Postnatal hydronephrosis – PUJO and others

Advanced Urology Course, June 2013
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Things to cover

• Evaluation of child post delivery - how early, what investigations (including problems with radionuclide scan interpretation, different types of O’Reilly curves)
• In PNH- observational treatment and its outcome.

• How do you manage a child by observation.
• Natural history of children treated conservatively due to PUJO.
• Briefly describe principles of Anderson-Heynes, also just mention other methods of repair
ANH

Unilateral

PUJO, VUR, VUJO, MCDK, Megaureter

Mild ANH
- U/S at 3-8 weeks of life. Underestimate if scanned <48 hours of life due to oliguria
- Persistent mild PNH or no PNH
  - Clinical follow-up
  - VUR

Moderate and severe ANH
- Prophylactic antibiotics
- U/S and VCUG 3-8 weeks of life
  - Boys think PUV
  - Others
    - If persistent, for radionuclide scan e.g. MAG3

Bilateral, Single kidney

PUV, Bilateral VUR, Bilateral PUJO/VUJO

Needs prompt U/S and VCUG
- If BOO suspected, bladder decompression + antibiotics
- Girls possible ectopic ureterocele
- Others, treat accordingly
Follow-up and when to intervene

- PUV – Azhar
- VUR – Siva
- Non-refluxing megaureter
- Multicystic dysplastic kidney (MCDK)
- Pelviureteric junction obstruction (PUJO)
Non-refluxing megaureter

- Requirement to operate is low 10-15%
- Operate if differential function <40%
- Likely to resolve if retrovesical diameter <1cm

- But if decision to operate relies on severity or persistence of dilatation then op rate 20-30%
- This policy not validated because severity ≠ loss of function

- Beyond 2-3 years of age, risk of functional deterioration or complications e.g. stone formation is small
MCDK

- **Hypertension** = nephrectomy
- But prophylactic nephrectomy to avoid hypertension **not** justified because incidence of hypertension 0.5%
- Long term data limited

- Risk of developing Wilms’ tumour among MCDK 1:2000-8000
- But should remove kidneys with atypical cystic anomalies which contain **solid components**
PUJO

- Can present with flank mass, pain, hematuria, infection
- Also uremia if bilateral, or unilateral PUJO in single kidney

- Accounts for **35-50% significant ANH**
- Previously, all cases had pyeloplasty on assumption that even asymptomatic newborns were destined to have morbidity later

- Ransley et al and Koff et al in late 80’s and early 90’s challenged this assumption base on:
  - **Difficult to establish obstruction** on isotope renography in infancy
  - **Natural history** of asymptomatic healthy infants poorly documented
PUJO

• Assessment
  – Ultrasonography to differentiate from other pathologies e.g. MCDK
  – Diuretic renography

• Diuretic renography
  – Information on differential renal function and obstruction
  – 99mTC-DTPA only filtered = slow kidney uptake = more blood background
  – 99mTC-MAG3 filtered and secreted = faster uptake = less background

• Problems with radionuclide scans? Inaccurate if:
  – Poor renal function = impaired response to furosemide
  – Gross dilatation = overestimate function depending of ROI
PUJO

- Type I curve
- Normal
• Type II curve
• Obstructed

Furosemide at 20mins

Curve flat or continues to rise
PUJO

- Type IIIa curve
- Low pressure, non-obstructed

Furosemide at 20mins

Curve falls after diuretics
PUJO

- Type IIIb curve
- Equivocal
- Can be clarified with F-15

Furosemide at 20mins

Curve falls slightly
PUJO

- Type IV curve (Homsy’s sign)
- Intermittent obstruction, which occurs at high flow rate
- F-15 will show obstructed pattern

Furosemide at 20mins

Curve falls then rises after a few minutes
SFU grading of infant hydronephrosis

**Pattern of renal sinus splitting**

0 – no splitting

I – urine in pelvis barely splits sinus

II – urine fills intrarenal pelvis

II – urine fill extra renal pelvis + major calyces dilated

III – SFU2 + minor calyces uniformly dilated + parenchyma preserved

IV – SFU3 + parenchyma thinned
PUJO - To pyeloplasty or not to pyeloplasty?

• Ismail et al, J Urol 2006
  – 234 ANH managed over a 13-year period
  – Early pyeloplasty in 22%
  – Of the remaining 78%, a quarter (19% of total) had delayed pyeloplasty (deterioration of function or infection) at mean age 18 months
  – Remaining 58% no deterioration

• Dhillon et al, personal communications
  – 76 ANH, unilateral PUJO, dif function >40%, min follow up 16 years
  – 37% had pyeloplasty for ↓ function, ↑ dilatation, symptoms
  – Mostly (80%) operated by 4 years of age
  – 52% complete or significant resolution by 16 years of age
  – 11% stable dilatation at 16 years and still on follow up
PUJO - To pyeloplasty or not to pyeloplasty?

• Conservative management (dif function >40%)
  – Renal pelvic (AP) diameter >2cm or SFU grade 4
  – Just over 50% probability of pyeloplasty by age 16
  – Up to 45% probability of complete resolution or sustained improvement
  – About 5% stable but significant obstruction by age 16 – further follow up

  – Dhillon et al followed up patients with differential function >40%
  – 84% of AP diameter 30-40mm and 100% of AP diameter >40mm
deteriorated and needed pyeloplasty

• Pyeloplasty
  1. Differential function <40%, or 10% reduction on serial renography
  2. AP diameter >35mm or ?SFU grade 4
  3. Symptoms/complications like pain and infection
PUJO - Pyeloplasty

• Anderson-Hynes dismembered pyeloplasty
PUJO – Pyeloplasty

- Anderson-Hynes dismembered pyeloplasty
  - Retroperitoneal approach is standard
  - Transperitoneal if bilateral
  - No need stent if straightforward repair in paediatrics – avoid another GA
  - Durable with long term recurrence of 5%

- For large redundant pelvis = reduction pyeloplasty
- If crossing lower pole vessel encountered = transpose the ureter
PUJO - Pyeloplasty

- **Foley Y-V plasty**
  - Best applied to those with high of the ureter
  - Base of the V at the dependent medial aspect of the renal pelvis
  - The apex of the V at the PUJ, and continued down the ureter till area of normal caliber ureter

- **Culp-DeWeerd spiral flap**
  - Suited for relatively long proximal ureteral obstruction
  - Flap placed on the lateral side of obstruction
  - Length-to-width ratio <3:1 to preserve vascularity
PUJO - Pyeloplasty

• Sardino-Prince vertical flap
  – When dependent PUJ is situated at the medial aspect of a box-shaped renal pelvis
  – Similar to spiral flap

• Ureterocalycostomy
  – PUJO and small intrarenal pelvis
  – Mobilize kidney to access lower pole for LP nephrectomy
  – After anastomosis, close renal capsule over parenchyma
  – But protect area of anastomosis with perinephric fat or omental flap
PUJO - Pyeloplasty

- Other approaches to pyeloplasty
  - Laparoscopic pyeloplasty
  - Mostly dismembered pyeloplasty
  - Contemporary series report success (durable clinical and/or radiographic success) at about 95%
  - Operating time some series longer than open but others comparable
  - Hospital stay shown to be shorter

  - More data on robotic-assisted pyeloplasty
  - Similar to laparoscopic
  - More expensive
PUJO - Endopyelotomy

• Laser
  – Short segment
  – Not functionally significant obstruction

• Percutaneous approach (cold knife)
  – Same as for laser
  – Concomitant renal stones
Thank you