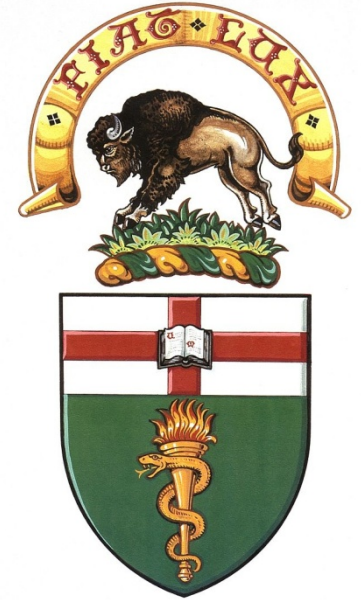




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Clinical Approach to Congenital Ureteropelvic Junction “Obstruction”



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Disclosures

- None





Objectives

1. Understand why Pediatric Urologists do not operate on all UPJ “obstruction”
2. Know the role of diuretic renography in the clinical approach to congenital HN
3. Know of helpful information to include in diuretic renogram report





Why DON'T Pediatric Urologists Operate on All Congenital UPJ “Obstruction”?

- We used to, but then we learned that we didn't have to
- Congenital UPJ “obstruction” is usually NOT obstructed





History of Congenital UPJ “Obstruction”

- Prior to routine antenatal US...
 - Definition of UPJ “obstruction” in *childhood*:
 - Flank pain
 - Hydronephrosis
 - Prolonged drainage curve
 - Symptoms resolves with pyeloplasty



History of Congenital UPJ “Obstruction”

- 1980’s: Onset of routine antenatal US...
 - “Near epidemic of fetal and newborn HN” *Koff 2008*
 - 15% w/ mod or severe Antenatal Hydronephrosis
 - Presentation and prevalence of childhood HN changed dramatically, but the definition changed minimally
 - Clinical definition of UPJ “obstruction” in *neonate*:
 - Flank Pain
 - Hydronephrosis
 - Prolonged drainage curve
 - Signs resolve with pyeloplasty



History of Congenital UPJ “Obstruction”

- Early 1980’s thinking:
 - “Newborns with severe obstruction often have marked improvement following correction; therefore early diagnosis and operation is important”

Murphy 1984





History of Congenital UJO “Obstruction”

- Late 1980’s: Natural history raises doubt about the diagnosis of “obstruction”
 - *Koff 2000*: -Function improves or remains stable in 78% of kidneys with moderate or severe HN
 - Contradicts assumption that significant obstruction should result in loss of function
 - *Koff 2000*: -Up to 60% neonates w/ severe ANH & $\uparrow T^{1/2}$ resolve spontaneously
 - Improvements seen similar in both operated and observed kidneys



History of Congenital Hydronephrosis

- *Koff 1987*: Revised definition of “obstruction”
 - Obstruction: “any restriction to urinary outflow that left untreated will damage the kidney”
 - We starting calling the condition Congenital “Hydronephrosis”



History of Congenital Hydronephrosis

- Goals for management of congenital hydronephrosis
 - Determine who is at risk for damage and observe closely and intervene before the damage is permanent
 - Determine who is a low risk of damage and limit unnecessary tests/intervention
- We are still looking for the perfect test to determine whose HN will lead to damage so we can perform pre-emptive pyeloplasty



Indicators for Pyeloplasty

- **Indication of renal damage**
 - Differential Renal Function (DRF) $<40\%$
 - $\Delta\text{DRF} > 10\%$
 - Worsening hydronephrosis
- Abdominal/Flank Pain +/- Vomiting
- Recurrent pyelonephritis
- Renal calculi
- Hypertension



Why Isn't Prolonged $T_{1/2}$ an Indication of “Obstruction”

- By definition, the “obstruction” must lead to renal damage
 - *Koff 2000*: Function improves or remains stable in 78% of kidneys with moderate or severe HN
 - *Amarante 2003*: There are children followed non-operatively for >2 yrs (2-6 yrs), with ongoing HN & $\uparrow T_{1/2}$, but no deterioration in DRF



Why isn't prolonged $T_{1/2}$ an indication of "Obstruction"

- Variability 2° Technical Factors
 1. Inadequate hydration
 2. Inadequate bladder drainage
 3. Variability in $T_{1/2}$ calculation
 4. Effects of gravity on dilated renal pelvis

– **Minimized by Protocol Standardization**



Why isn't prolonged $T_{1/2}$ an indication of "Obstruction"

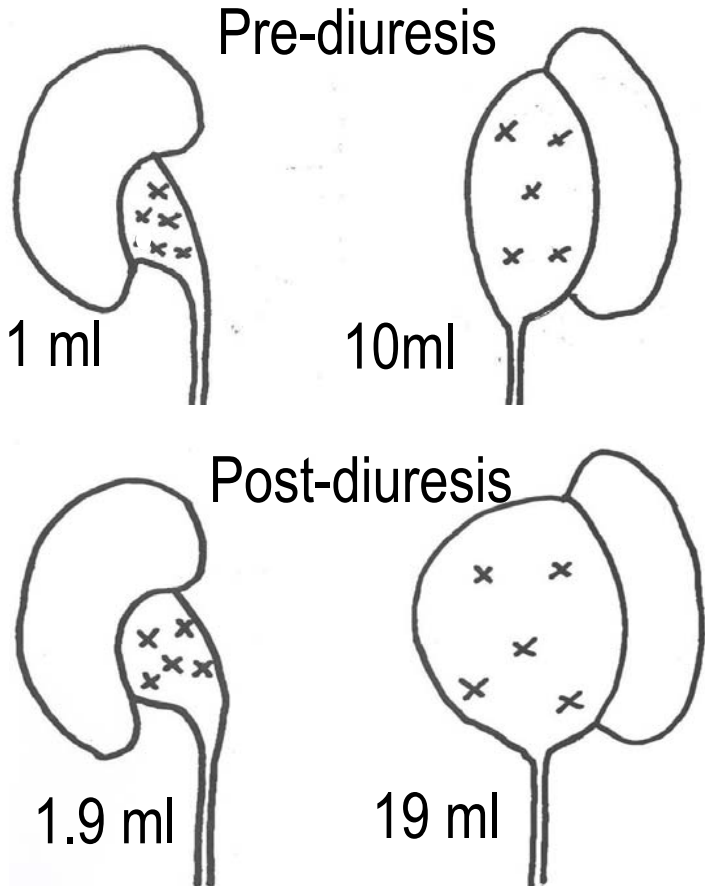
- Variability 2° Physiological Factors
 - Decreased and Immature renal function
 - Response to tracer
 - Response to diuretic



Why isn't prolonged $T_{1/2}$ an indication of "Obstruction" Koff 2005

- Variability 2^o Anatomical Factors
 - Renal pelvis of young kidney is very compliant and distensible
 - Isotope dilution provides explanation for $\uparrow T_{1/2}$ in non-obstructed kidney

Why isn't prolonged $T_{1/2}$ an indication of "Obstruction" Koff 2005



- Assume equal tracer into each kidney
- Tracer diluted 10x with initial excretion
- With diuresis pelvis size \uparrow by 85% in both
 - Tracer diluted further
- Assume equal rate of drainage from UPJ
 - 10x longer to reach $T_{1/2}$
- Distention most dramatic under age 2 years



Clinical Approach to Congenital Hydronephrosis



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Antenatal US – Severe HN
Is the other kidney normal?

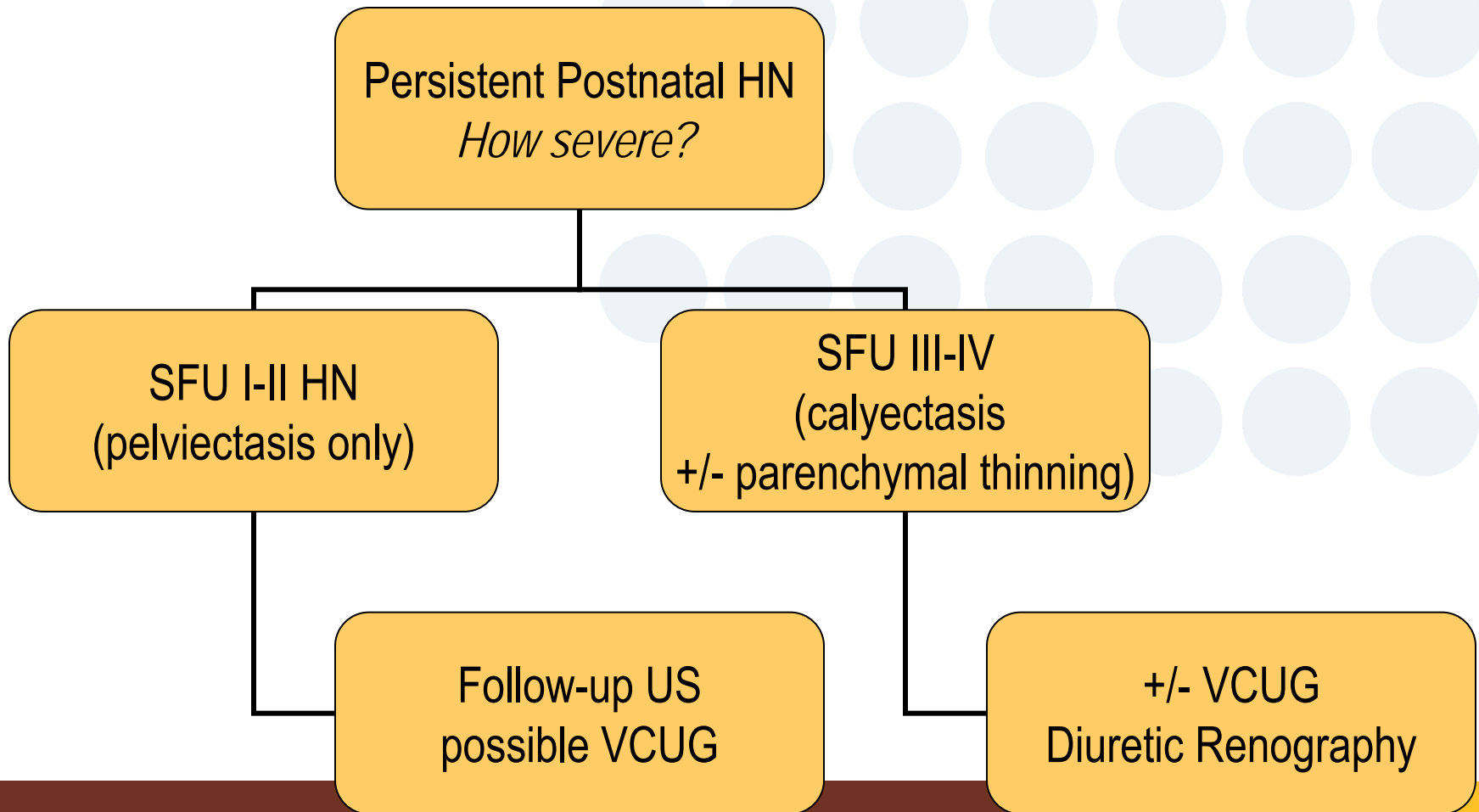
Yes

No

Do nothing now
Postnatal US age 1-2 weeks

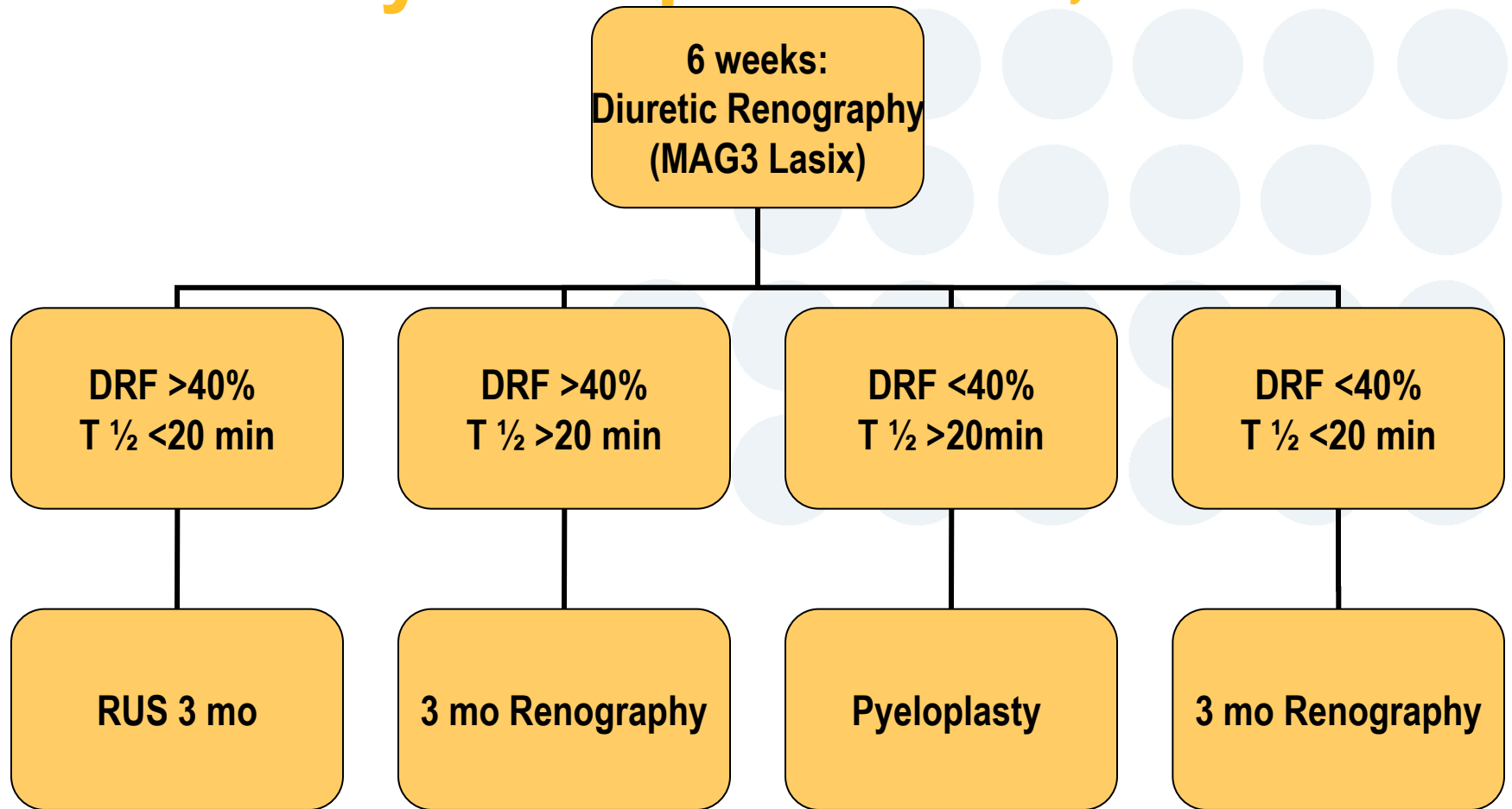
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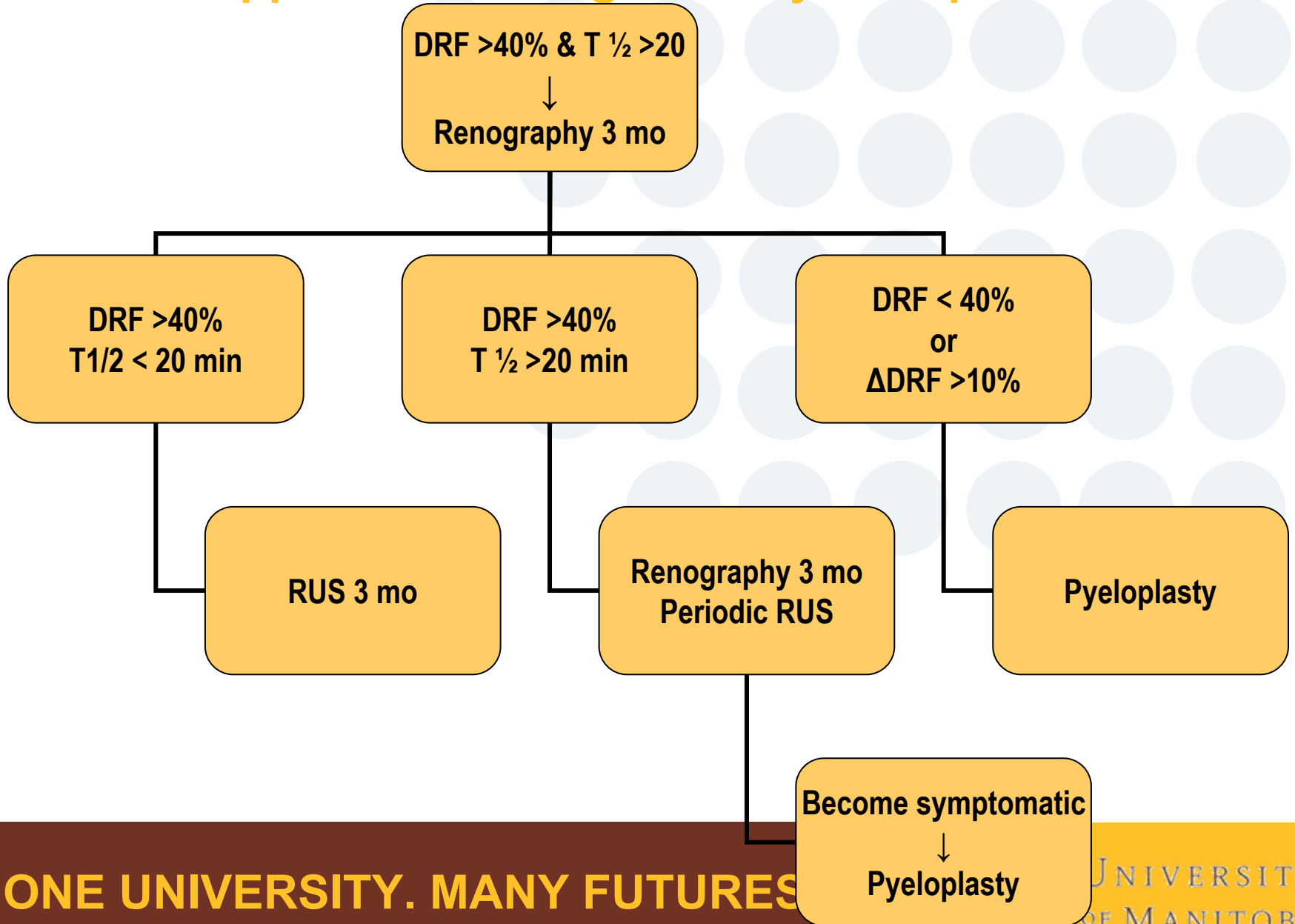


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2 years old and still
DRF >40% & T $\frac{1}{2}$ >20
-Natural History
Unknown

Parental Option
- Pyeloplasty

Parental Option
– Ongoing F/Up
With prolonged intervals
b/w renography

Unique Situations Algorithm does not Apply

- Bilateral congenital hydronephrosis
- Solitary kidney with congenital HN

Bilateral Congenital Hydronephrosis

- No normal control kidney
- Function of both kidneys is at risk
- *Onen 2002*: Natural history study
 - Safe to observe closely
 - Intervene if:
 - \uparrow HN
 - differential function of $>10\%$ difference
($48/52 = 4\%$ difference - $43/57=14\%$)

Solitary Kidney w/ Congenital Hydronephrosis

- No literature on the subject
- No control kidney to assess DRF
- My thoughts - Intervene if:
 - Elevated Cr
 - No improvement seen early on
 - Unlikely to want to wait for signs of damage



My Indications of Pyeloplasty ≤ 2 Years Old *(2002-2009)*

- 17 pyeloplasties in ≤ 2 years old

#	Indication for Pyeloplasty
3	Initial/persistent fxn $<40\%$
3	Drop fxn $<40\%$
1	Sol K - \uparrow HN
2	\uparrow HN & \uparrow T $\frac{1}{2}$
4	\leftrightarrow HN & \leftrightarrow T $\frac{1}{2}$ at 2 y
3	Recurrent UTI
1	Pain & \uparrow T $\frac{1}{2}$ (\downarrow HN)

Dismembered Pyeloplasty

Open Surgery

Laparoscopic

Intra-peritoneal

Extra-peritoneal

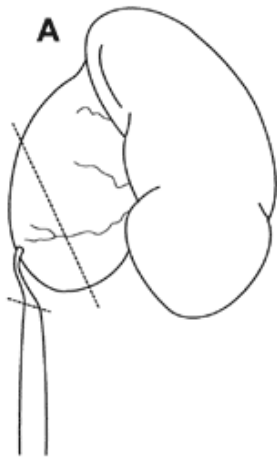


Figure 1 - Anderson-Hynes pyeloplasty.

mayo
CA-167580B-01A



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Post-Op Assessment

Diuretic Renography

-if $T_{1/2} < 20$ min =

Success

Psooy 2003

Renal US

**-decreased HN
suggests success**

Useful Information to Include in Your Report

1. DRF & T $\frac{1}{2}$
2. Description of the drainage curve if atypical
3. Any additional concerns about function
4. Level of hold up (UPJ or UVJ)
5. Comparison to the previous study
6. Technique (ex: foley catheter, IV hydration)
7. Hydronephrosis
8. Consider avoiding using the word “obstruction”
 - “UPJ Obstruction” vs “Hydronephrosis with prolonged drainage from the renal pelvis”

Thank You

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