Challenges in Paediatric Nephrology

Chaw Su Khine

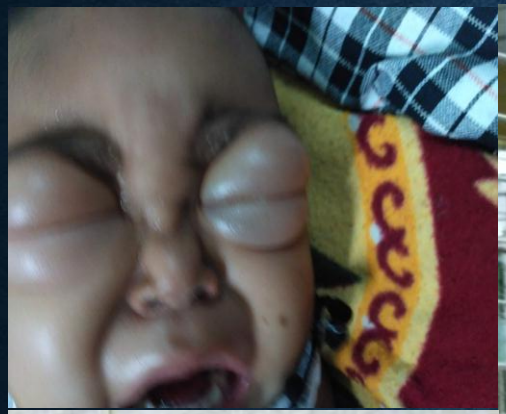
Paediatric Nephrology Unit

Mandalay

HISTORICAL PERSPECTIVES

- 1902: First experimental kidney transplantation by Emerich Ullmann
- 1933: First human kidney transplant by Voronoy
- 1950-53: First functioning human kidney transplant (2 centers)
- 1961: Azathioprine first used successfully
- 1962: First use of tissue matching to select a donor
- 1963: Prednisolone and Azathioprine combination produced longer graft survival
- 1972: Successful transplantation into a 9 month-old girl
- 1978: First clinical use of cyclosporine A

PAEDIATRIC NEPHROLOGY UNIT



FIRST PAEDIATRIC NEPHROLOGY UNIT YANGON CHILDREN'S HOSPITAL

established in 2006

Peritoneal Dialysis (2006) at Yangon Children Hospital

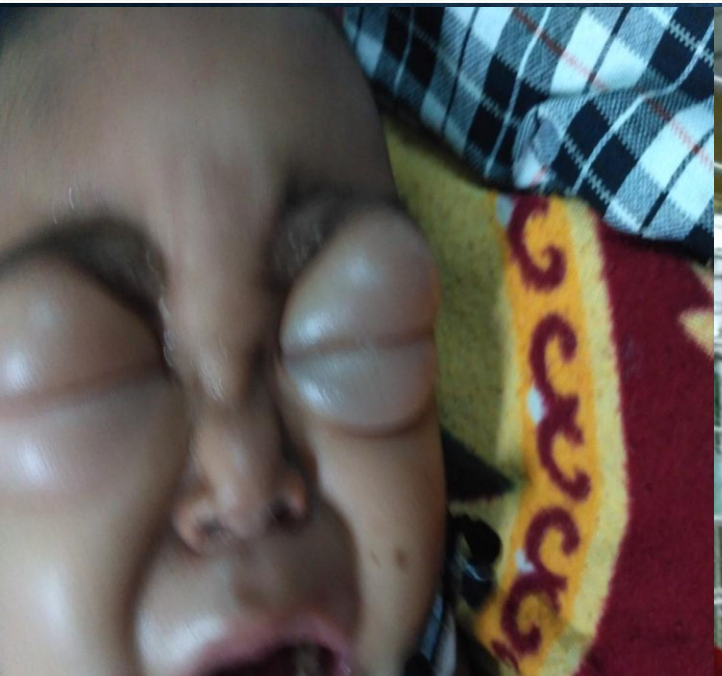
HEMODIALYSIS UNIT YCH

SPECTRUM OF RENAL DISEASES IN CHILDREN

- **Glomerulonephritis**
  - Nephrotic syndrome
  - Acute nephritic syndrome
  - RPGN
  - Chronic nephritis
  - Asymptomatic Hematuria Proteinuria
- **Tubulointerstitial Diseases**
  - Tubular dysfunction syndromes
- **Structural Renal Diseases**
  - Antenatal detection
  - Urinary tract infections
  - Voiding dysfunction
  - Abdominal mass

NEPHROTIC SYNDROME IN CHILDREN

Total admission in 2016 (MCH)	198	
Steroid sensitive nephrotic syndrome	112	56.5%
Steroid dependent nephrotic syndrome	39	19.69%
Steroid resistance nephrotic syndrome	47	23.7%



PRIMARY NEPHROTIC SYNDROME IN CHILDHOOD

HISTOLOGY	ISKDC	ADULTS
1. MINIMAL CHANGE	76%	23%
2. MPGN	8%	7%
3. FSGS	7%	12%
4. DPGN	2%	
5. MES PROLIF GN	2%	27%
6. FOCAL GLOBAL GS	2%	
7. MEMBRANOUS GN	2%	28%
8. CHRONIC GN	1%	3%

USEFUL DEFINITION

- Remission----- loss of oedema /urine protein creatinine ratio <0.02 g/mmol or total urine protein excretion <4 mg/m2/hr urine dipstick neg or trace for 3 consecutive days
- Steroid Responsive----remission achieved steroid therapy alone
- Relapse----UPCR >0.2 g/mmol or urine dipstick >=2+ for 3 consecutive days and or generalized oedema and hypoalbuminemia with previously remission
- Infrequent Relapse--- relapse after first episode <2 episodes within 6 months or <4 episodes within 12months
- Frequent Relapse-----relapse after first episode >=2 episodes within 6 months or >=4 episodes within 12months
- Steroid Dependent ---frequent relapse with 2 consecutive relapses while on steroid therapy or within 2 weeks cessation of steroid
- Steroid Resistance-----failure to achieve remission despite 6-8 week of daily high dose prednisolone therapy

THERAPY FOR SSNS AT PRESENTATION & INFREQUENT RELAPSES

At first presentation-

- **Prednisone 60 mg/m2/day x 4 wks**
  Followed by 40 mg/m2 / EOD x4 weeks and gradual taper x 4-8 wks
  Single morning dose

Relapses –

- **Prednisolone 60 mg/m2/day for minimum 14 days or proteinuria free for 3 days**

Followed by 40 mg / m2 /EOD x 4 weeks and taper x 12 weeks

Frequent Relapse

After the treatment of relapse, on maintainance therapy with alternate day prednisolone 0.1-0.5 mg/m2 EOD 3-6 month

Steroid Dependent

Maintainance therapy with prednisolone 0.1-0.6 mg/m2 EOD 9-12 month

1.

PREDICTORS OF MINIMAL CHANGE DISEASE

- Age of onset: 1-10 years
- No hypertension
- No gross hematuria
- Normal renal function
- Normal serum complement
- Highly selective proteinuria
- Steroid-responsive

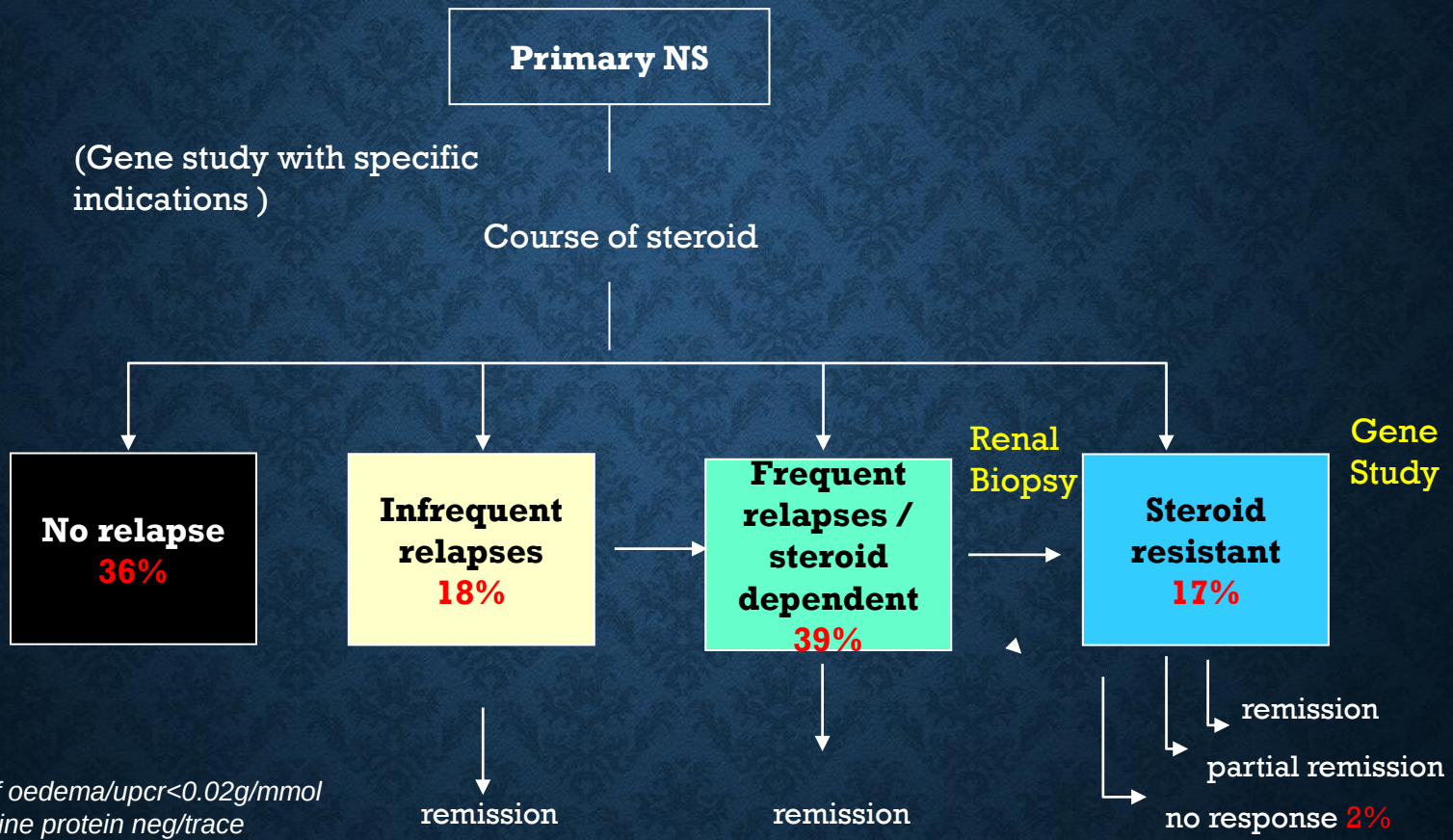
LONG-TERM OUTCOME OF STEROID-RESPONSIVE NEPHROTIC SYNDROME

- Long-term outcome for children is excellent:

  Mortality 1%-<5% *(ISKDC 2002)*

- Mortality due mainly to sepsis and thrombosis rather than renal failure

CLINICAL COURSE OF NS IN CHILDREN



Remission loss of oedema/upcr<0.02g/mmol urine protein neg/trace

Relapse upcr >0.02 orurine dipstick >= 2+ for 3 days and or generalized oedema

**FR:* ≥ 3 relapses/yr (2 in 6 months)

SD: relapse on tapering steriod or off steroid within 2 wks on 2 occasions

COMPLICATIONS OF NEPHROTIC SYNDROMES

Relapses

Relapse

Anarsarca

Hypovolemia

Thrombo-embolism

Infections

Acute renal failure

Steroid

-Cushingnoid

-Hypertension

-Osteoporosis

-Hirsutism

-Prone to infections

-Subcapsular cataract

-Growth retardation-

Long term complications

:

- Chronic renal failure,
- Hypertension,
- Cardiovascular diseases
- Growth retardation

APPROACH TO STEROID DEPENDENT NEPHROTIC SYNDROME

- Frequent relapsers with 2 consecutive relapses while on steroid therapy or within 2 weeks of cessation of steroid
- **Maintainance therapy with prednisolone 0.1-0.6 mg/m2 EOD 9-12 month**
- with unacceptable side effect

INDICATIONS FOR SECOND LINE TREATMENT IN STEROID-DEPENDENT NEPHROTIC SYNDROME

- Severe growth retardation
- Clinically significant cataracts
- Difficult hypertension
- Diabetes mellitus
- Disabling emotional disorders related to the cosmetic appearance

PERSISTENT PROTEINURIA & RENAL FAILURE

- Goal of immunosuppressant therapy is to induce & maintain remission to reduce proteinuria

- decrease risk of complications of nephrosis and preserve renal function

Persistent proteinuria

- related to lower long term renal survival
- For steroid resistance FSGS, 50% ends in renal failure in ~10 yrs

STEROID SPARING AGENTS

To avoid steroid toxicity/significant side effects:

- Levamisole
- Cyclophosphamide
- Chlorambucil
- Mycophenolate (MMF)
- Cyclosporin A
- Tacrolimus
- Rituximab

ADJUNCTIVE THERAPY

Anti-proteinuric agents:

- Improved kidney survival in NS shown in those >50% proteinuria. (large adults studies)
- Several studies in children showed the use of ACEI or ARB also showed reduction in proteinuria in SRNS Ⅰ
- Their use in partial or refractory NS (incl. genetic causes) is recommended

ACEI & ARB

- ***ACEI:***

  ramipril 0.05 mg/kg/d up to 10 mg/d

  enalapril 0.08 mg/kg/d up to 5 mg/d

- ***ARB:***

  losartan 0.7 mg/kg/d up to 50 mg/d

  valsartan 0.8 – 3 mg/kg/d

Withheld when Cr ↑30% baseline; or hyperkalemia not controlled.

DRUG SIDE-EFFECTS

Steroid
-Cushingnoid
-Hypertension
-Osteoporosis
-Hirsutism
-Prone to infections
-Subcapsular cataract
-Growth retardation-

Levamisole
- neutropenia
-G-I upset
- rash

Alkylating Agents
- neutropenia
- infections
- alopecia
- h'agic cystitis
- ?malignacy
- gondal toxicity

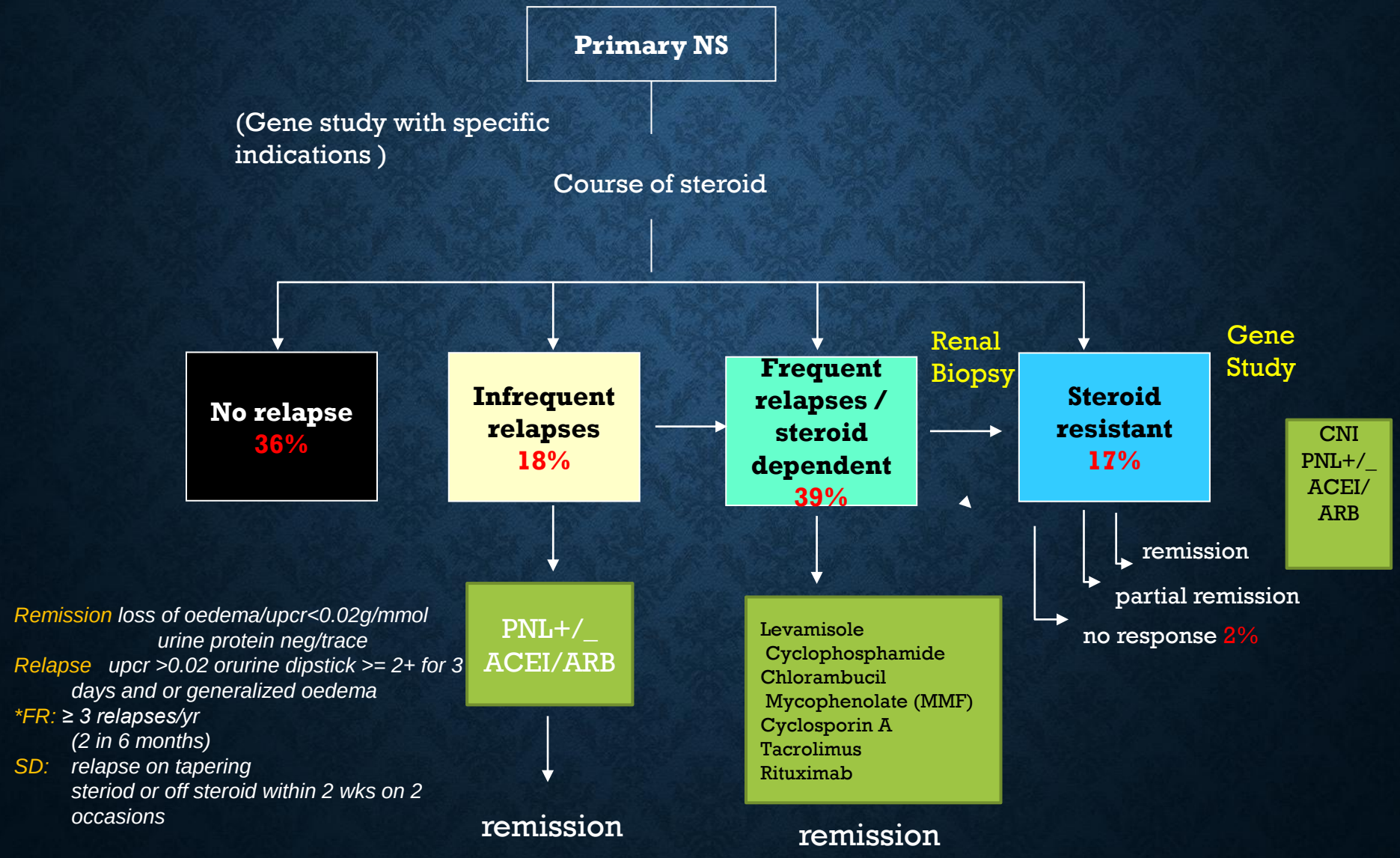
CsA
-Nephrotic
-Gum hypertertrophy
-Hirsutism
-hypertension
-hyperkalaemia
-hypomagnesaemia

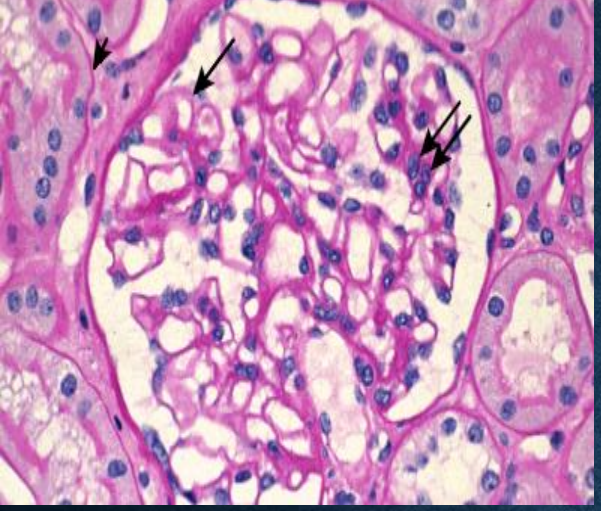
MMF
- marrow suppression
-G-I upset, h'age

Rituximab
- leucopenia,
-hypogammoglobulinaemia
- infection
- angio-oedema rash
- fever
-

Tacrolimus
- nephrotoxic
- hyperglycaemia
- hand tremor

CLINICAL COURSE OF NS IN CHILDREN

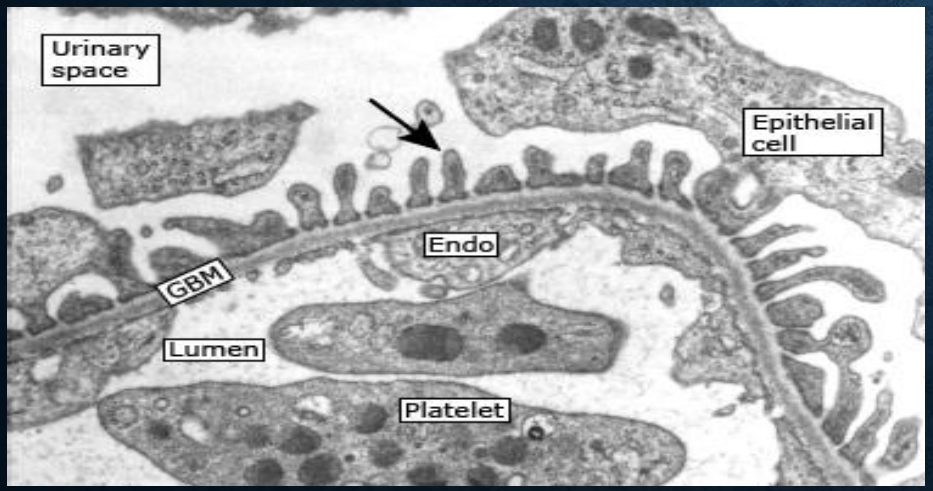




RENAL BIOPSY AND GENETIC STUDY

Renal biopsy

Electronmicroscopy and Immunoflorescent examination are currently unavailable at local centre



- whyudy genetic study need
- Most genetic causes of SRNS have histological features that are not distinguishable from nongenetic disease,. As a result, **a renal biopsy** will generally not distinguish between genetic and nongenetic forms of SRNS.

GENETIC STUDY IN NEPHROTIC SYNDROME

- Congenital and infantile nephrotic syndrome

(WT1 gene, NPHS1, NPHS2,LAMB2,PLCE1)

- Childhood onset SRNS or SDNS

(WT1 gene, NPHS1, NPHS2)

- Adult onset FSGS

(NPHS2,TRPC6,ACTN4,CD2AP,MYH9,INF2)

TREATMENT - SRNS

Genetic Diseases

- No steroid / immuno-suppressants
- *Some WT1 mututions may respond to CsA & slows progression to ESRD*
- ACEI & AR
- Supportive therapy

Non-Genetic Diseases

- MCD / FSGS

  -CsA and prednisone; and if there is response, taper prednisone, and reduce CsA after 6 mons and maintain for at least 12 mon.

  - ACEI & ARB to be added if partial / non-responsive
  - beware of nephrotoxicity together with CsA)
  - No Alkylating agents,
  - MMF may be considered to be added
  - Rituximab usually not recommended

LONG TERM OUTCOME OF STEROID-RESISTANT IDIOPATHIC NEPHROTIC SYNDROME IN CHILDREN

- Findings suggest that responsiveness to initial immunosuppresant and detection of a hereditary podocytopathy are prognostic indicators of favorable and poor long-term outcome, respectively, in children with steroid-resistant nephrotic syndrome.

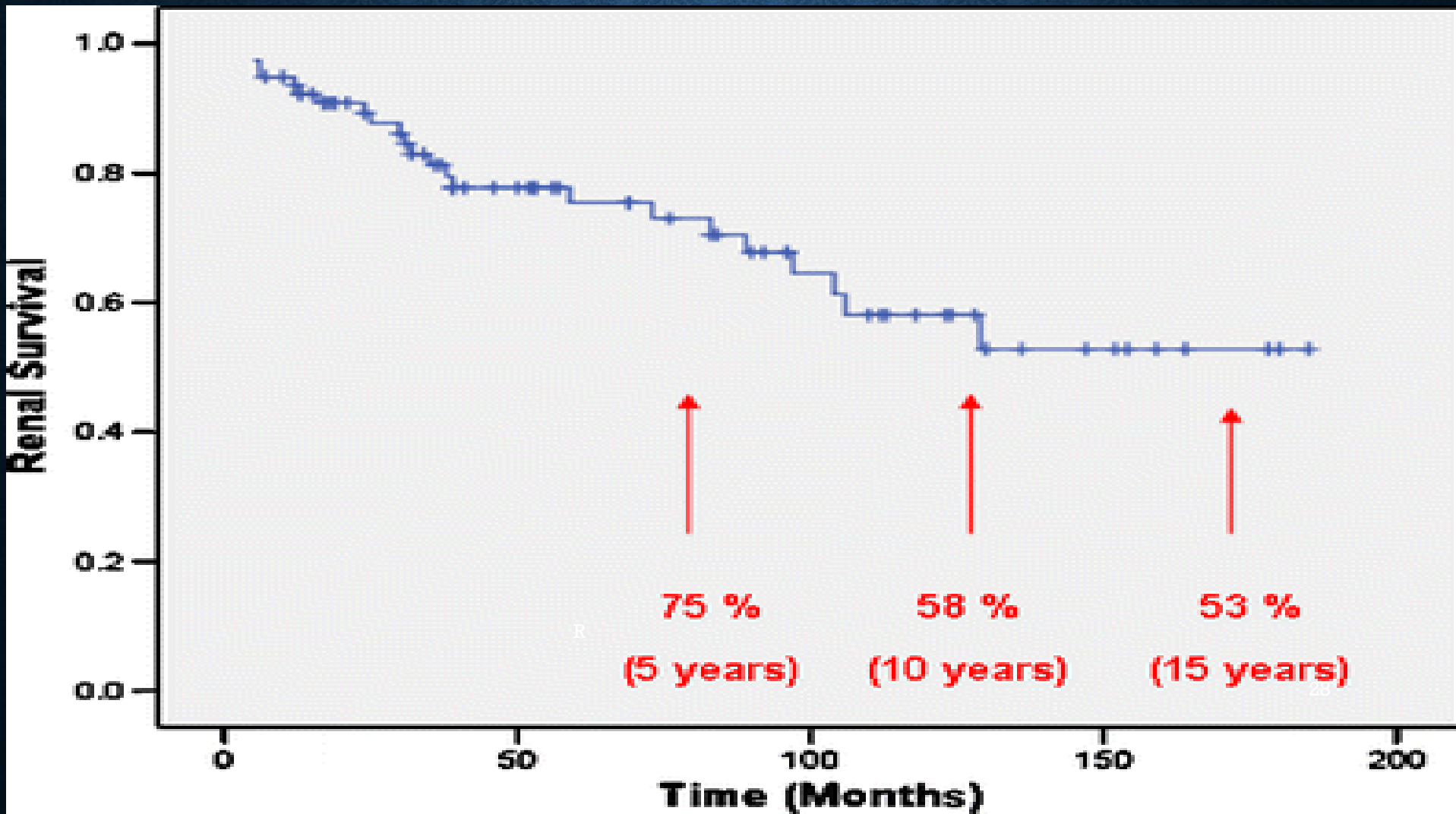
- Children with multidrug-resistant sporadic disease show better renal survival than those with genetic disease.

- Furthermore, histopathologic findings may retain prognostic relevance when a genetic diagnosis is established.

IMMUNOSUPPRESSIVE THERAPY – SRNS

- OVERALL EFFICACY for Genetic Causes
  - Generally not useful in SRNS with genetic causes
  - In 43 genetic causes, only 2 had partial remission in contrast with the 2/3 of 31 non-genetic cases;
  - None of 29 NPHS2 mutation has complete remission
  - Heterozygotic carriers of NPHS1 or NPHS2 mutation may be more likely to respond than homozygous

Long Term Prognosis of Steroid Resistant Primary NS in children: Multi-centers Study

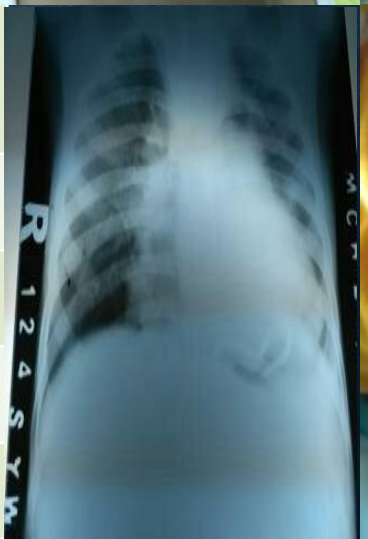


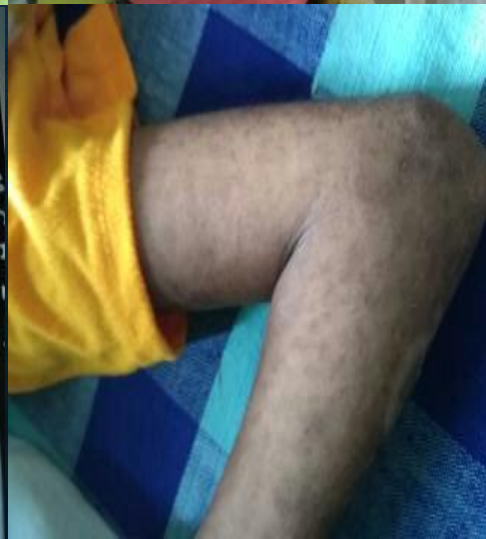
CAUSES OF ESRD IN CHILDREN

Cause	%
Glomerulonephritis	31.3
Chronic atrophic pyelonephritis and urological malformation	22.5
Renal hypoplasia	12.1
Hereditary disease	16.2
Systemic disease	7.0
Vascular disease	1.5
Others	5.7
Unknown	3.7

ACUTE NEPHRITIS SYNDROME IN CHILDREN

Diagnosis	No
Acute Glomerulonephritis due to infectious cause	45
Systemic Lupus Erythromatosus with Lupus Nephritis	89
ANCA positive renal specific vasculitis	7
Henoch Schonlein Papura	19
Ig A Nephropathy	2
Systemic JIA	1
Alport syndrome	2





CHILD WITH GLOMERULONEPHRITIS

Primary Glomerular Disease

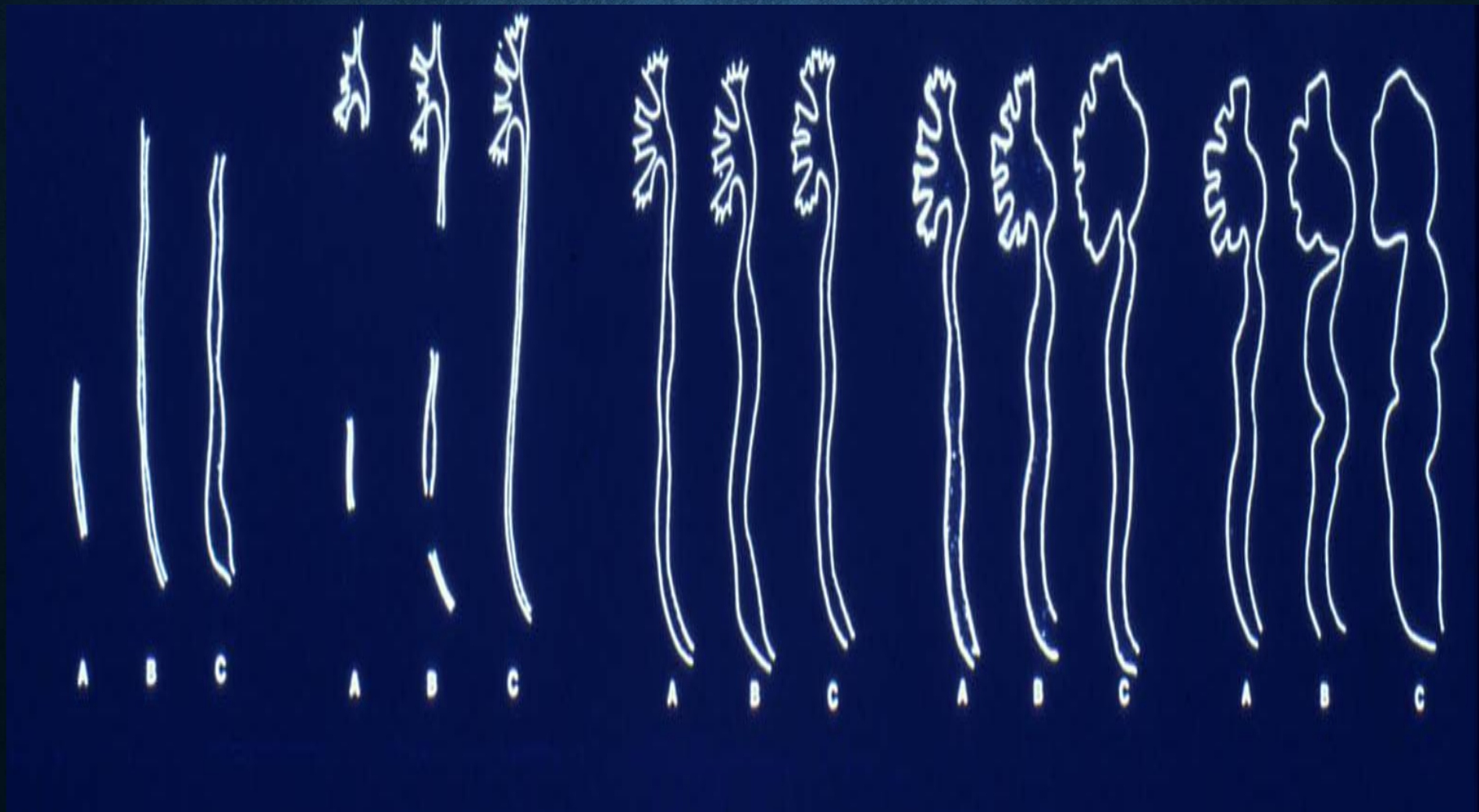
Secondary Glomerular Disease

- Infections
- Drugs
- Autoimmune disease
- Hereditary nephritis
- Metabolic disease
- Vascular disease

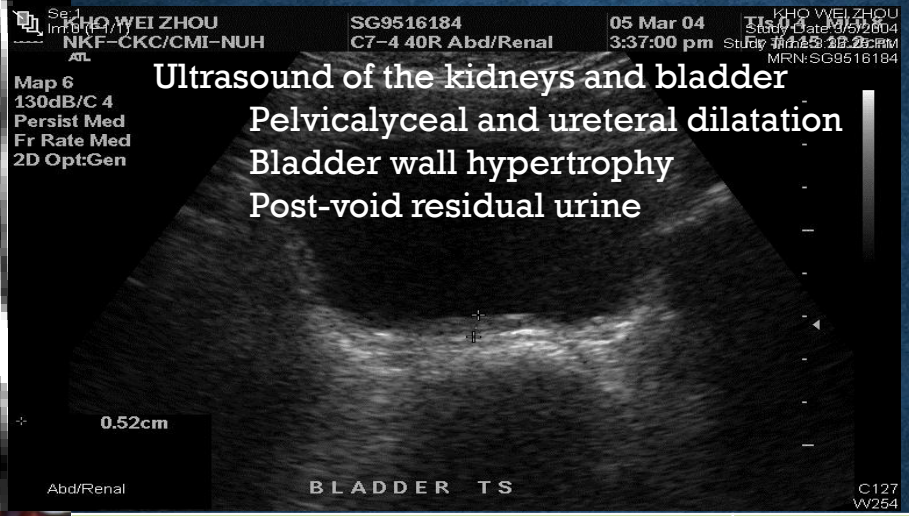
MANY ETIOLOGIC AGENTS HAVE BEEN IMPLICATED IN ACUTE POST-INFECTIOUS GN

Bacterial	**Viral**
Skin or throat: Group A β-hemolytic Strep	Varicella zoster
Endocarditis: Strep viridans, Staph aureus	Measles
Shunt: Staph aureus, Staph albus, Strep viridans	Mumps
Visceral abscess: Staph aureus, E coli, Pseudomonas sp, Proteus mirabilis	Hepatitis B
Typhoid: Salmonella typhi	Cytomegalovirus
Pneumonia: Strep pneumoniae, Mycoplasma	Epstein-Barr virus
Fungal and Rickettsial	**Parasitic**
Coccidioides immitis	Malaria
Scrub typhus	Toxoplasmosis
	Schistosoma mansoni
	Filariasis

OBSTRUCTIVE UROPATHY

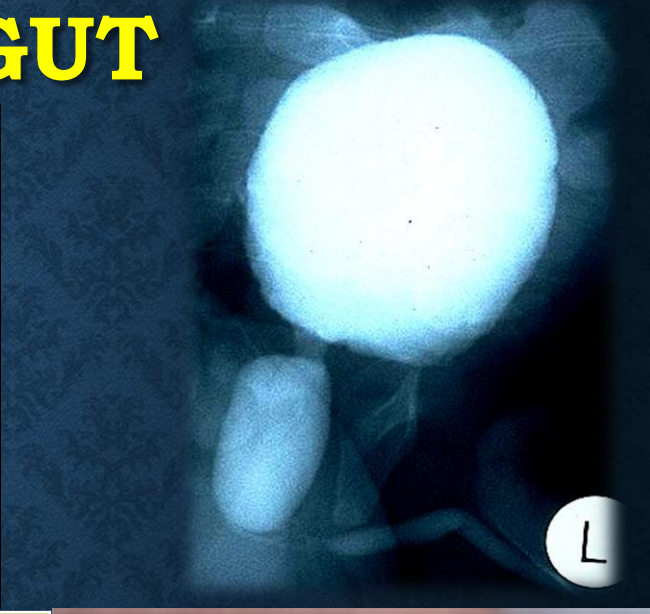


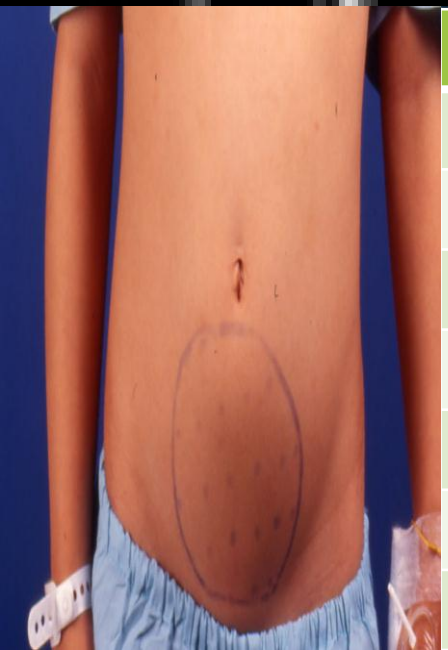
OBSTRUCTIVE UROPATHY AND CAGUT



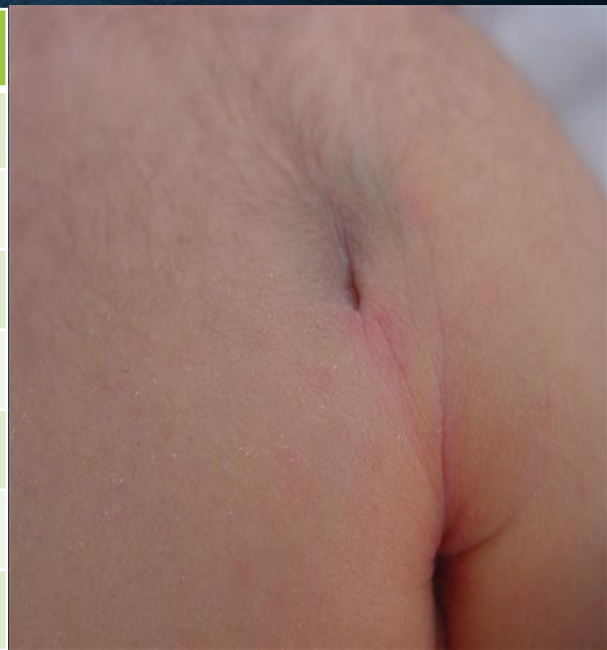
Ultrasound of the kidneys and bladder

- Pelvicalyceal and ureteral dilatation
- Bladder wall hypertrophy
- Post-void residual urine

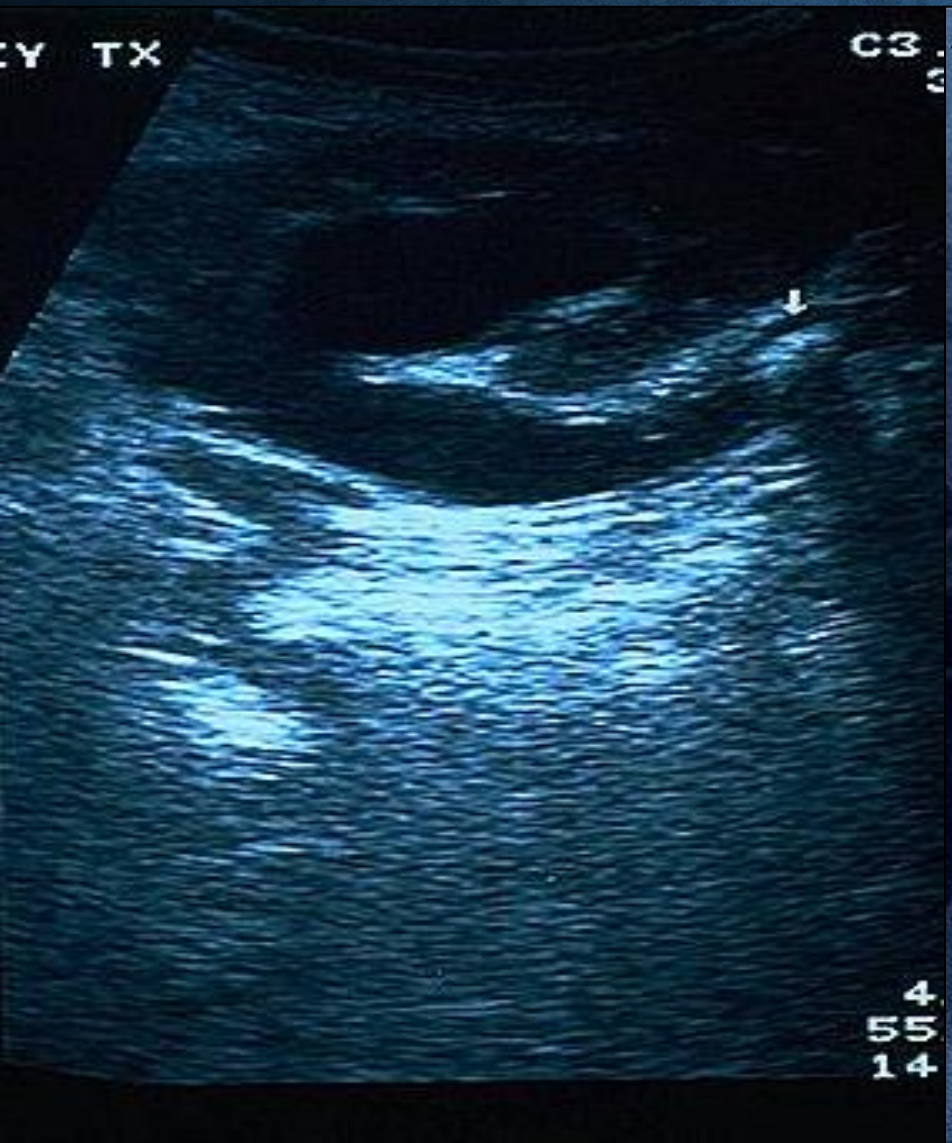


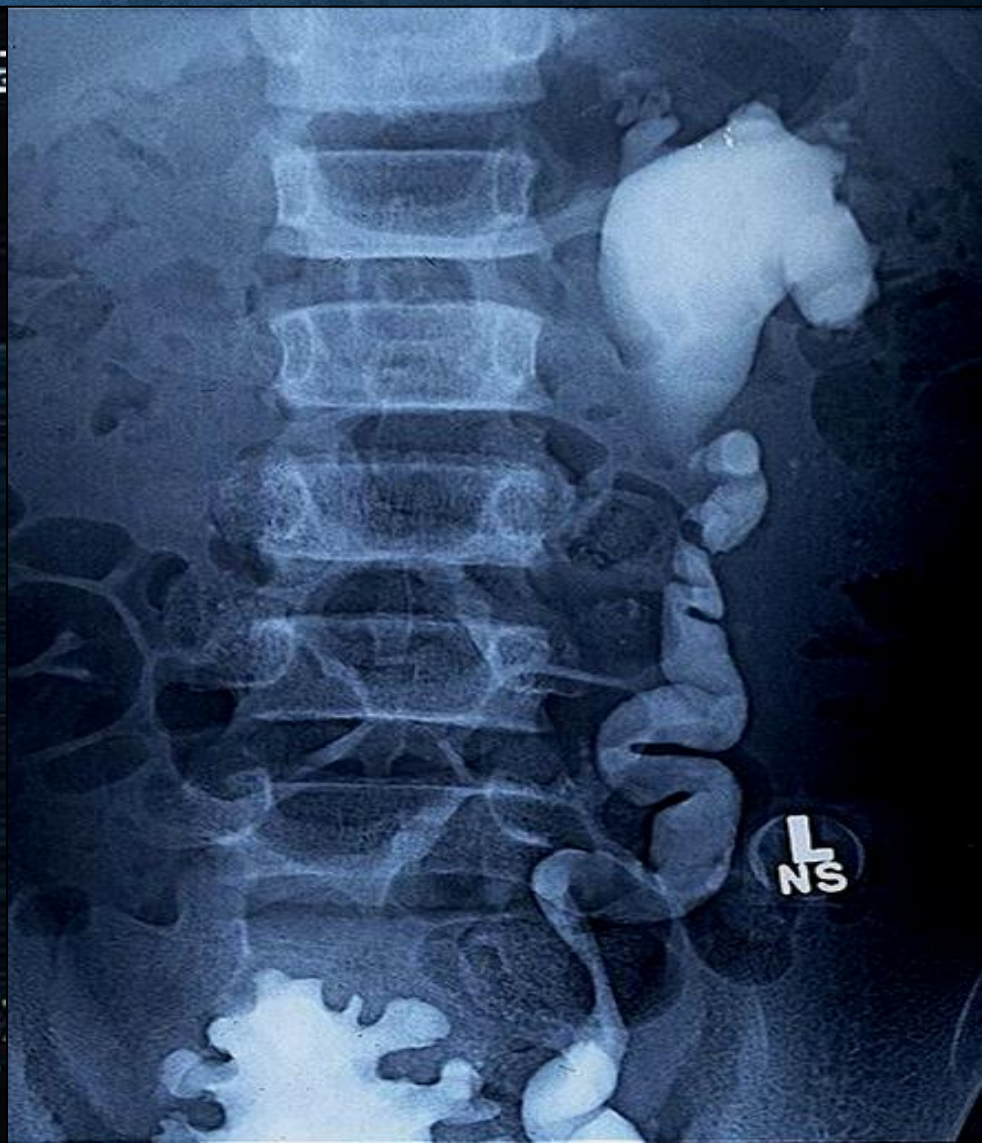


diagnosis	No
Hydronephrosis	14
Posterior Urethral Valve	7
Neurogenic bladder	5
Renal Stone	3
Single Kidney	3
Vesico Ureteric Reflux	5

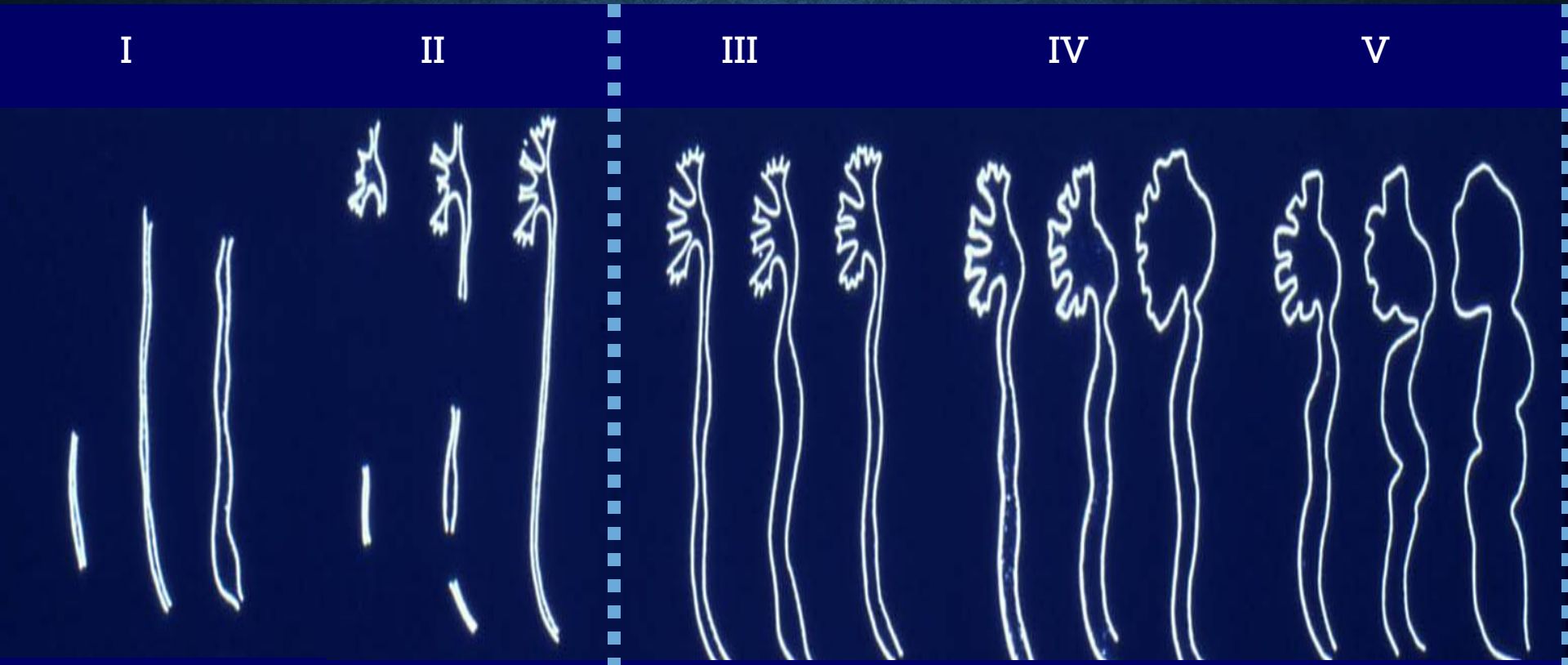


UROLOGY MALFORMATION





International Classification of VUR



I	II	III	IV	V
Ureter only	Ureter, pelvis, calyces, no dilatation	Mild dilatation of pelvis	Loss of sharp angle of fornices	Loss of papillary impression with gross dilatation

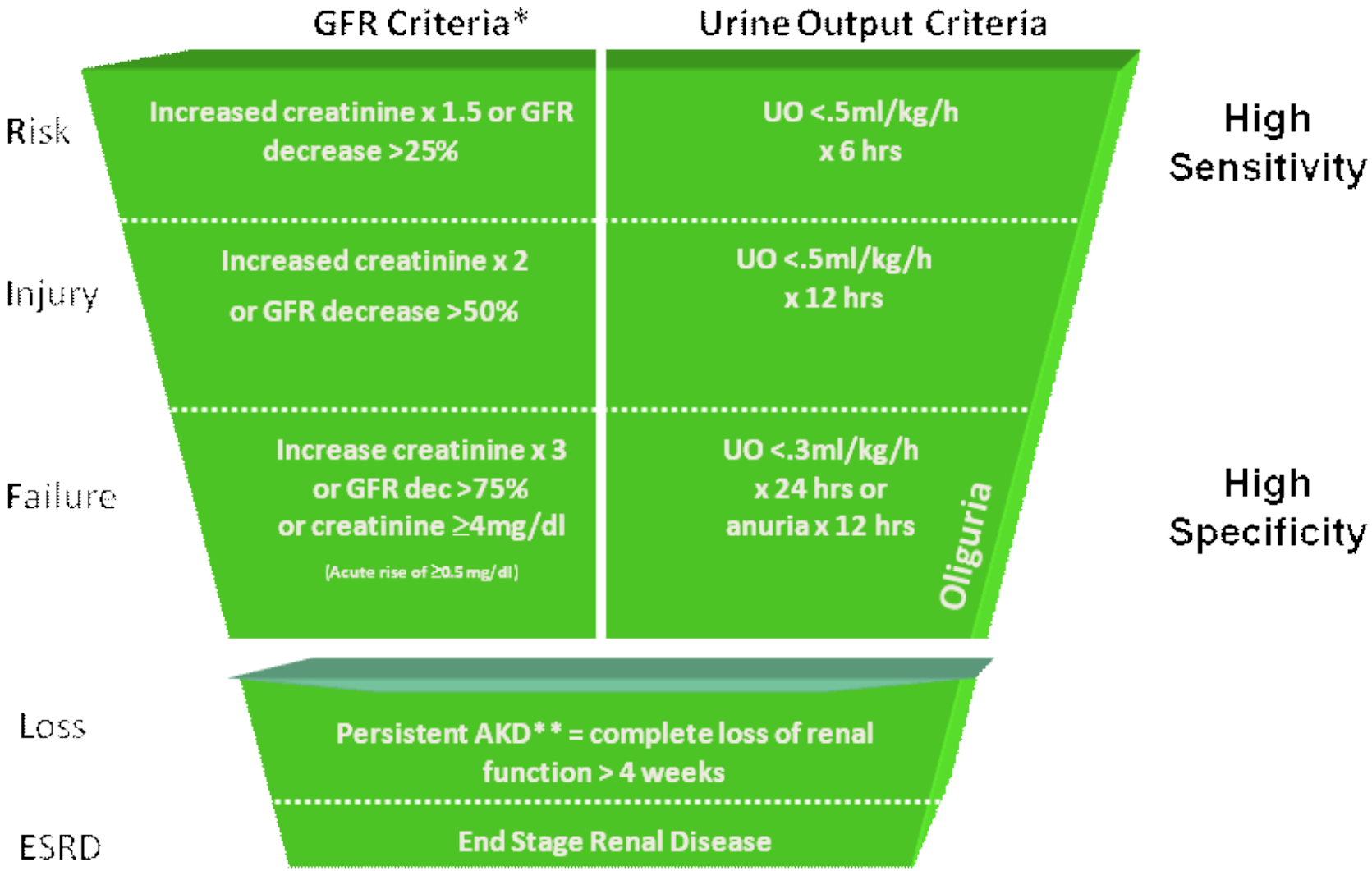
Dilating VUR

UTI AND UROLOGICAL MALFORMATION

Findings	%
Normal	50
VUR with scarring without scarring	12 23
Defects requiring surgery: hydronephrosis, calculi	8
Renal scarring without VUR	1
Others: duplex, solitary kidney	6

ACUTE KIDNEY INJURY IN CHILDREN

RIFLE Criteria for Acute Kidney Dysfunction



www.ADQI.net

Bellomo R, et al. Crit Care. 2004;8:R204–R212.

AKIN criteria for Acute Kidney Injury

Akin Stage	Serum Creatinine Criteria	Urine output criteria
1	Increase in S Cr of 1.5 to 2, or >= 0.3 mg/dl	< 0.5 ml/kg per h for 6 h
2	Increase in serum creatinine of 2-3 fold	< 0.5 ml/kg per h for 12 h
3	Increase in S Cr > 3 fold, or baseline Cr > 4 with an acute rise > 0.5 mg/dl	< 0.3 ml/kg per h for 24 h, or Anuria for 12 h

TABLE 1. A Comparison of the RIFLE and AKIN Classification and Definitions for Acute Kidney Injury

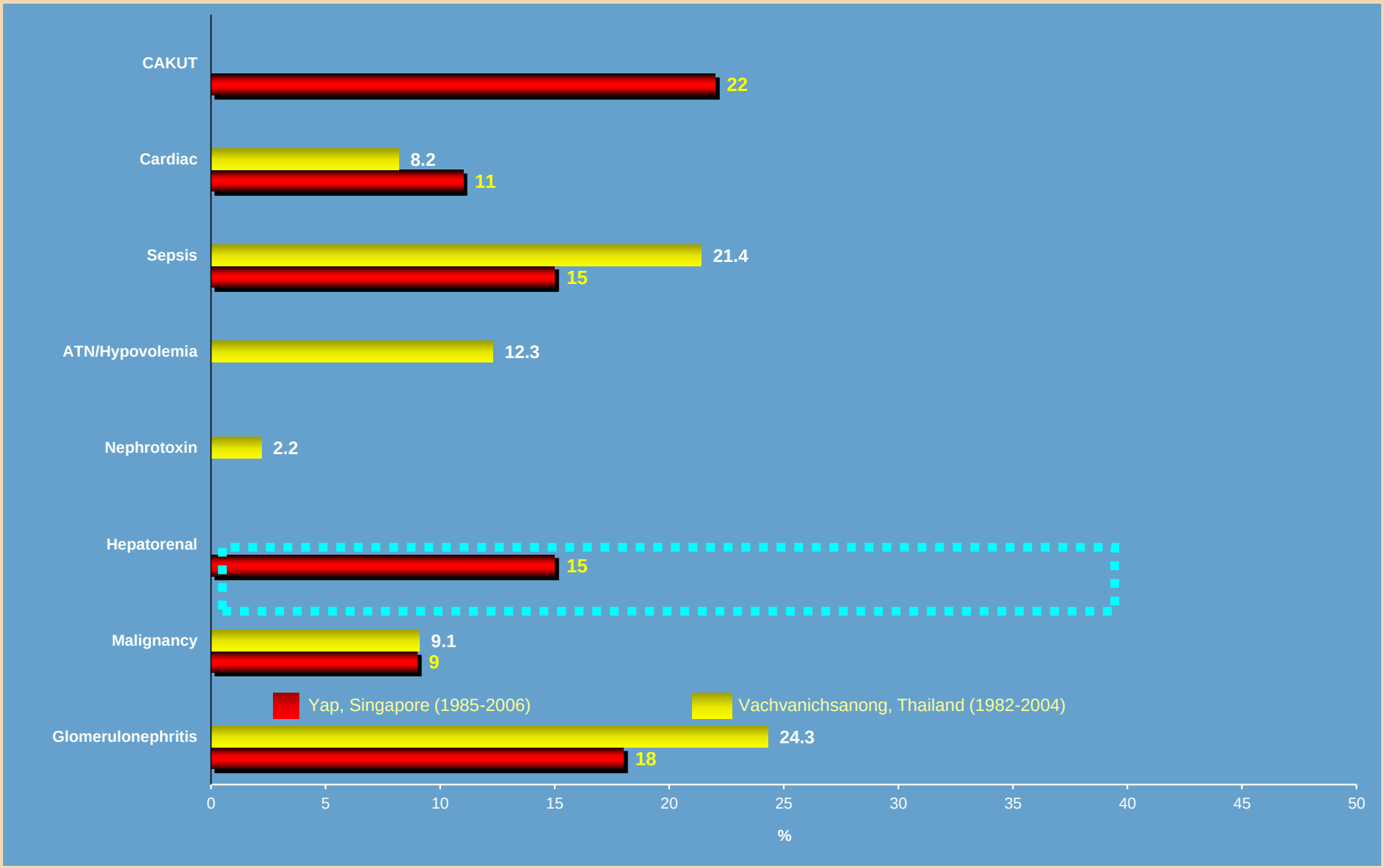
RIFLE Criteria*			AKIN Criteria†		
Stage	**GFR or Creatinine**	**Urine Output**	**Stage**	**Creatinine**	**Urine Output**
Risk	GFR decrease > 25% or S Cr increase × 1.5 (baseline)	UO < 0.5 ml/kg/h for > 6 h	1	0.5 to 2 times (baseline) or Increase of > 0.3 mg/dl	UO < 0.5 ml/kg/h for > 6 h
Injury	GFR decrease > 50% or S Cr increase × 2 (baseline)	UO < 0.5 ml/kg/h for 12 h	2	2 to 3 times (baseline)	UO < 0.5 ml/kg/h for > 12 h
Failure	GFR decrease > 75% or S Cr increase × 3 (baseline) or level of 4.0 mg/dl with an acute increase of 0.5 mg/dl	UO < 0.5 ml/kg/h for 12 h	3	> 3 times (baseline) or level of 4.0 mg/dl with an acute increase of 0.5 mg/dl or RRT	< 0.3 ml/kg/h for 24 h or anuria for 12 h
Loss	Persistent AKI = loss of renal function > 4 weeks				
ESKD	End stage kidney disease > 3 months				

* Renal assessment time window up to 7 days. † Renal assessment time window up to 48 h.
AKI = acute kidney injury; AKIN = Acute Kidney Injury Network; GFR = glomerular filtration rate; RIFLE = Risk-Injury-Failure-Loss-End stage kidney disease; RRT = renal replacement therapy; S Cr = serum creatinine; UO = urine output.

ACUTE KIDNEY INJURY IN CHILDREN

- In 2016 total patients 324 admitted to PICU,MCH
- 172 patients (53%)had AKI due to several causes
- 21.5% due to sepsis
- 10.5% due to viper bite
- 8.5% due to glomerular disease
- 30.2% required renal replacement therapy
- 67.3% HD 17.3% PD both 15.4%
- 48.8% mortality rate 37% AKI with sepsis
- high mortality rate in younger age group

AGN/RPGN is an important cause of pediatric AKI



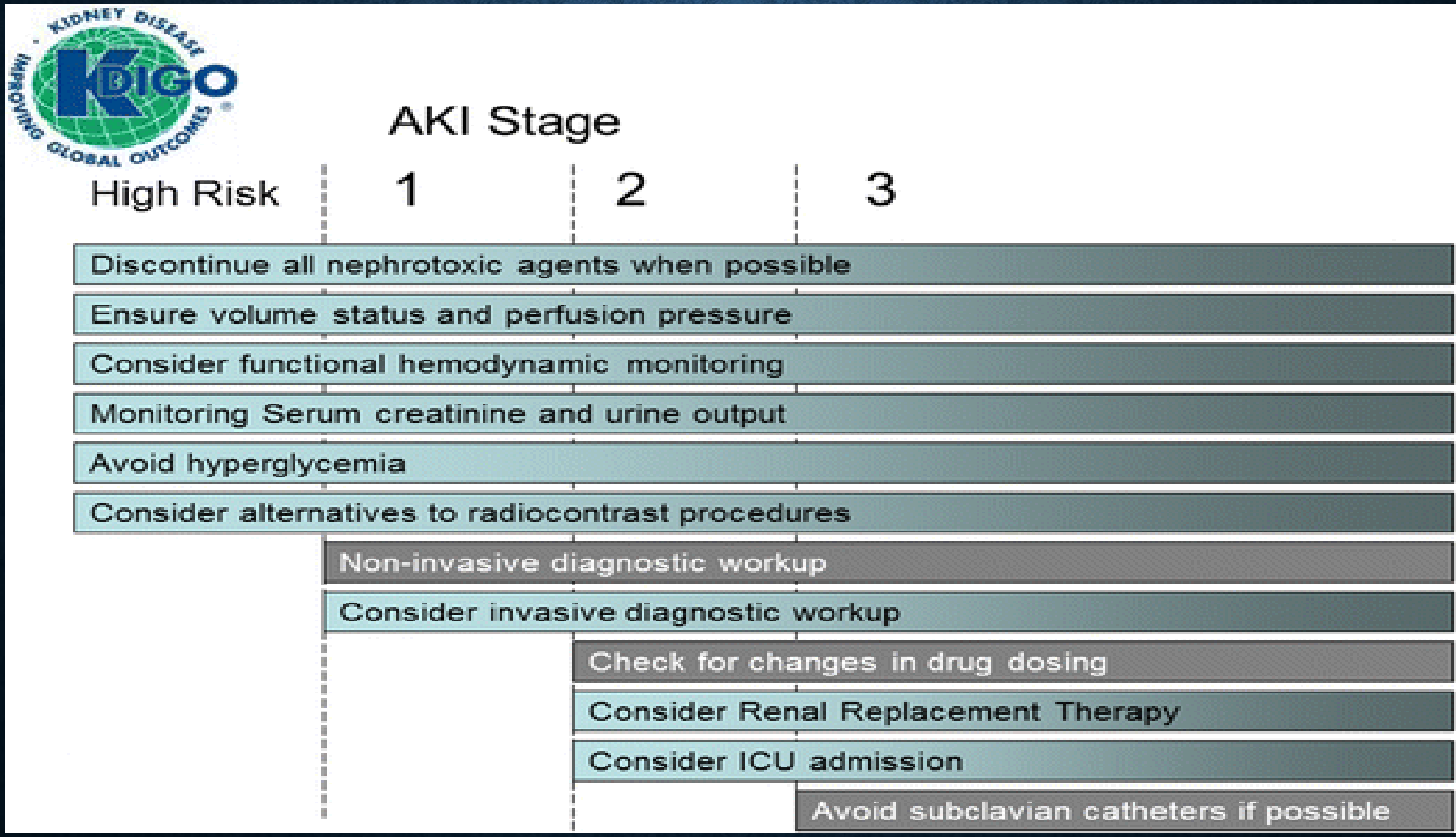
EXPOSURES

- Sepsis
- Advanced age
- Circulatory shock
- Burns
- Trauma
- Cardiac surgery (especially
- with CPB)
- Chronic diseases (heart, lung, liver)
- Major noncardiac surgery
- Nephrotoxic drugs
- Radiocontrast agents
- Anemia

SUSCEPTIBILITIES

- Dehydration or volume depletion
- Critical illness
- Female gender
- Black race
- CKD
- Cancer
- Poisonous plants and animals

APPROACH TO MANAGEMENT OF AKI



MANAGEMENT OF AKI

Medical Management

- maintain adequate renal perfusion
- prevention fluid overload and hypertension
- maintain normalelectrolytes and acid base status
- ensure adequate nutrition
- dosage adjustment of medication
- avoid futher nephrotoxic insults

Acute Renal Replacement therapy

INDICATION FOR RENAL REPLACEMENT THERAPY

- Intractable fluid overload
- Intractable hyperkaelemia
- Refractory hypertension
- Uremic neurological dysfunction
- Uremic serositis
- Refractory metabolic acidosis
- In critically ill child with AKI in order to maintain homeosta sis and create enough volume space

ACUTE KIDNEY INJURY IN NEONATE


100
137
112/
56
76
00:25:13
14-DEC-2016
LEADS FAIL
Dash 4000
NIPRO
SURDIAL 55Plus

CHRONIC KIDNEY DISEASE AND END STAGE RENAL DISEASE

CHRONIC KIDNEY DISEASE IN CHILDREN

- Abnormalities in kidney structure or function present for more than 3 months with implication of health
- Base on CGA criteria
  - Cause
  - GFR
  - Albuminuria

HOW DO YOU RECOGNIZE THE CHILD WITH CHRONIC RENAL FAILURE?

- Short stature
- Sallow appearance
- Uraemic breath
- Anaemia
- Hypertension
- Rickets

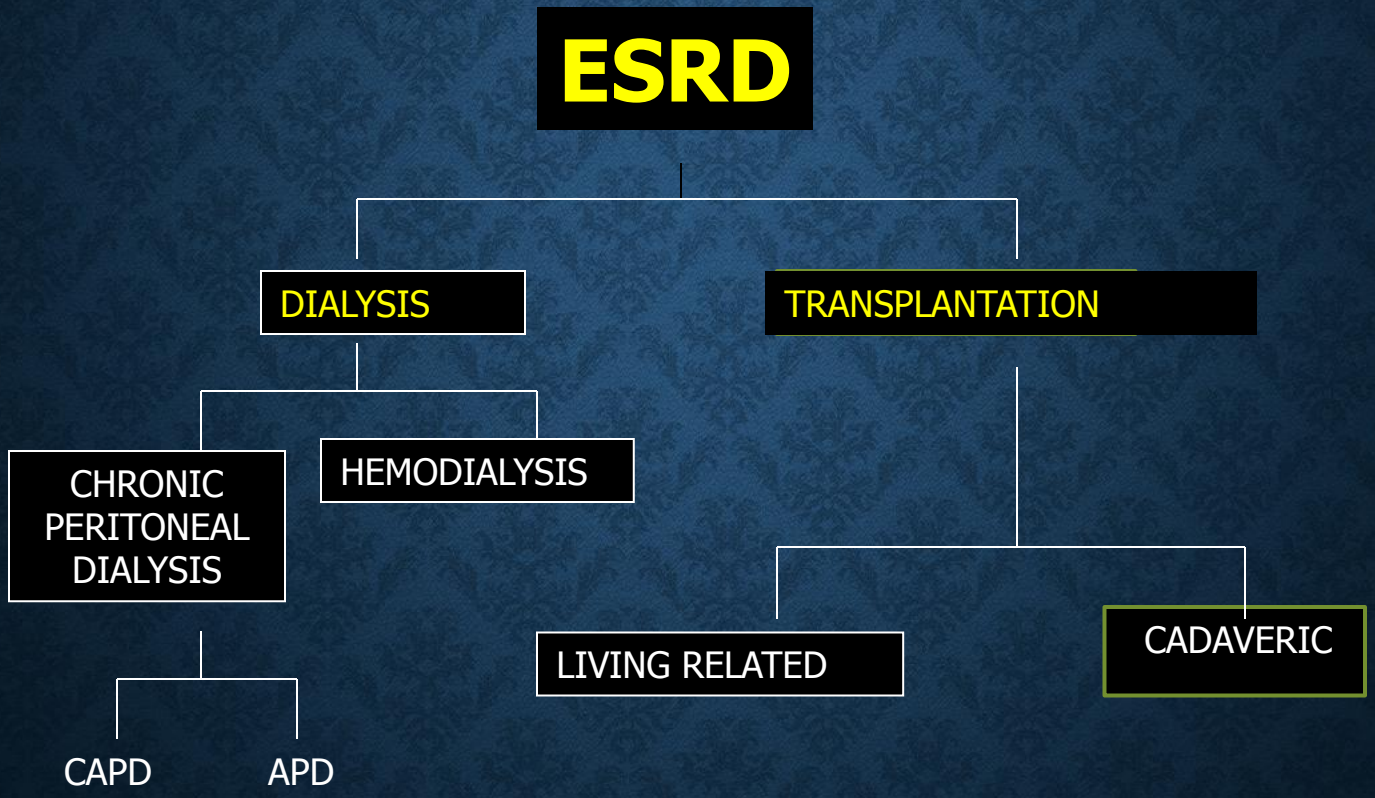
IMPORTANT CONSIDERATIONS IN A CHILD WITH CHRONIC RENAL FAILURE

Problem	Medical Treatment
Anaemia	Erythropoietin
Uraemic bleeding	Dialysis
Hypertension	Antihypertensives Diuretics Dialysis
Electrolyte abnormalities	Electrolyte replacement Dialysis
Renal osteodystrophy	Calcium carbonate 1,25 Vit D3

END STAGE RENAL DISEASE

- CKD stage G5 with e GFR <15ml/min/1.73 m2 with minimal residual renal function

MANAGEMENT OF ESRD IN CHILDREN



INITIATION OF RENAL REPLACEMENT THERAPY

- Preparation for RRT when the patient who reach CKD stage G4
- Timing for initiation CKD stage G5 with eGFR <8 ml/min/1.73 m2

KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease

VOLUME 3 | ISSUE 1 | JANUARY 2013

SUMANEE PRAKOBSUK 24 Sep 2013

Prognosis of CKD by GFR and Albuminuria Categories: KDIGO 2012

GFR categories (ml/min/ 1.73m²) Description and range				Persistent albuminuria categories Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30-300 mg/g 3-30 mg/mmol	>300 mg/g >30 mg/mmol
	G1	Normal or high	≥90			
	G2	Mildly decreased	60-89			
	G3a	Mildly to moderately decreased	45-59			
	G3b	Moderately to severely decreased	30-44			
	G4	Severely decreased	15-29			
	G5	Kidney failure	<15			

DATA ON ESRD

DIAGNOSIS	No. of Patients	Percent
Aplastic, hypoplastic, or dysplastic kidneys	**571**	**15.2**
Obstructive uropathy	476	12.7
Reflux nephropathy	129	3.4
Focal segmental glomerulosclerosis	526	14.0
Systemic immunological disease	282	7.5
Chronic glomerulonephritis	143	3.8
Hemolytic uremic syndrome	122	3.3
Polycystic kidney disease	114	3.0
Congenital nephrotic syndrome	88	2.3
Medullary cystic disease	79	2.1
MPGN Type II	75	2.0
MPGN Type I	38	1.0
OTHER DISEASES		
Diabetic glomerulonephritis	5	0.1
Sickle cell nephropathy	14	0.4
Unknown	255	6.8

Characteristics of Dialysis Patients

	Number	Percent
Gender		
Male	2549	56.1
Female	1997	43.9
Race/ethnicity		
White	2261	49.7
Black	1074	23.6
Hispanic	925	20.3
Other	286	6.3
Age at initiation		
0-1 years	568	12.5
2-5 years	467	10.3
6-12 years	1407	31.0
13-17 years	1739	38.3
>17 years	365	8.0

From Neu, Pediatr. Nephrol., 17:2002

ACCESS TO RENAL REPLACEMENT THERAPY IS SEVERELY LACKING IN DEVELOPING COUNTRY

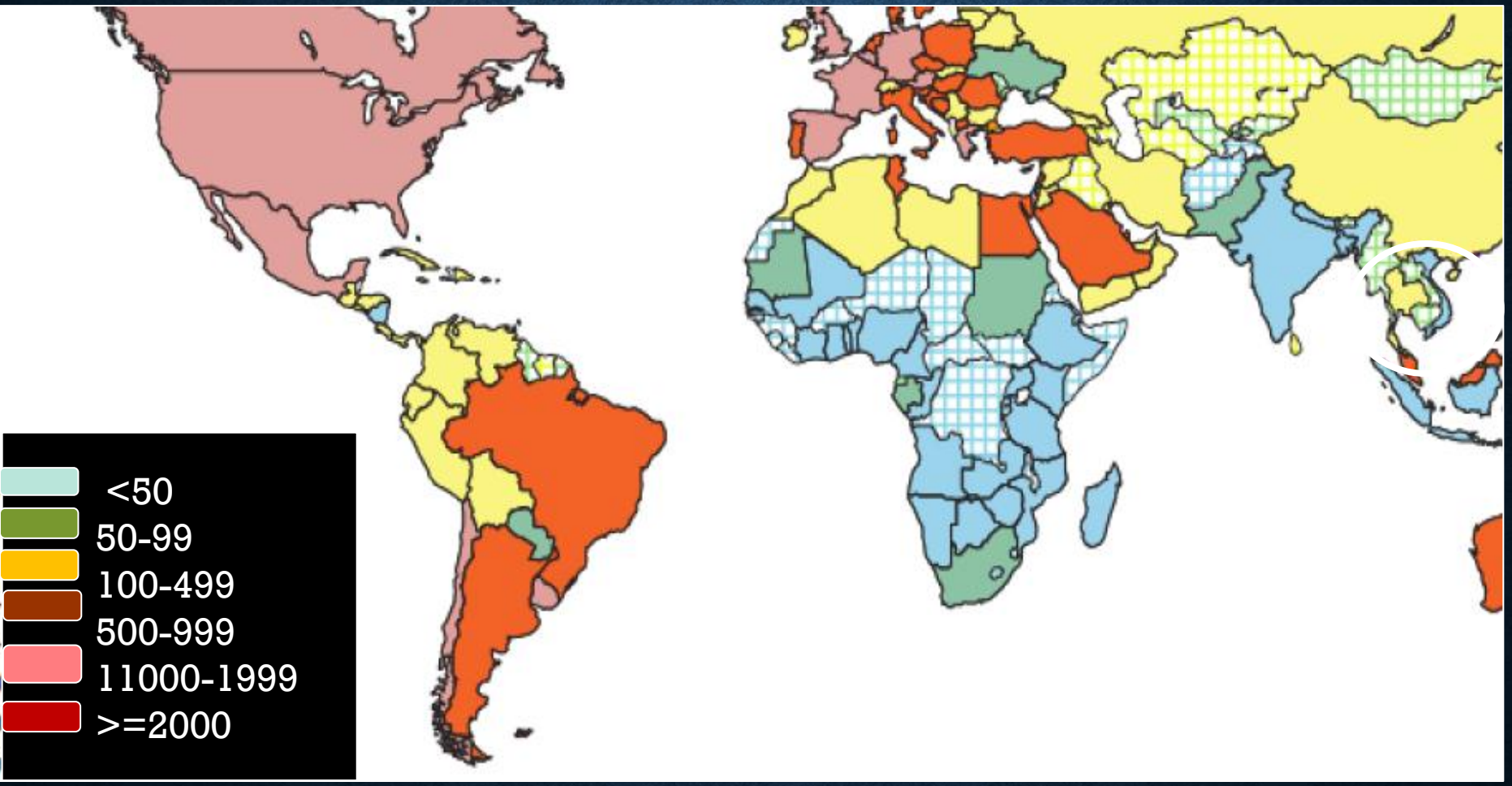
- How many people who need RRT are **not**

receiving it?

Low-income countries: 96%

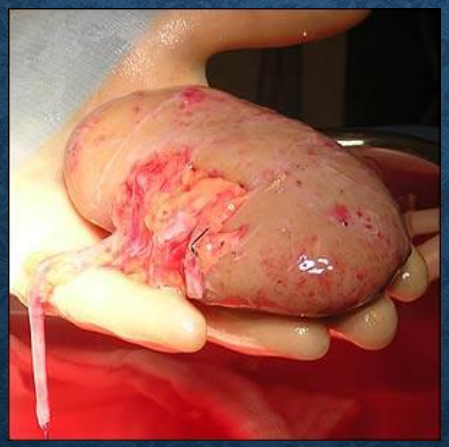
lower middle income countries: 88%

PATIENTS RECEIVING RRT PER MILLION POPULATIO



WE ARE ON HEMODIALYSIS AND PERITONEAL DIALYSIS FOR END STAGE RENAL DISEASE

PEDIATRIC RENAL TRANSPLANT



ISN SISTER RENAL CENTERS (SRC)

In 2015, the sister renal center (SRC) pair was started between Myanmar and Singapore.
This program links renal centers in emerging countries with supporting centers of excellence in the developed world.

Emerging center – YCH, Myanmar
Supporting center – NUH, Singapore

- **Dialysis Nurse from NUH visited twice per year in 2015 and 2016.**
- **Gave 4 workshops in dialysis both Peritoneal and Haemodialysis**

NUH - National University Hospital

ISN EDUCATIONAL AMBASSADORS PROGRAM

Prof Yap Hui Kim from Children Kidney Center, NUH visited to Paediatric Nephrology Units of YCH and MCH in January 2016

Dr. Ng Kar Hui, a Consultant from Children Kidney Center, NUH visited to Paediatric Nephrology Units of YCH and MCH in January 2017.

WHAT IS THE END POINT FOR OUR ESRD KIDS

- **From:** Yap Hui Kim (Paediatrics)
  Sent: Monday, May 23, 2016 11:33 PM
  To: GManuzi@theisn.org
  Subject: ISN Sister Center with Myanmar (Pediatric Dialysis Program)
-
- Dear Giorgia
- We spoke on the phone regarding a potential Trio program for Pediatric Renal Replacement Therapy in Myanmar. Below is my proposal:
- The Shaw-NKF-NUH Children's Kidney Center at the National University Hospital, Singapore is the ISN Sister Center to Yangon Children's Hospital Renal Unit since 2015. We have conducted 2 site visits so far, one in May 2015 and one in November 2015. During the 2 visits, we have conducted dialysis workshops in hemodialysis and peritoneal dialysis both acute and chronic, and this was attended by doctors and nurses involved in the program not only from Yangon Children's Hospital but also from the 300 Bedded Children's Hospital Mandalay. These 2 centers are currently dealing with all the children with acute and chronic renal failure in Myanmar. The primary doctors involved have been trained over the years at our center under the auspices of the IPNA training fellowship. There are currently 2 fellows in Yangon Children's Hospital, and 3 fellows in Children's Hospital Mandalay.
- Our Nurse Manager has conducted audits on the Dialysis Unit at Yangon Children's Hospital and have recommended changes to their protocol and areas of improvement. Since then, the 2 Centers have started chronic dialysis for children in Myanmar.
- Unfortunately, there is no pediatric renal transplant program in Myanmar. So the children started on chronic hemodialysis are unable to go home to the outlying provinces. The longest staying child on hemodialysis has been residing in the hospital for a year with no prospects for renal transplantation at this point.

- During my recent visit as ISN ambassador in January 2016 after discussion with the stakeholders in Myanmar, we would like to take the Pediatric Renal Replacement Program in Myanmar one level higher by helping them start a pediatric renal transplant program. In assessing the requirements to start a pediatric renal transplant program, the local center will require training of the transplant surgeons on-site. Unfortunately, Yangon Children's Hospital is not in an ideal position to start the transplant program, as this is a stand-alone Children's Hospital admitting patients to 12 years of age, with no adult service backup, and hence the difficulty in doing a living-related donor workup. On the other hand, the 300 Bedded Children's Hospital Mandalay is within an adult General Hospital campus, and hence has the support of the adult nephrology service. In addition, the IPNA fellows that now run the program here have been trained in renal transplantation.
- I would like to enquire whether it is possible for us to submit a renewal of the Sister Unit application for 2017 to include a Trio center with our Center as the Mentor Unit, with both Yangon Children's Hospital and the 300 Bedded Children's Hospital Mandalay forming the Trio.
- *Our proposal is to bring a surgical team to Mandalay together with a pediatric nephrologist from our Center to help their surgeons perform their first 2 pediatric renal transplants, and to continue supporting them to develop a preemptive renal transplant program, so that these children with ESRD can finally return to their home and schooling and not become long-term residents of the hospital*!
- Please let me know if this is a feasible proposal for us to work along with the 2 hospitals in Myanmar to further develop the renal replacement program for children in their country.
- Thank you very much.

ARGUMENTS AGAINST LONG-TERM DIALYSIS

Dialysis

- Decreased growth velocity
- Difficulties in nutritional care
- Poor school attendance
- Inadequate family and social activity
- Need for vascular or peritoneal access
- Increased risk of renal osteodystrophy
- Metabolic disturbance

Renal Transplantation

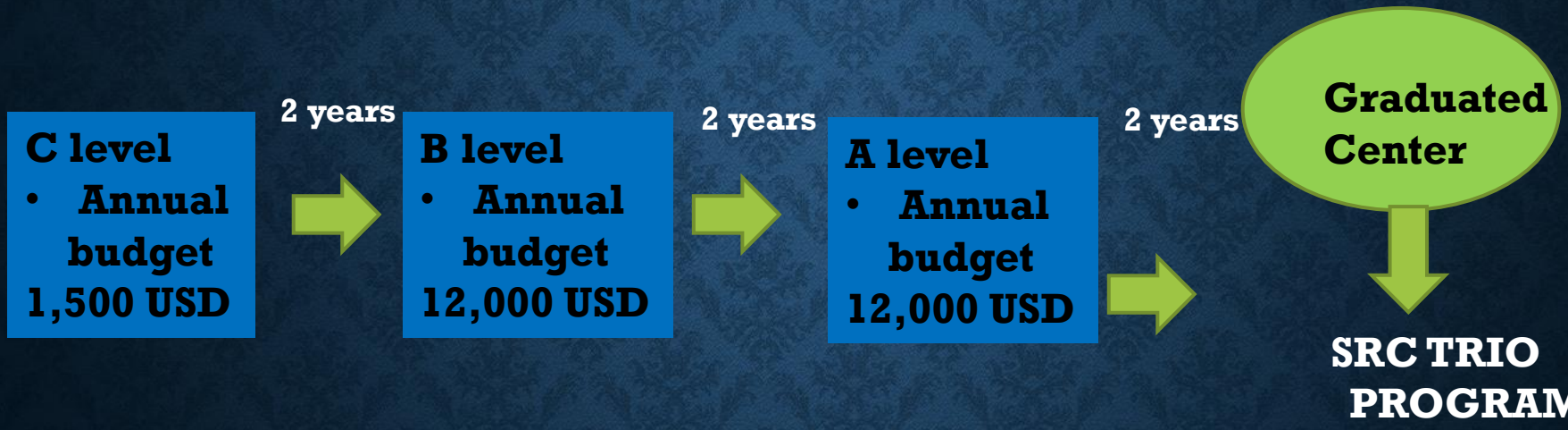
- Improved quality of life
- Optimal growth
- Optimal cognitive development
- Better rehabilitation

RENAL TRANSPLANTATION IS THE OPTIMAL FORM OF RENAL REPLACEMENT THERAPY

Age at transplantation

Age	Number	Percent
0-1	333	5.1
2-5	998	15.3
6-12	2256	34.5
13-17	2527	38.7
>18	420	6.4

-SISTER RENAL CENTERS PROGRAM



Supporting center
(NUH)
+
Graduated EC now SC
(YCH)
+
New Emerging Center
(MCH)

AFTER HAVING THE BIG MULTIDISPLARY SUPPORT

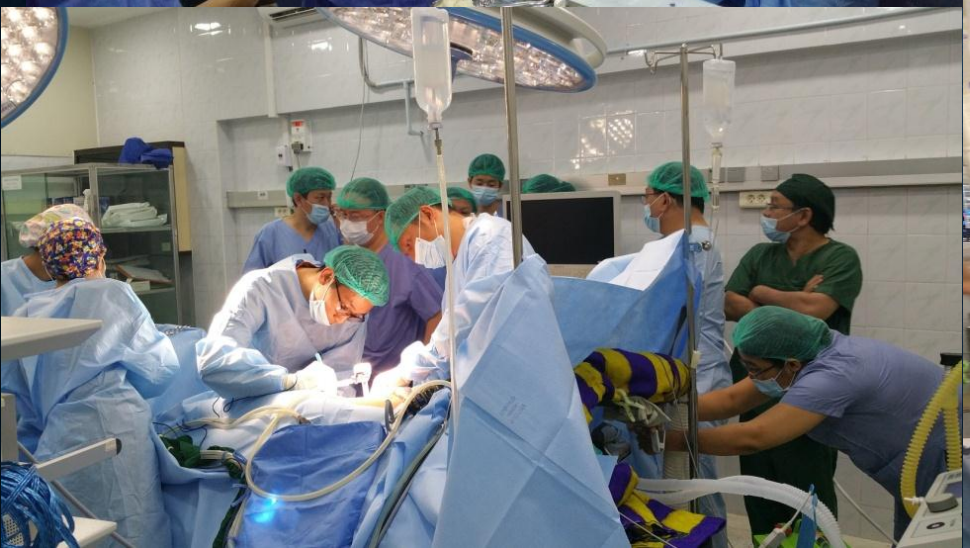
Ten years ago, Pediatric Renal transplantation was a dream too far-fetched to
come true for all of us.


DEPARTMENT OF PEDIATRICS UMM.

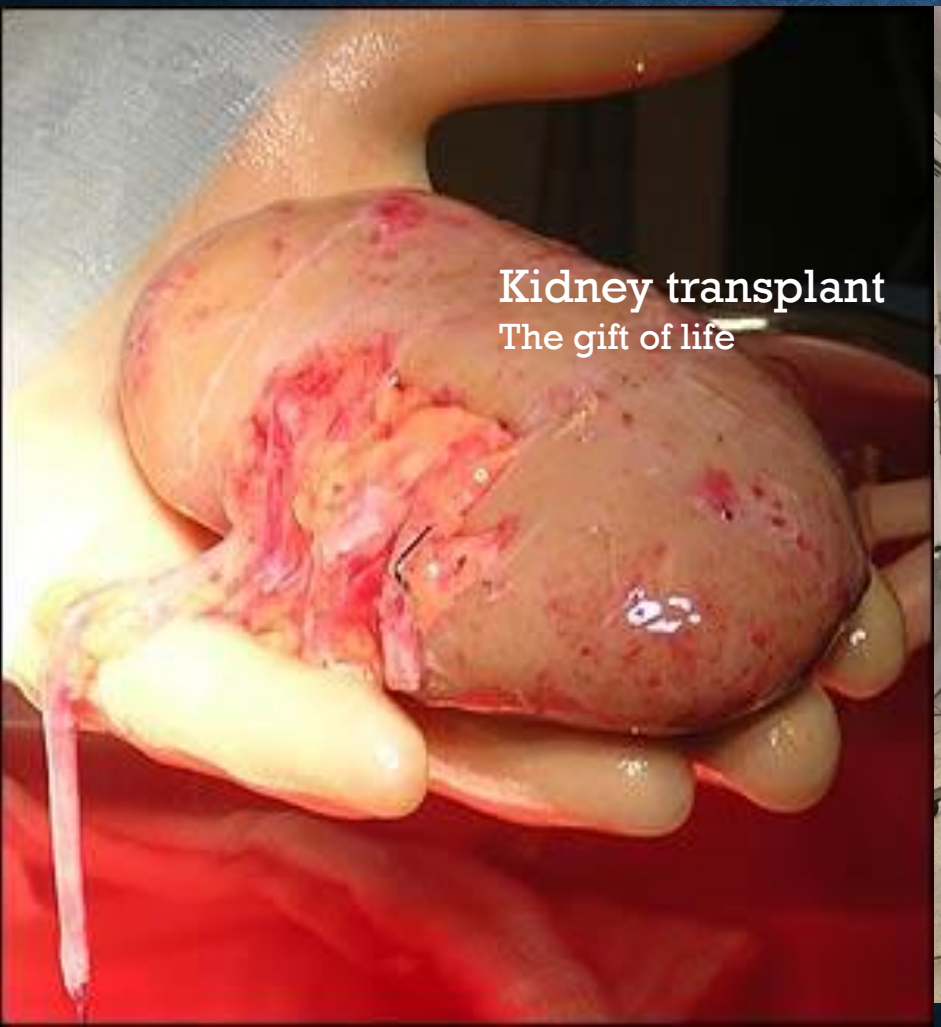
FIRST CHILDREN'S LIVE RELATED KIDNEY TRANSPLNATATIONS IN MYANMAR (FEBRUARY 2017)

It was successfully done with the help of knowledge and technical support from Singapore Transplant Team including Pediatric Nephrologists from transplant center, Pediatric transplant surgeon, adult transplant surgeon, cardiovascular surgeon, pediatric radiologist and paediatric anesthetist coordinating with Myanmar Adult Renal Transplant Team and Pediatric Surgical Team.

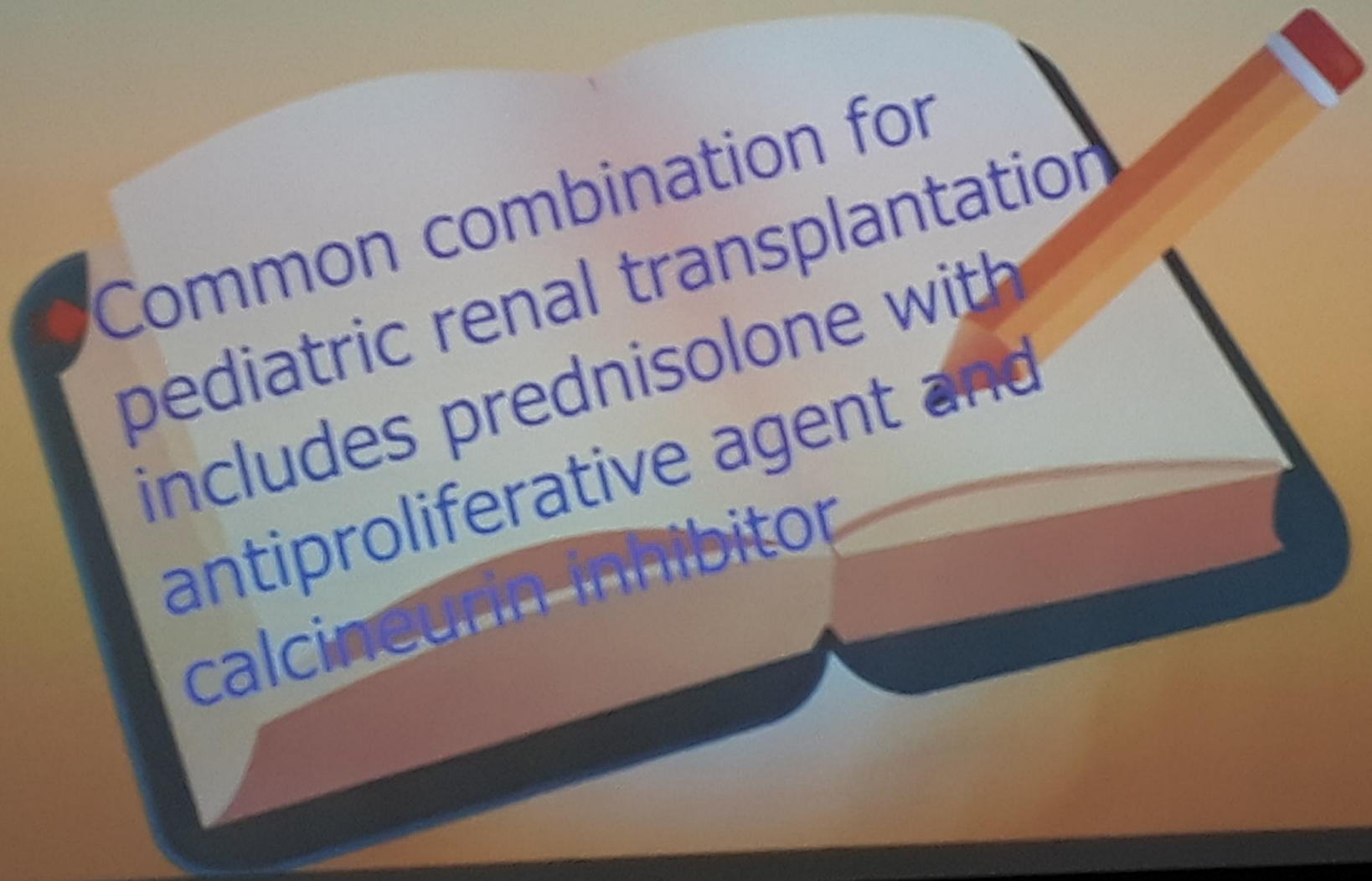
LIVING RELATED DONOR RENAL TRANSPLANT



MYANMAR AND SINGAPORE ORGAN TRANSPLANT TEAM COLLABORATION



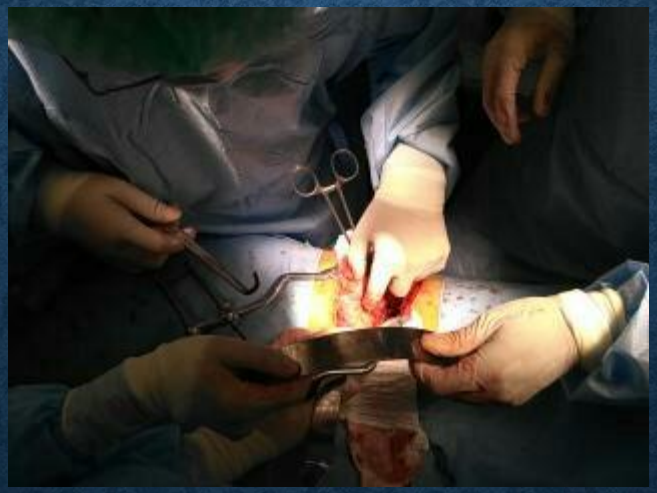
Current recommendations for pediatric renal transplantation



COMMON DRUGS USED IN RENAL TRANSPLANTATION

- Monoclonal antibodies
- Prednisolone
- Azathioprine / Mycophenolic acid
- Cyclosporine / Tacrolimus
- Antihypertensive drugs

CHALLENGES

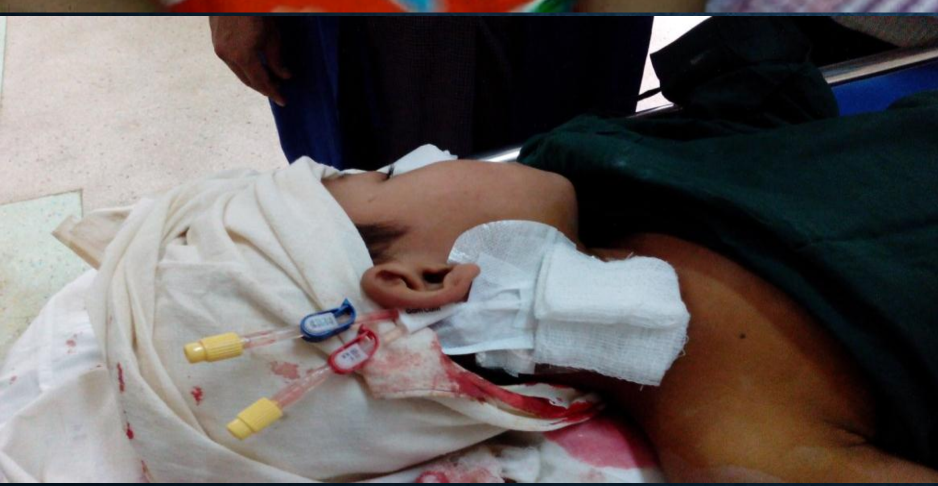


KIDNEY DISEASE IMPROVING GLOBAL OUTCOME


ကလေးလူနာ လေးဦးအား ကျောက်ကပ်အစားထိုးကုသမှု

ကလေးဆေးရုံ(မန္တလေး)၌ ယခုနှစ်အတွင်း အောင်မြင်စွာ ဆောင်ရွက်နိုင်ခဲ့

မန္တလေး ဩဂုတ် ၈



UPCOMING PEDIATRIC RENAL TRANSPLANT

- At Mandalay Children Hospital on 24th and 25th January 2018
- At Yangon Children Hospital on 27th and 28th January 2018


THANK YOU