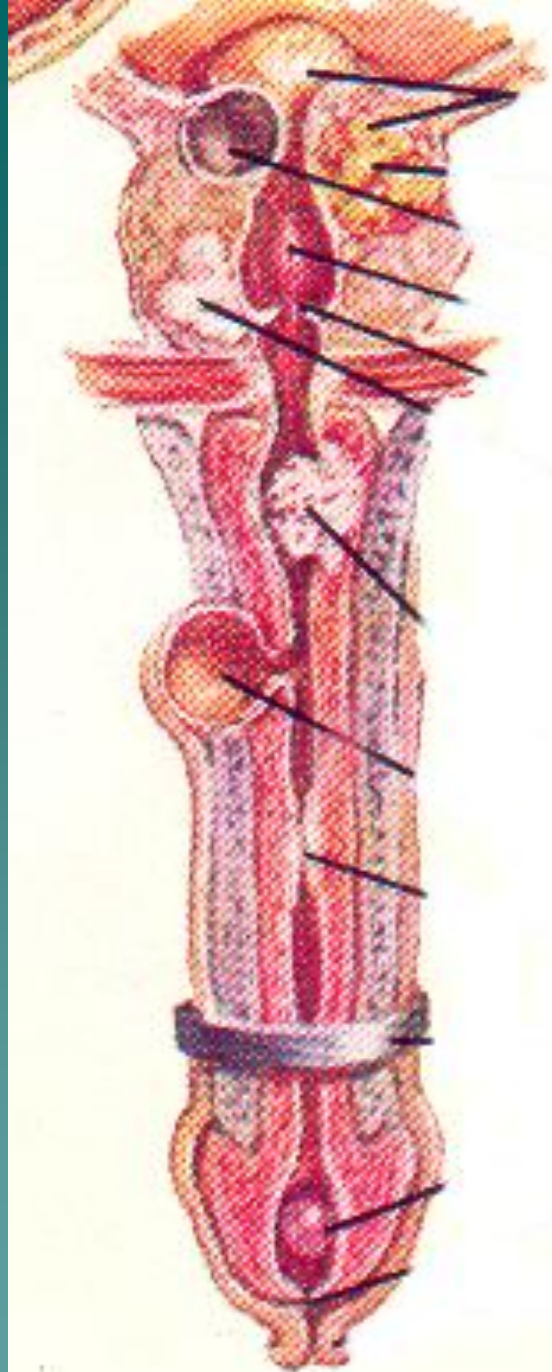
Obstructive uropathy: Bilateral causes



CONGENITAL BLADDER
OUTLET OBSTRUCTION



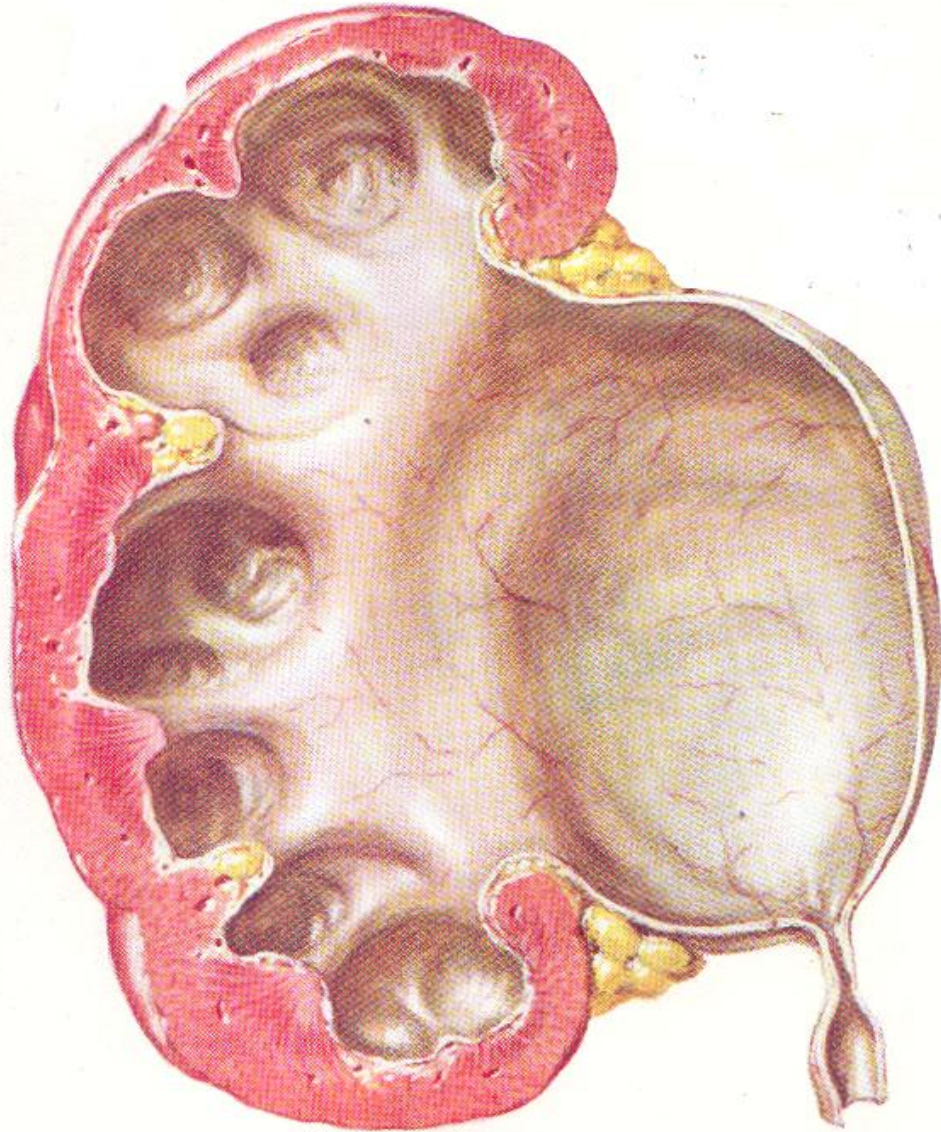
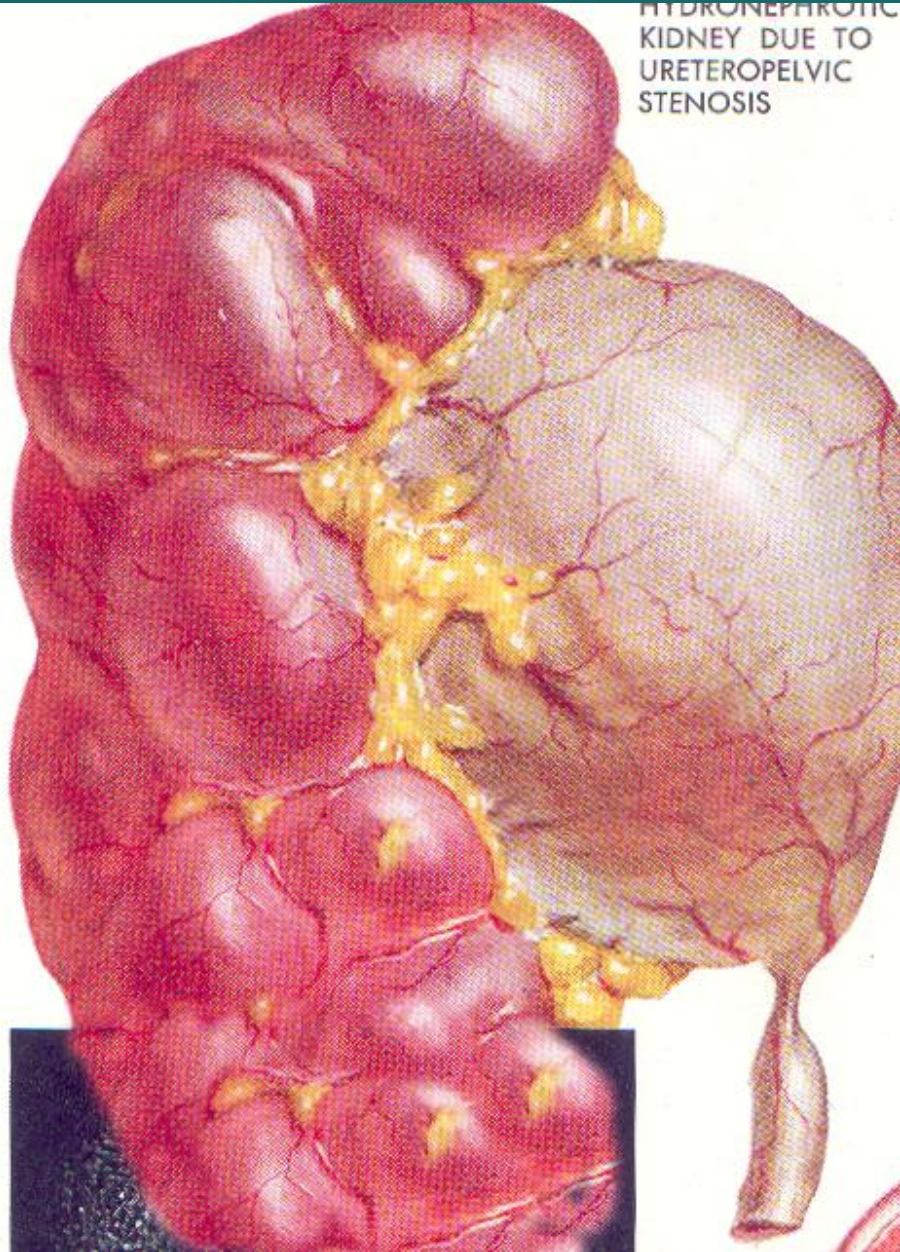
are those of prolonged obstruction: anuria or drib- some patients secondary changes at the ureteropelvic



PATHOLOGY

- ◆ Dilation of pelvi-calyceal system
- ◆ Paper thin kidney.
- ◆ Renal parenchyma atrophied
- ◆ Depends upon type of renal pelvis
- ◆ Three type Renal, pelvi-Renal, pelvic
- ◆ Idiopathic P U obstruction produces greatest dialation
- ◆ Stone – Infection – Thickened pelvis – Dialation will be less
- ◆ Similar to Courvoisier's law

HYDRONEPHROTIC
KIDNEY DUE TO
URETEROPELVIC
STENOSIS



Additional changes depending upon level of urinary obstruction

1. Lower Tract : Distal to bladder neck

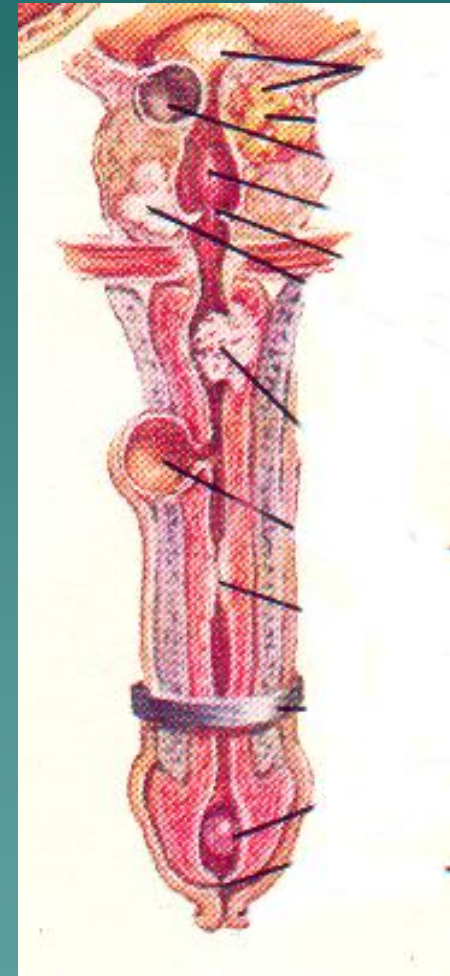
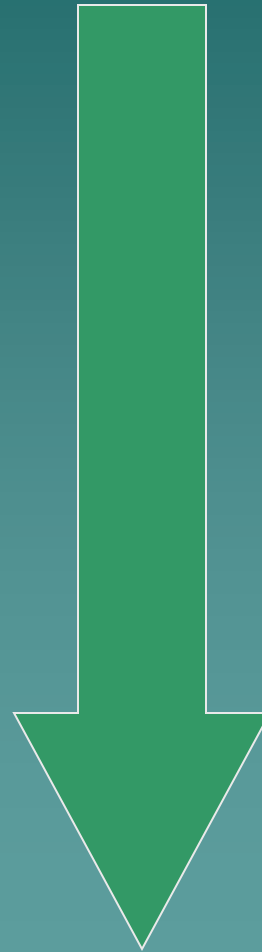
Dilation of urethra

Urethral diverticulum

Extravasation of urine

INFECTION

Periurethral abscess



2. Mid tract : Bladder, prostate

◆ Compensatory phase

Hypertrophy of muscle wall 2 to 3 times

To balance increase urethral resistance

Oedema of submucosa

Infiltration with plasma cells, PMN, Lymphocytes.

Individual muscle fiber hypertrophies

◆ *TRABECULATION*

Pathological changes in bladder

Individual muscle fiber increased

◆ *TRABECULATION*

Hypertrophy of trigone
Interureteric muscle

Raised
Intravesical
pressure

Mucosa pushed between
Superficial muscle fibres

Cellule formation
(through muscle layer)

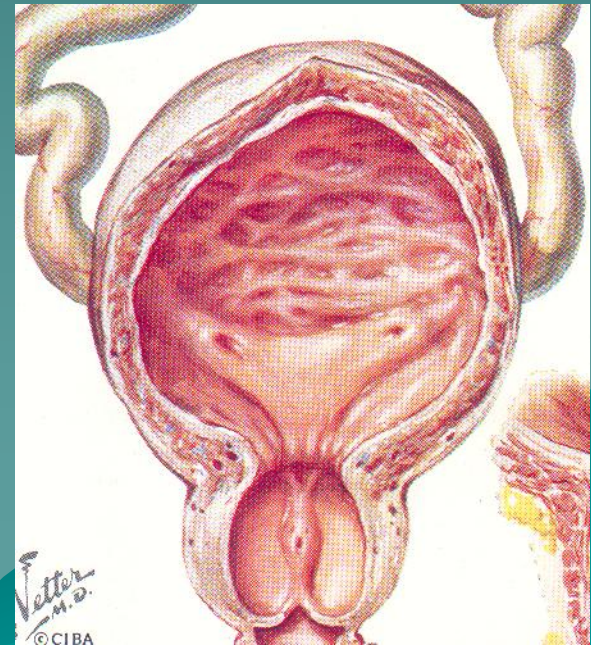
Saccule
(All musculature of wall)

Diverticulum

Accentuation of
downward pull of ureter

Increased vesical
Resistance

Function obstruction of
Uretero Vesical junction



Pathological changes in Bladder

Diverticulum

Embedded in perivesical tissue
(No muscle wall fat covered by peritoneum)

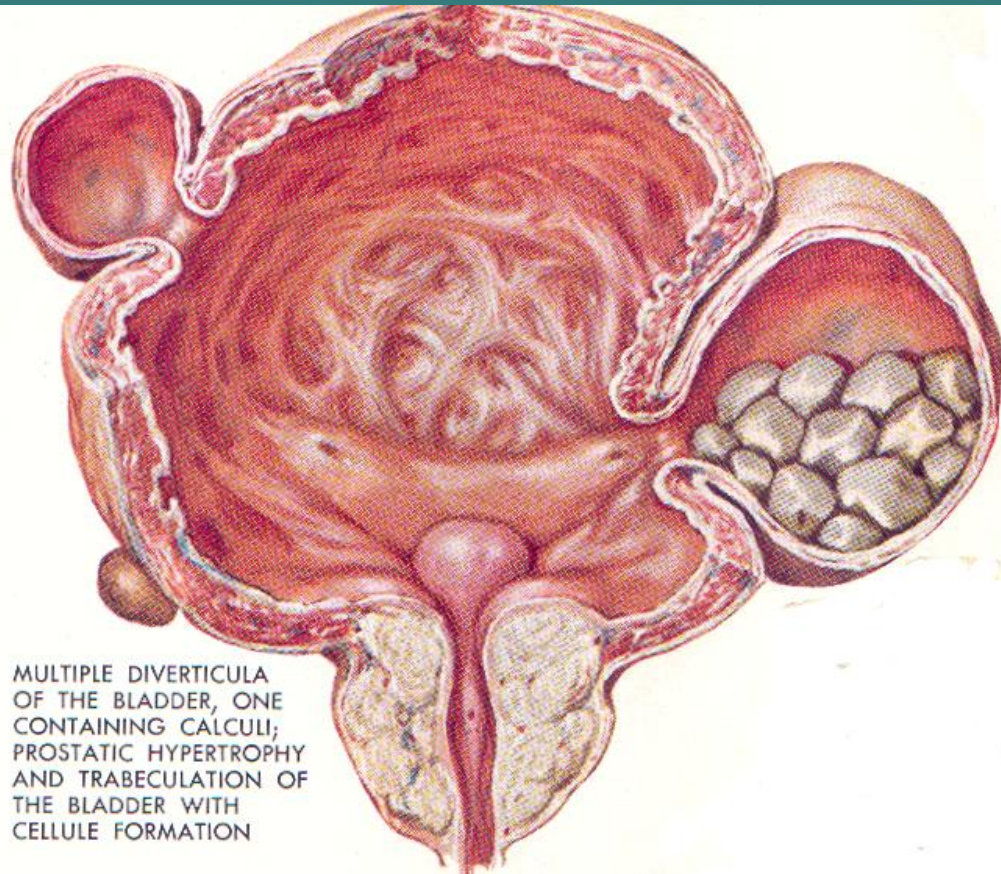
➤ Residual Urine
(No expulsion of urine)

Infection

Stone formation

◆ No relief of symptoms inspite
cause removal

◆ Diverticulectomy



MULTIPLE DIVERTICULA
OF THE BLADDER, ONE
CONTAINING CALCULI;
PROSTATIC HYPERTROPHY
AND TRABECULATION OF
THE BLADDER WITH
CELLULE FORMATION

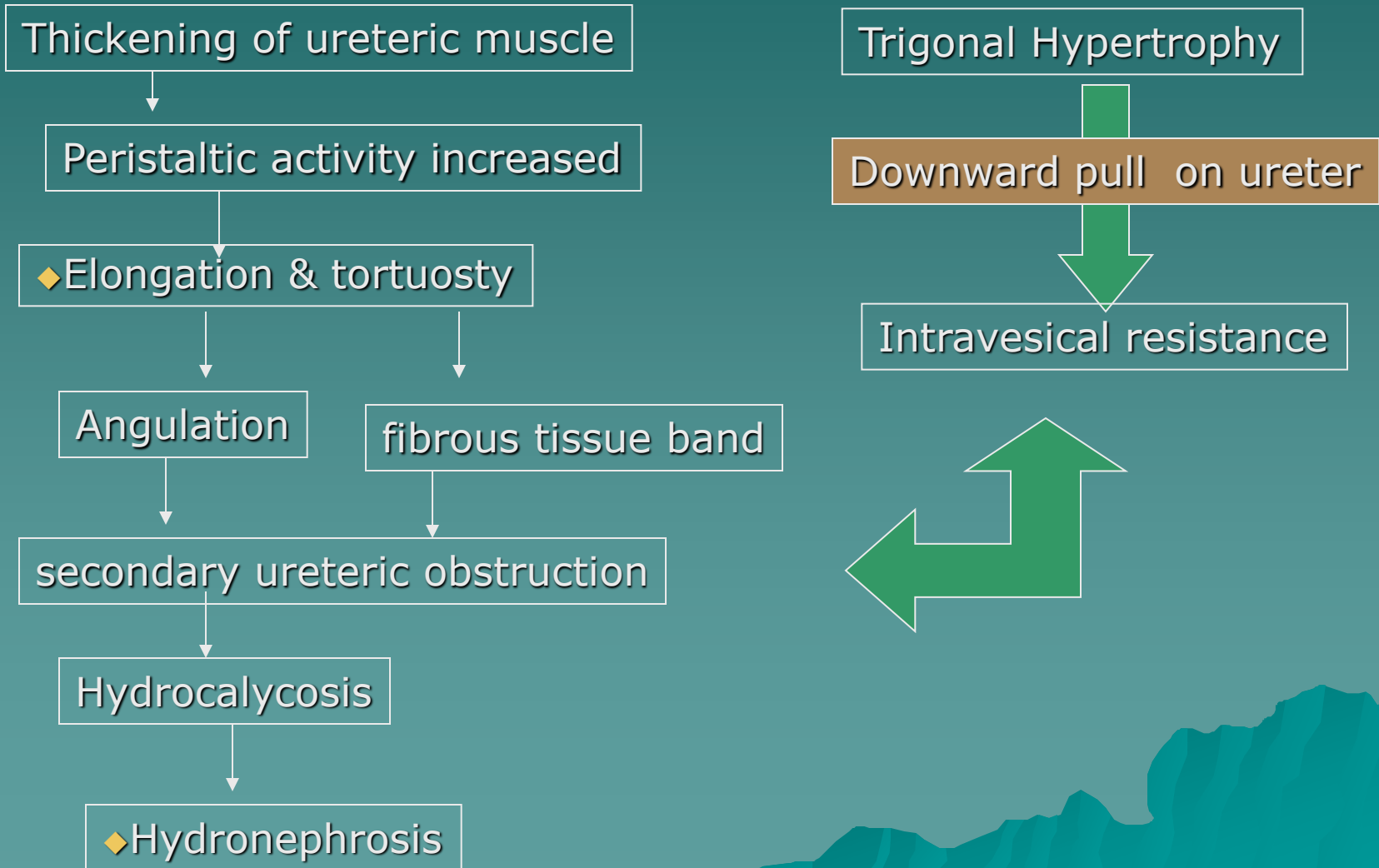
Pathological changes in Bladder 2

Stages of decompensation :

- ◆ Muscle less contractile
 - ◆ weak muscle
 - ◆ Residual urine increased
 - ◆ Aggr. Factor : Prostatitis
 - ◆ Relief may not be there inspite of obstruction removed surgically
 - ◆ Medico legal Importance
- 
- A decorative teal-colored silhouette of a mountain range is located in the bottom right corner of the slide.

Upper Tract : Ureter

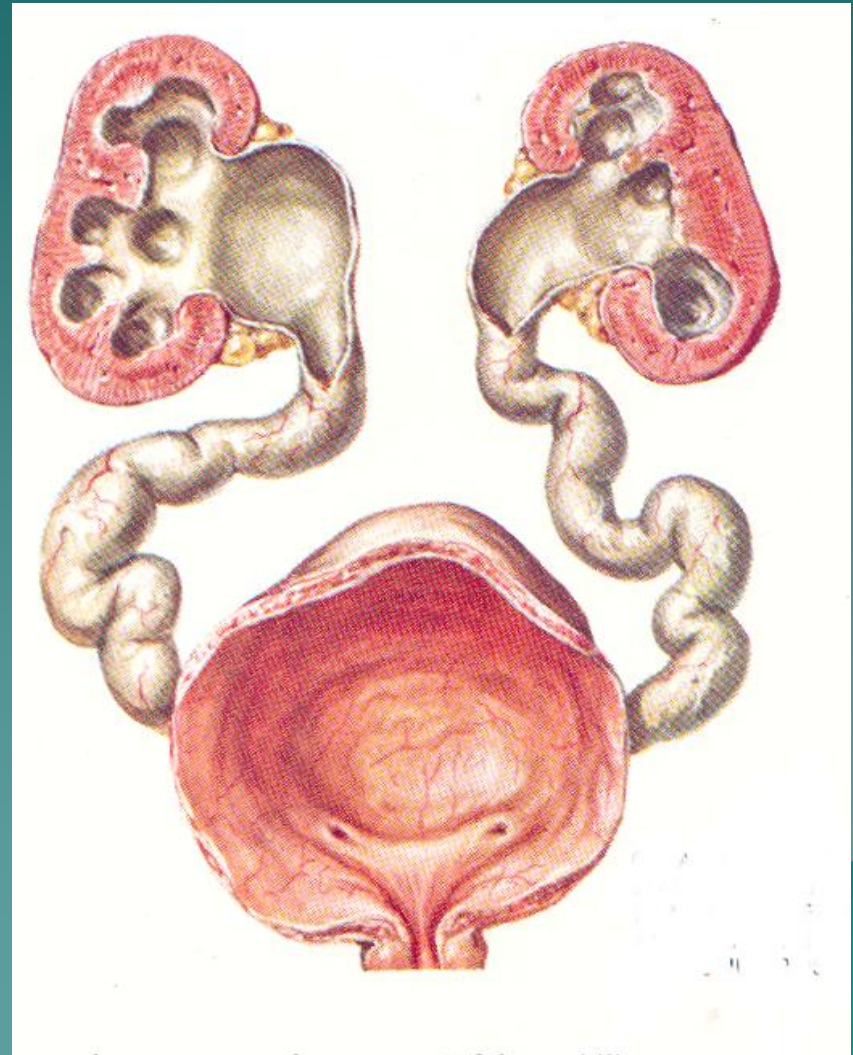
Stage of compensation



Upper Tract : Ureter Stage of Decompensation

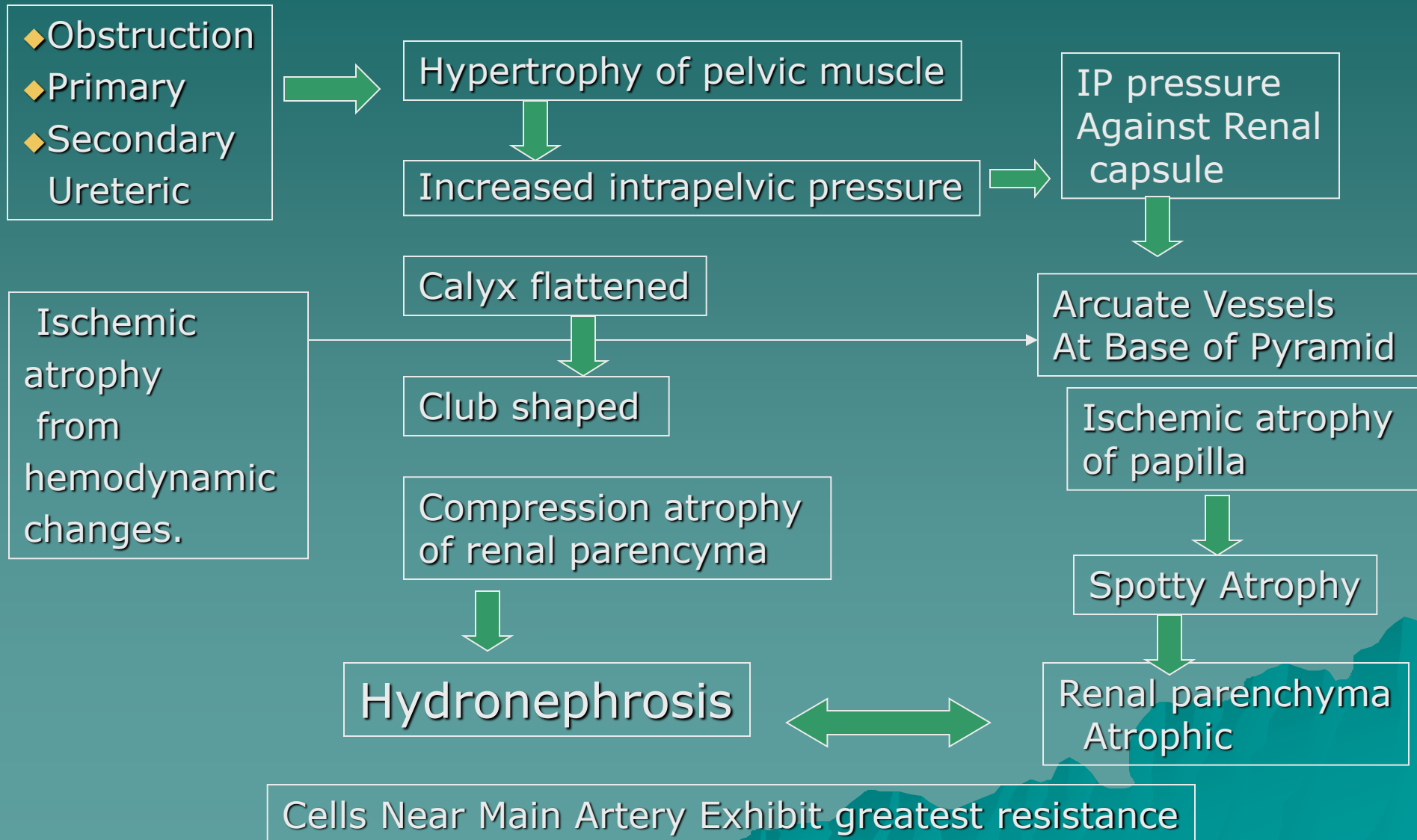
Attenuation of
ureteric wall
less contractile
power

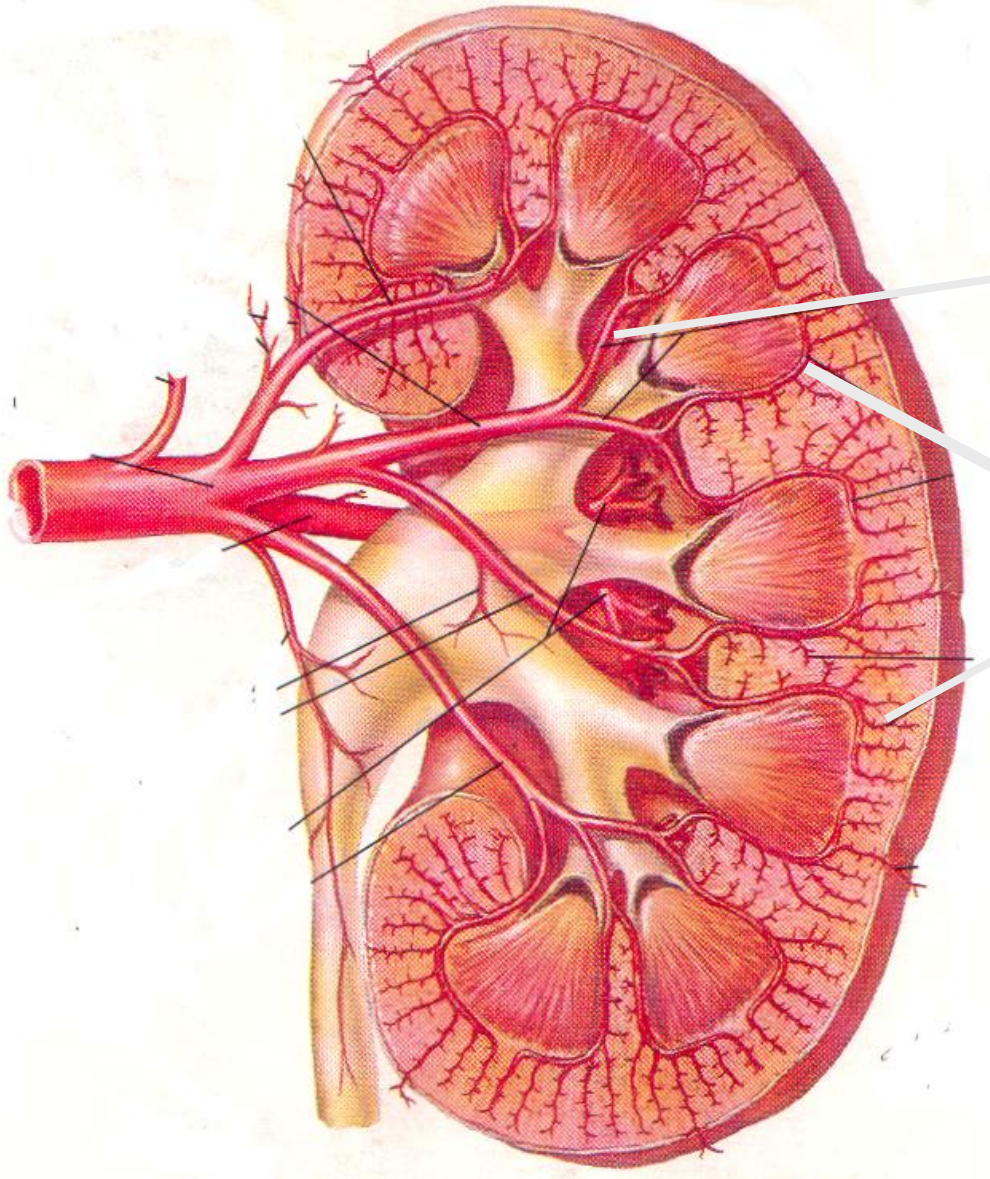
Dilatation of ureter
like bowel loop.



Upper tract : Renal pelvis calyces

A. Stage of compensation





- ◆ Anterior and Post Branch
- ◆ Interlobar artery
- ◆ Arcuate Artery
- ◆ Interlobular Artery

Direction of Raised Intra pevic pressure is parallel to all arteries except Arcutae artery where it is parpendicular

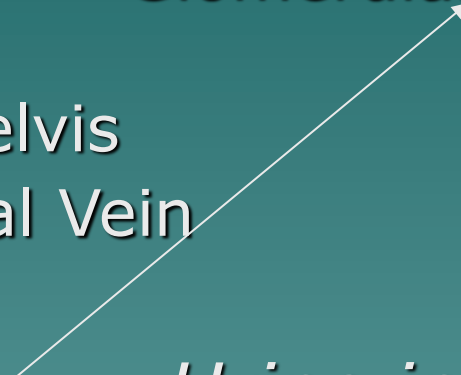
Factors affecting extent of Hydronephrosis

- * Site of Obstruction
 - * Degree of Obstruction
 - * Duration of Obstruction
 - * Pelvis extra or intra renal.
- 
- A stylized, dark teal silhouette of a mountain range is located in the bottom right corner of the slide, adding a decorative element to the background.

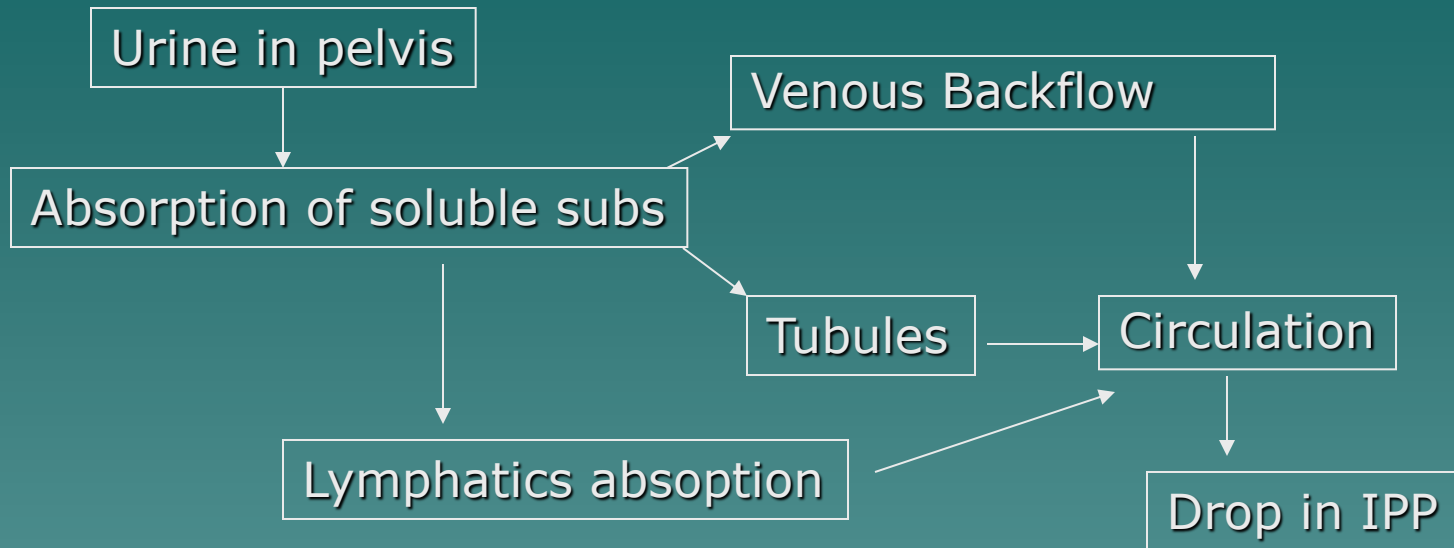
Recovery of Kidney _ Relief of Obst

1. Experimentally 4 wks.
Complete recovery
Human Irreversible damage: 7 days.
2. Unilateral hydronephrosis:
Opposite Renal function increases
Renal Counter Balance
Anatomical Repair
Kidney function fail to improve
3. Bilateral hydronephrosis:
Solitary Kidney “
Stimulus for Kidney is more
Recovery is remarkable

Events Occurred in Hydronephrotic Kidney

- 
1. Obstruction:
 2. Raised Intrapelvic Pressure
 3. Secretion as long as $\leftrightarrow$ Glomerular capillary pressure
 4. Dilatation of renal pelvis
 5. Compression of Renal Vein
 6. Renal Congestion
 7. Renal Hypertension
 8. Safety Mechanism
 - ◆ *Breaks at Weakest point*
 - ◆ *Surface lining of collecting system at Fornices*
 - ◆ *Seepage of urine*
 - ◆ *Intravasation in Parenchymal interstitium*
 - ◆ *Lymphatics absorption*
- Urine in pelvis
- 
- 

Hydronephrosis. Events cont.



Hydronephrotic fluid is not in true sense Urine only water + few salts

If More than GL. Filtration Pressure

Secretion

HYDRONEPHROTIC FLUID IS DYNAMIC

◆ PELVI URETERIS OBSTRUCTION

*Signs & Symptoms depend upon age:

1. Young Children <5 yrs: Asymptomatic
Renal Mass

2. Pre-adolescent:

- : Intermittant Abd. Pain

- Sometimes peri-umbilical

- : Acute Onset Hypertension

- : Gross Hematuria Initiating ? Trauma

- : Pyelonephritis

3. Older patients, Adolescent:

- Intermittant back or Flank Pain

- Hematuria (Gross or Micro)

- nausea and Vomiting.

Hydronephrosis

Pelvi-Ureteric obst. Cont.

- ◆ Symptoms of Stone: Renal Colic.
Gross Hematuria
- ◆ Symptoms of Infection:
 - Fever with Chills,
 - Cloudy Urine:
 - Burning Micturation.
- ◆ Symptoms of Renal Failure:
 - : Nausea, Vomiting
 - : Loss of Weight
 - : Loss of Strength
 - : Pallor.

Urinary Obstruction: Investigations:

- ❖ K.U.B.: Renal Shadow increased
 - ❖ Renal, Ureteric, bladder stone.
 - ❖ Calcific Bodies
 - ❖ Spine: Secondaries from Ca.Prost.
 - ❖ (# Spine, Osteoblastic shadow)
- ❖ Catheterization: Residual Urine, Bladder Neck/BBP

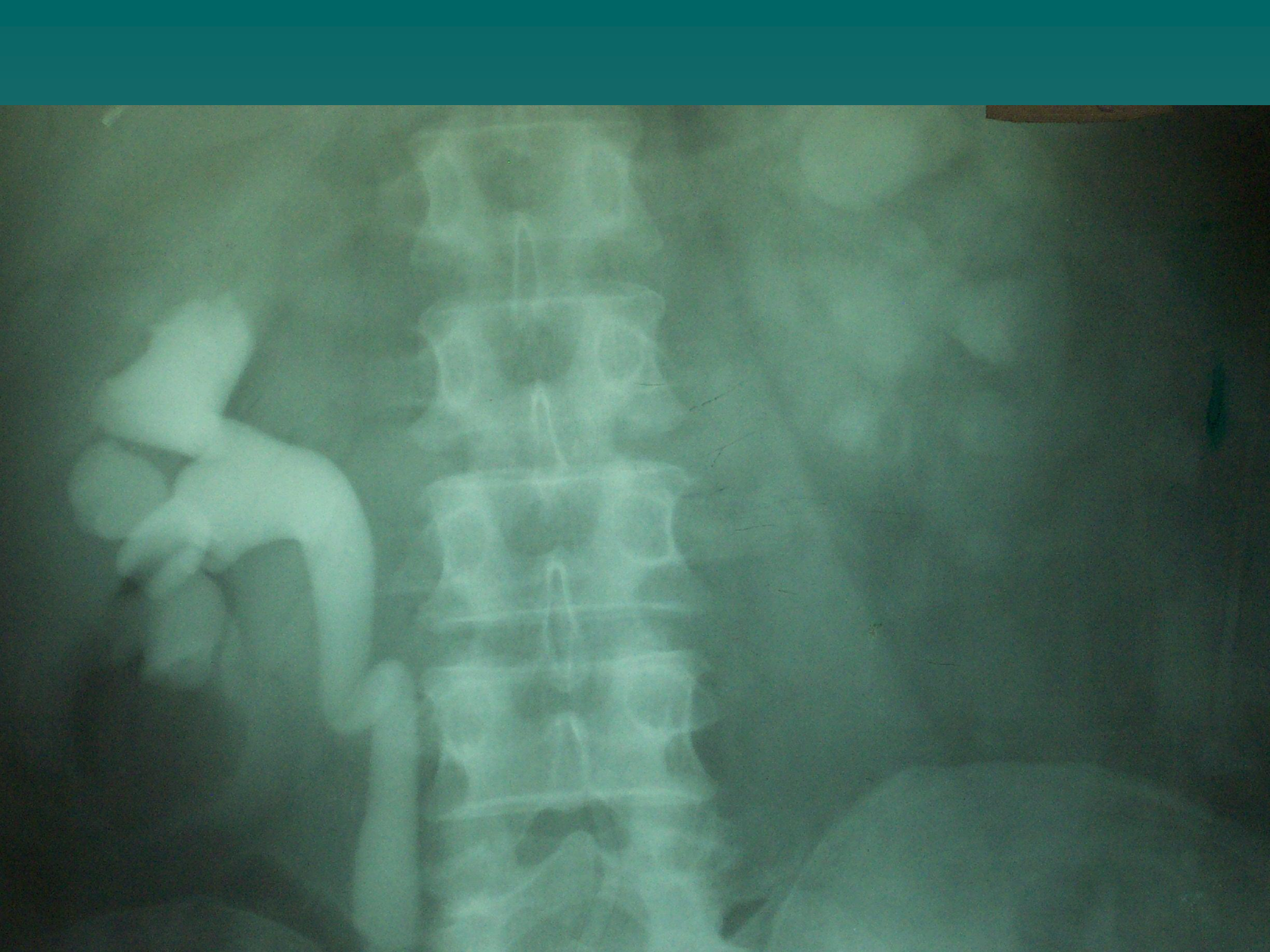
U.S.G.:

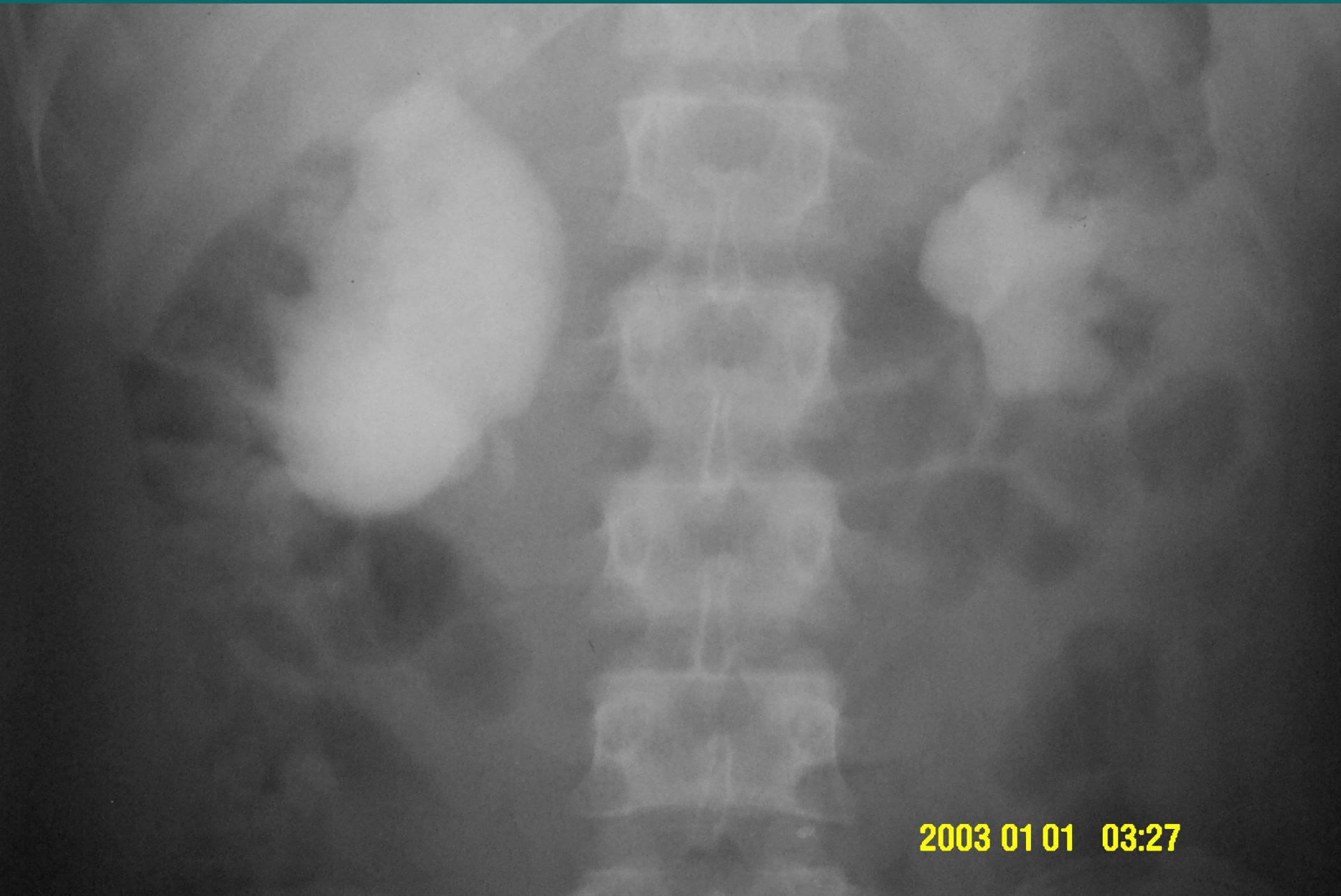
- ◆ Informative
- ◆ First investigation in All lumps
- ◆ Thickness of Renal parenchyma
- ◆ Degree of Dialation
- ◆ Independent of Renal Function
- ◆ PCN can be performed
- ◆ Renal size, stones
- ◆ Internal Echos from Pyonephrosis,
Tuberculosis
Ureter Dialation

Urinary Obst. Cont

Intra Venous Pyelography.::

- ◆ Changes proportion to Degree of Obstruction)
- ◆ Not useful if RFT increased
 1. Clubbing of calyces
 - Dilation of calyces, Pelvis, Ureter
 - Ureteric Stenosis Kinking Secondary, Primary.
 - Filling defect of Papillary Carcinoma
 - Extrinsic Pressure.
 - Ureter not seen in PU junction Obstruction
 2. Segmental Dilation V.U.R.
 3. Cystogram:
 - * Trabeculation, Diverticuli
 - * Filling defects due to Bladder Tumour
 - * BEP -ve shadow in bladder
 - * Residual Urine- Post voiding.





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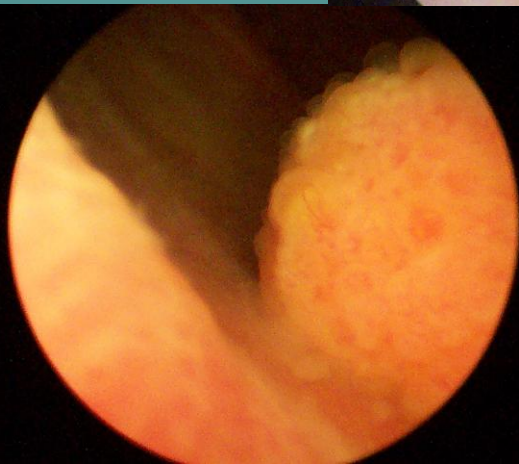
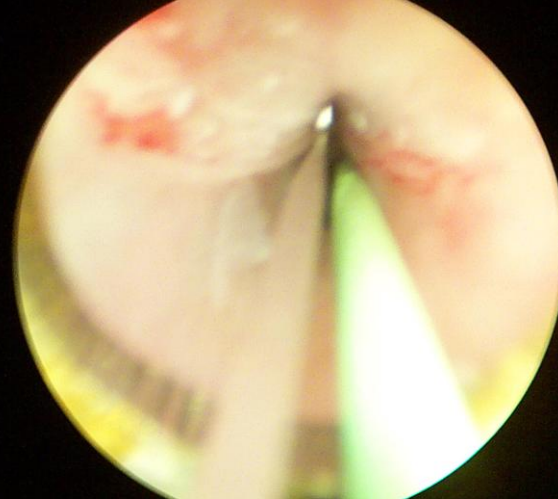


Urinary Obstruction; Invest. Cont.

- ◆ M.C.U.:
- ◆ RGU V.U.R. , Stricture Urethra
- ◆ Cystoscopy:
 - ❖ Stricture Urethra
 - ❖ Spasm of ext. sphincter
 - ❖ S/o outlet obstruction,
 - ❖ Diverticulum
 - ❖ Bladder Tumour
 - ❖ Valves
- ◆ R.G.U. Separate kidney function.
 - Ureteric stricture.
- ◆ R.G.P. ; Filling defect, stricture ureter



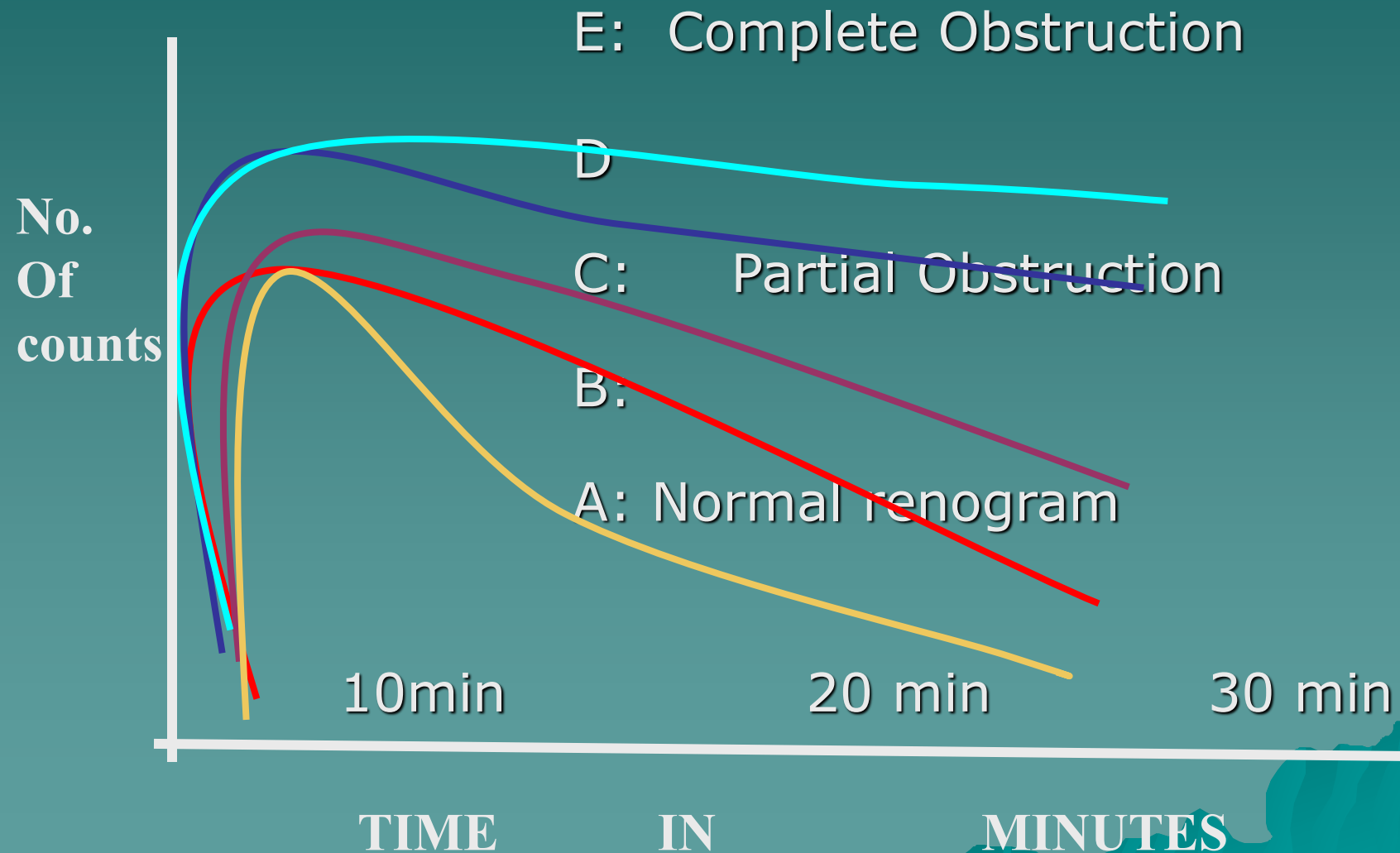
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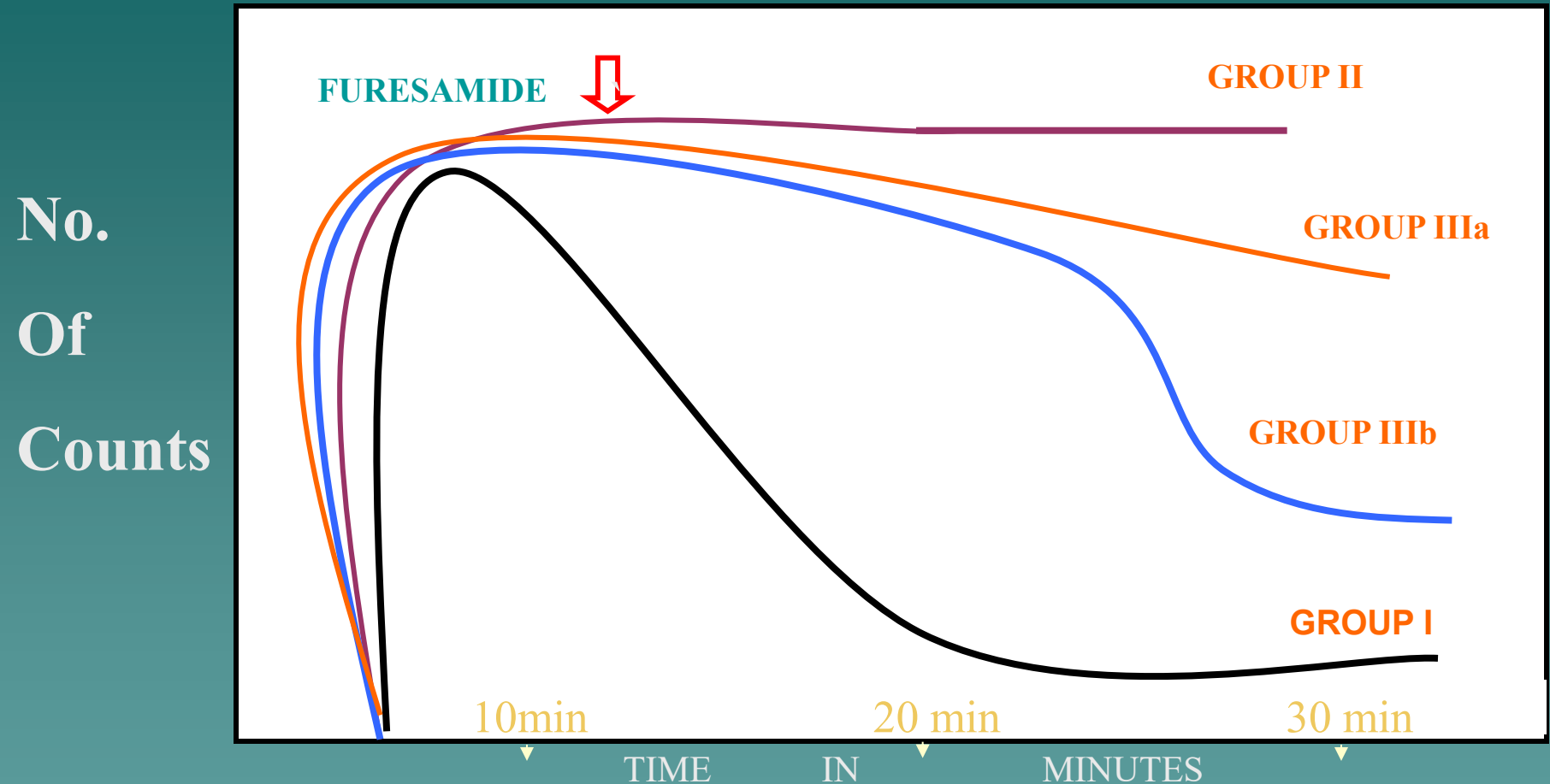
Urinary Obst. Invest. Cont.

- ◆ Isotope Scanning:
 - Vascular phase decrease
 - Secretory phase decreased
 - Excretory Phase inc
- ◆ Lasix Renogram:.. Dye in Renal Pas

DTPA Isotope Renogram



DTPA SCAN IN OBSTRUCTIVE UROPATHY



Group I Normal Renogram **Group II** genuine Obstruction
Group IIIa Dilated but nonobstructed System
Group IIIb sub total Obstruction or poorly functioning kidney

Urinary Obst. Invest. Cont.

- ◆ Whitakar Antegrade

- ◆ Perfusion Pressure

Patient under GA: Two needles in Kidney
One for pressure 2nd for perfusion with St.Saline.

Pressure <10cm H₂O Normal
>20cm obstruction

- ◆ Urodynamics; Degree of Atony of Bladder
Stage pof Decomensation
Neurogenic Bladder.

Management of Urinary Obstruction

- ◆ Phase of Compensation:

1. Relief of Obstruction

Various operations depending upon pathology

2. Eradication of Infection

Operative Procedures for PUJ Obstruction/Hydronephrosis

◆ Duplicated System

1. Uretero-Pyelostomy with/without dismembered pyeloplasty
2. Uretero-Ureterostomy
3. Pyelo-pyelostomy with/without dismembered pyeloplasty.

◆ Accessory Vessels

1. Anderson-Hynes Dismembered Pyeloplasty
2. Hellstorms Operation for Relocation

Operative Procedures ..cont.

◆ Retrocaval Ureter

Anderson-Hynes Dismem.Pyeloplasty

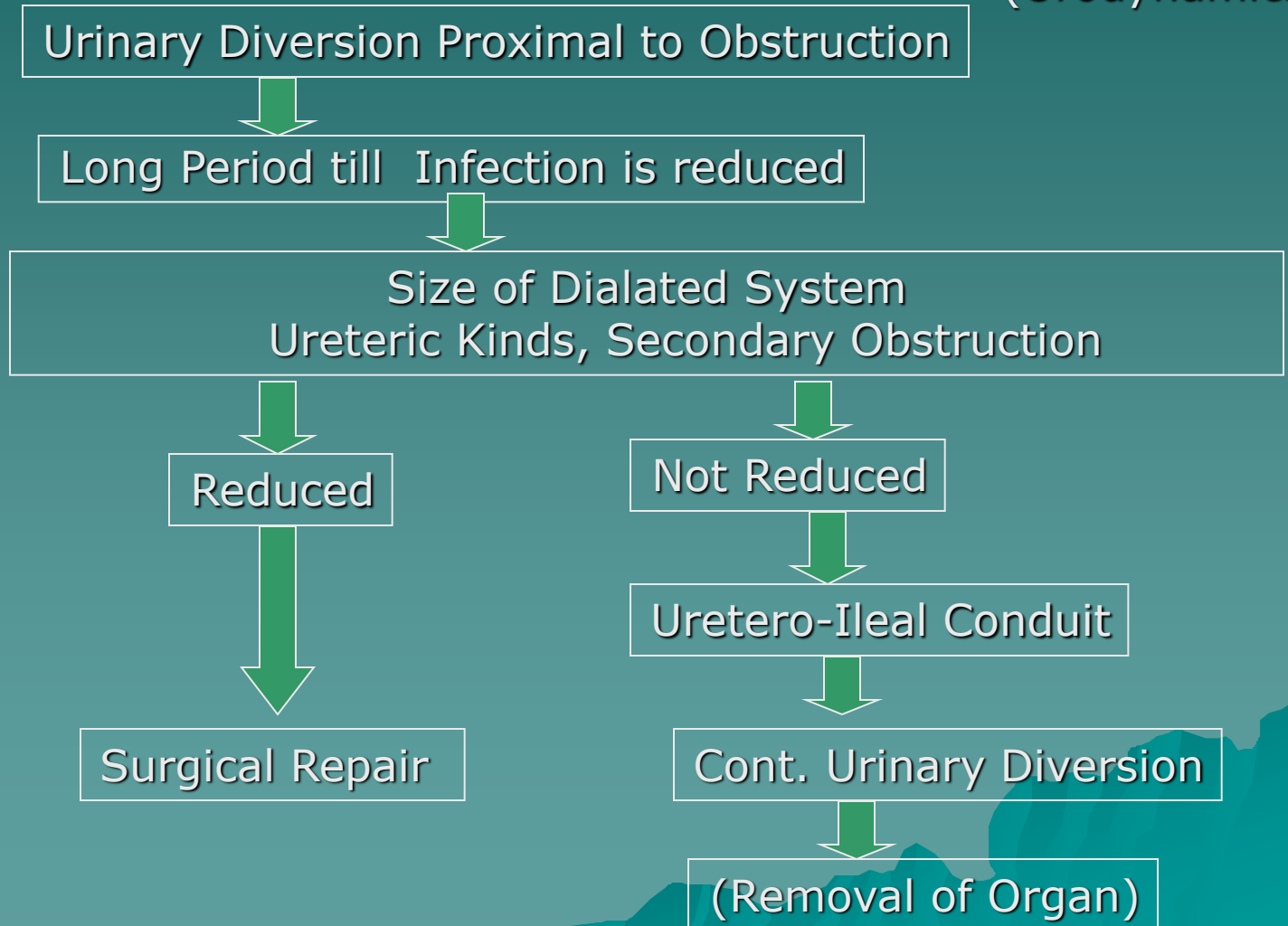
◆ Ureteric Obstruction

- ◆ Ureterocol : De roofing with smily S inc
- ◆ Ureterolithotomy, Uretero-Ureterostomy
- ◆ Ureterolysis R.P.F.
- ◆ Removal of Extrinsic Obstruction:
- ◆ Nephropexy : Nephroptosis
- ◆ Uretero-ureterostomy:
Kinks, Stricture Ureter
- ◆ Papillary Carcinoma: Partial Nephrectomy
Radical Nephrectomy



Management in Phase of Decompensation

(Urodynamics)



Hydronephrosis: Pyeloplasty

◆ Open Incisional Surgery

- ◆ Dismembered;
- ◆ Anderson-Hynes
 - For Retrocaval ureter, Inf Polar Vessel
- Large Redundant pelvis with lower P-U Junction

◆ Non dismembered

- ◆ Foley Y-V Plasty

◆ Augmentation Pyeloplasty:

- ◆ Culp-Deweerd Spiral Flap
- ◆ Scardino-Prince Vertical Flap

◆ Davis Intubated Ureterotomy

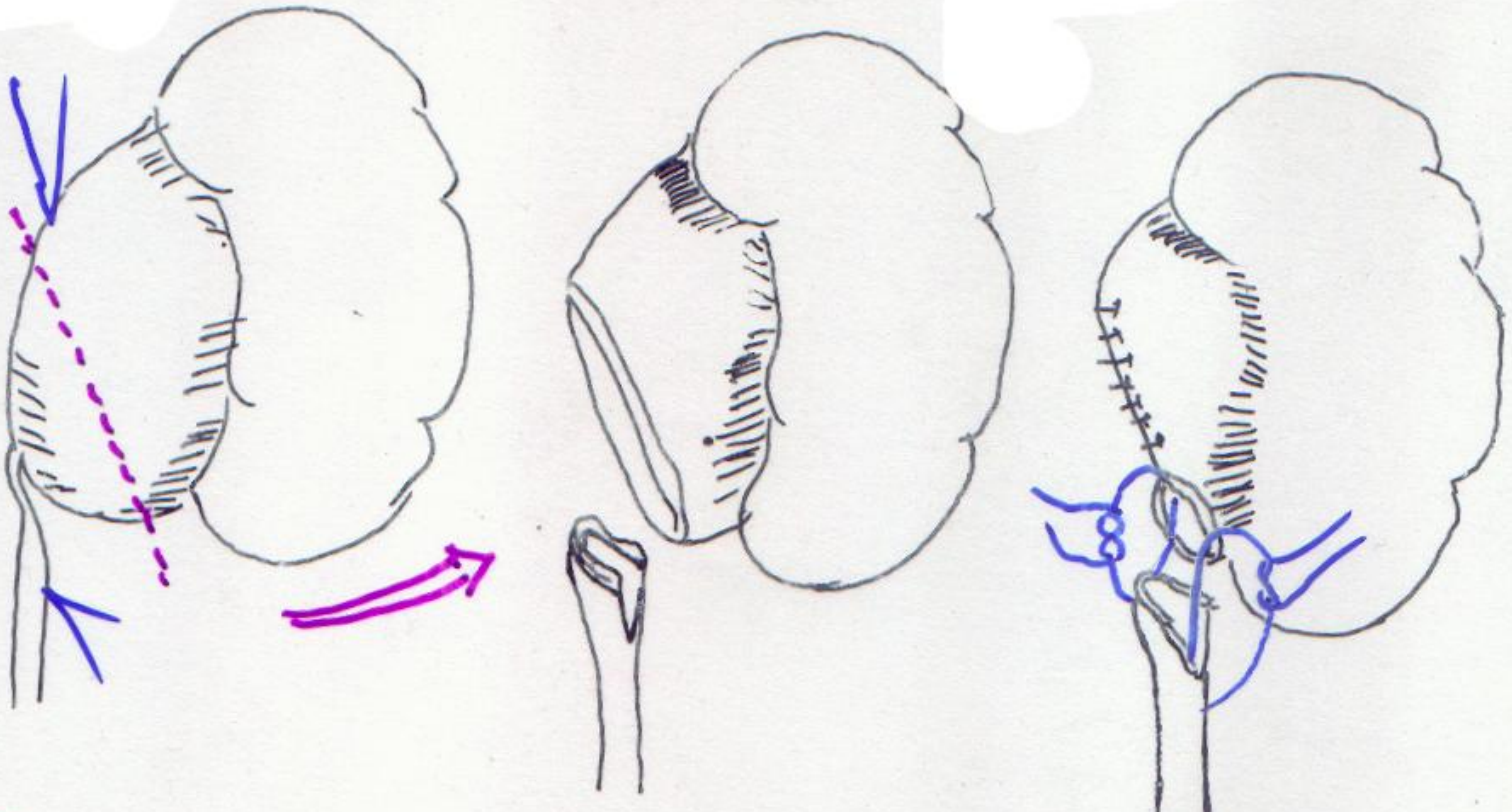
◆ Salvage Procedure:

- ◆ Renal Capsular Flap Technique
- ◆ Uretero-Calycostomy

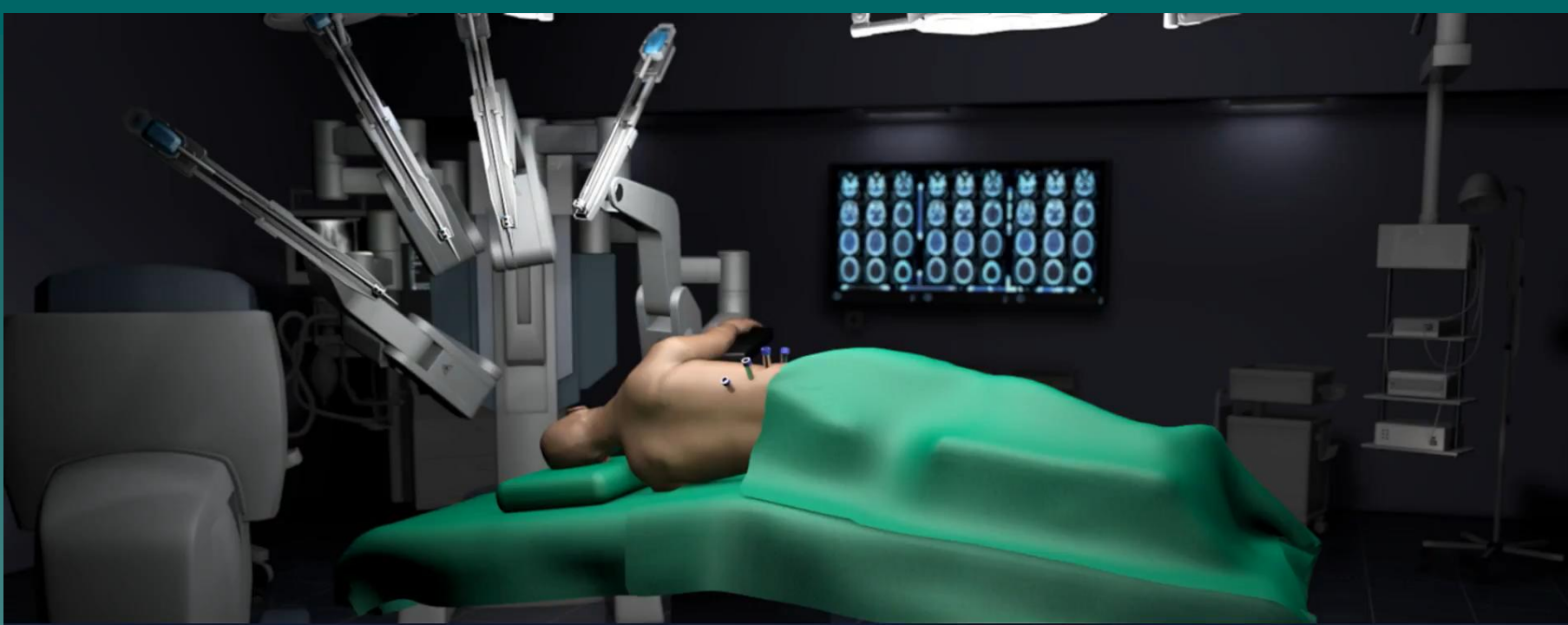
◆ ENDOSCOPIC PERCUTANEOUS PYELOPLASTY

- ◆ ENDOPYELOTOMY

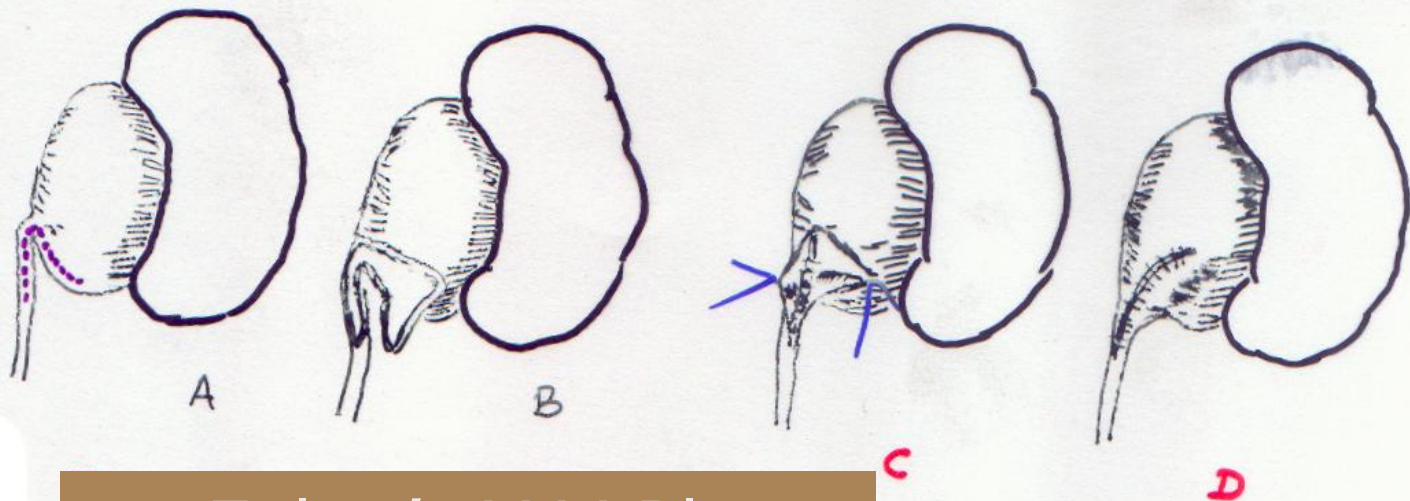
PYELOPLASTY



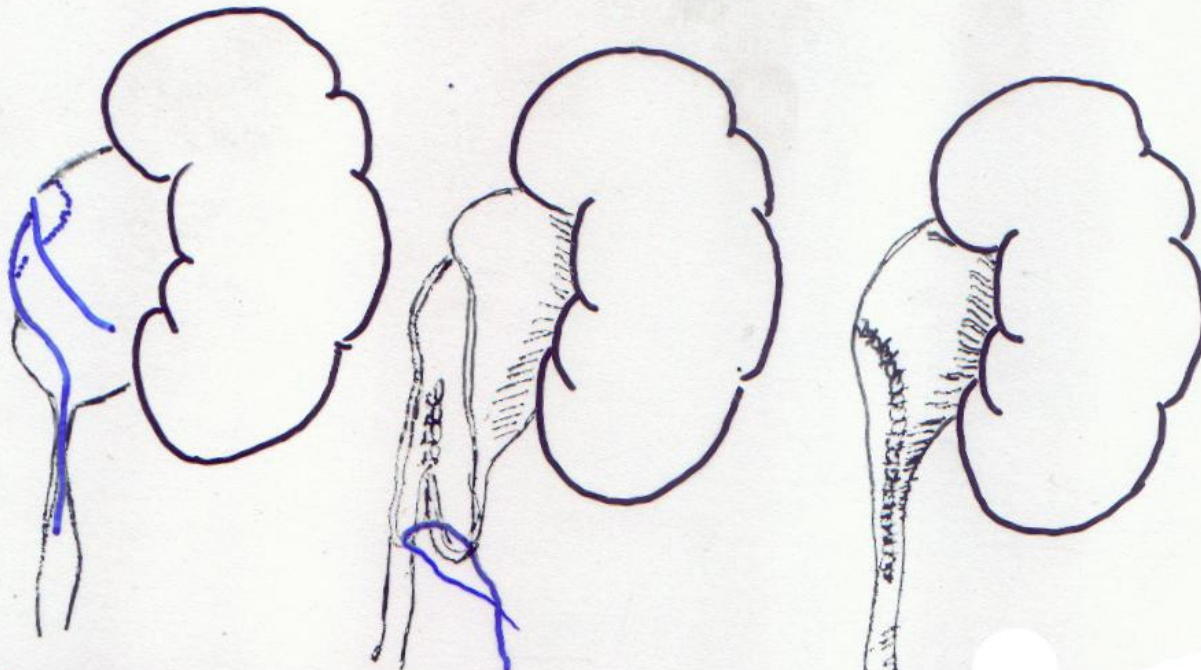
Anderson-Hynes Dismembered
Pyeloplasty



ROBOTIC ASSISTED PYELOPLASTY

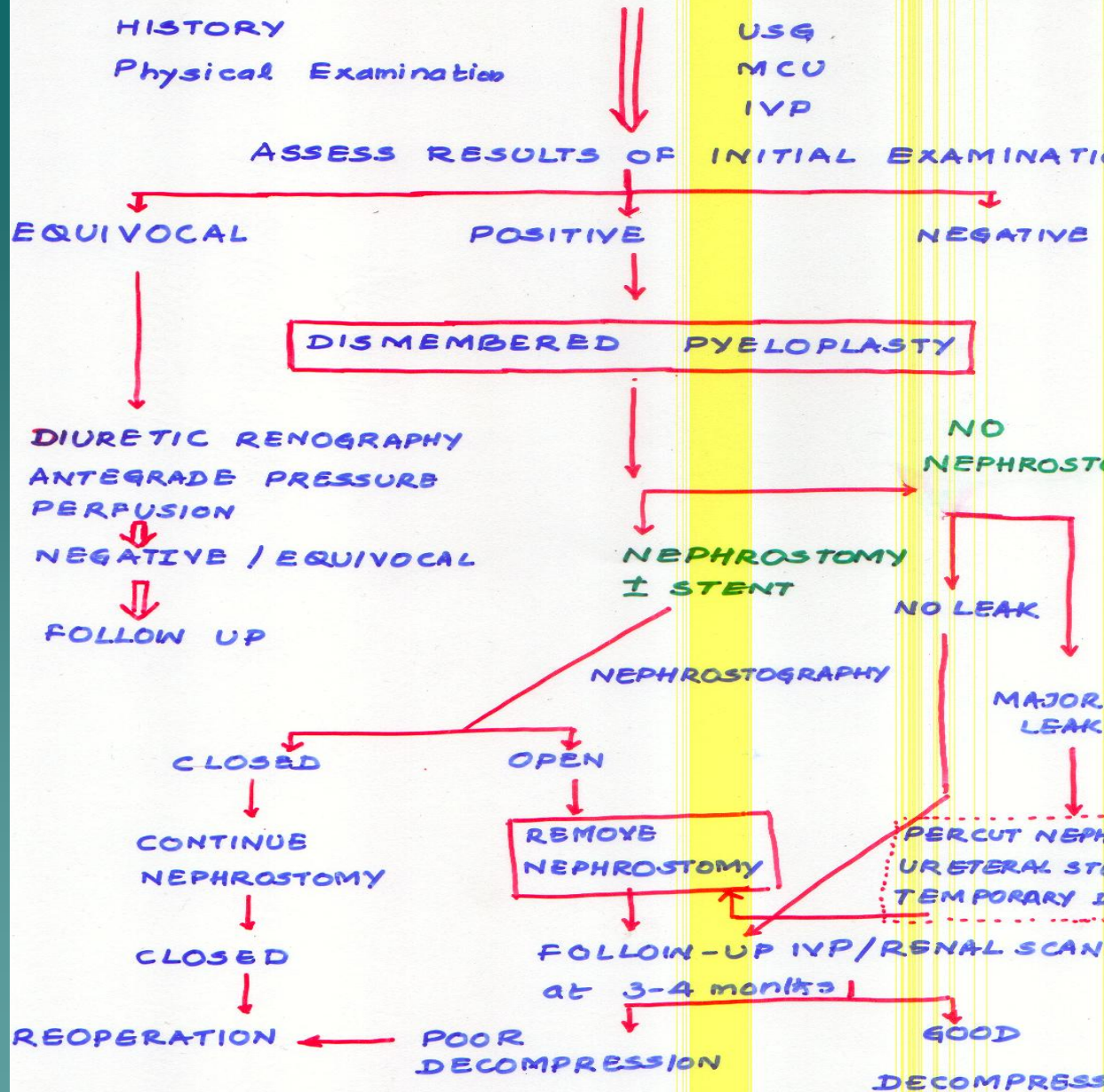


Foley's Y-V Plasty



Culp-Deweered Spiral Flap

URETERO PELVIC JUNCTION OBSTRUCTION



PELVIC URETERO JUNCTION OBSTRUCTION

History
IVP
MCU

Physical Examination
USG

Assess Results of Initial Examination

Negative

Equivocal

Positive

Dismembered Pyeloplasty

Diuretic Renography
Antegrade Pressure
Perfusion

Nephrostomy + Stent

No Nephrostomy

Nephrostogram

ve/Equivocal

No Leak

Major leak

Follow up

Closed

Open

Percut nephr
Ureteric Stent

Continue
Nephrosto
my

Remove
nephrostomy

Follow-up IVP/
Renal Scan at 3-4
months

Closed

Reoperation-

Poor Decompression

Good Decompression

Nephrostogram showing total block



Male child without Hydronephrosis

◆ History
Exam.

- Urinalysis

USG

Single System

Bilateral		Unilateral
Distended	Normal	VCU/IVP
Thickened		No reflux Reflux
	Extra U T I	Refluxing
IVP/VCU causes		Megauret
	Pelvic Mass	Diuretic Renography
Post urethral Valve	Obstruction	No Equivo
Prune Belly		Megaureter Antegrade
Ant.Urethral div	Ectopic uretheroceles	I
Urethral stricture	PUJ obstruction	whitaker
Neuropathic bladder	Ectopic ureter	

Duplicated system

	IVP/VCU	
P. U J	Ureterocele	Reflux
Obstruction		Upper pole Lower pole

**ENDOPYELO TOMY
FOR
URETEROPELVIC JUNCTION
OBSTRUCTION**

Ex: 01000

MEDVIEW IP-01000
M 30 30010
Ex: Dec 01 2000

Sta: 4
Volume Rendering No cut
DFC/V28.8cm
SOFT/HSE/AR40

R
1
0
7

L
1
5
0

No VOI
kV 120
mA 100
F02 0.30s/HSE+ 30.4mm/rot
0.3mm 0.30s: 70.32sp
Tilt 0.0
10:03:44 AM
W = 432 L = 381

1443

AETIOLOGY

EXTRINSIC : 1/3 CASES

LOWER POLAR RENAL ARTERY

INTRINSIC: DISEASED UPJ AREA

- PRESENCE OF DYSFUNCTIONAL MUSCLE CELLS
- SECONDARY TO EXCESSIVE INTERCELLULAR DEPOSIT'S OF COLLAGEN ,

:

ENDOPYLOTOMY
MODERN METHOD: WICKHAM AND MILLER

**THROUGH NEPROSTOMY TRACT USE SACH'S
URETHROTOME**

**INCISE PERCUTANEOUSLY AN OBSTUCTED UPJ
FROM INSIDE OUT VIA 1 CM FLANK INCISION.**

LESS FAVORABLE IND

- CHRONIC MASSIVE HYDRONEPHROSIS**
- POOR RENAL FUNCTION**

TEHNIQUE 1

**PASS RETROGRADE 0.035" FLOPY TIP
OR TERIMO GUIDE WIRE**

**PERCUTANEOUS NEPHROSTOMY INTO
UPPER OR MIDDLE , POSTERIOR CALYX**

DILATE NEPHROSTOMY TRACT

TEHNIQUE ***

- PLACE 30 FR. AMPLATZ SHEATH
- SECOND GUIDE THRO.
- URETERO-PELVIC JUNCTION
- DIRECT INCISION ON UPJ
BETWEEN TWO GUIDE WIRE USING
SACHSE'S URETHROTOME
OR PYELOTOME

TEHNIQUE ****

**FULL THICKNESS INCISION OVER UPJ
UNTILL RETROPERITONIAL FAT IS SEEN**

**INCISION TAKEN OVER POSTERO-LATERAL
BORDER OF UPJ**

**EXTEND 1CM BEYOND
PUJ OBSTERUCTION**

RETROGRADE ENDOPYELOTOMY

RIGID OR FLEXIBLE URETROSCOPE USED

Transurethral Approach

Not Always Successful

THE CUTTING MODELITIES USED

- **ELECTRO-CAUTERY**
- **Nd:Yag LASER**
- **KTP LASER**
- **COLD KNIFE**

COMPLICATION

- **HAEMORRAGE**
- **URETRAL AVULSION**
- **URINOMA**
- **UTI**

A photograph of Machhapuchhare (Mount Fishtail) in the Nepal Himalaya. The mountain is covered in snow and partially obscured by clouds. The image is framed by dark, silhouetted tree branches in the foreground. A large, white, serif text overlay reads "Thank you".

Thank you

Machhapuchhare (Mount Fishtail), Nepal Himalaya