Raised Creatinine in Childhood

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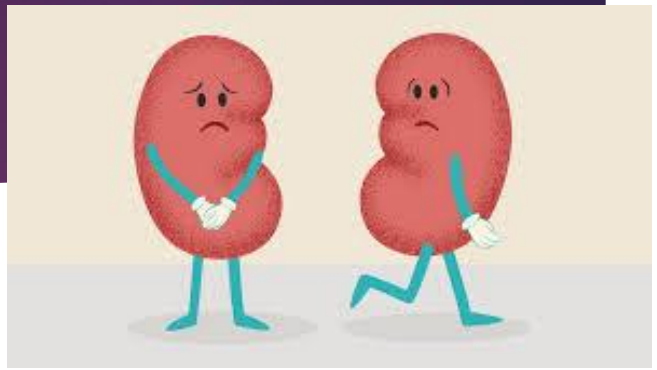
Overview

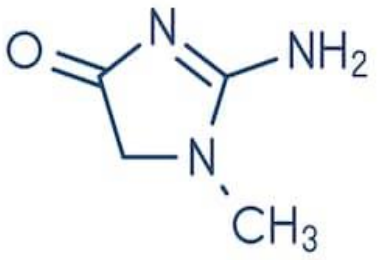
- What is a raised creatinine and why does it matter
- How to calculate eGFR in children
- Renal failure in children
- How to approach raised creatinine
- What needs monitoring in secondary care
- When to consider tertiary referral

Renal failure in children



- Chronic renal failure in children in uncommon
- Children in the UK rarely have routine bloods taken
- Normal ranges of creatinine vary between labs and are dependent on height and muscle mass of the child
- Raised creatinine a child may be physiologically normal or may reflect acute or chronic renal pathology
- Important to identify CKD in children as careful management in childhood may preserve renal function to avoid or delay ESRF

‘Normal Creatinine’



creatinine

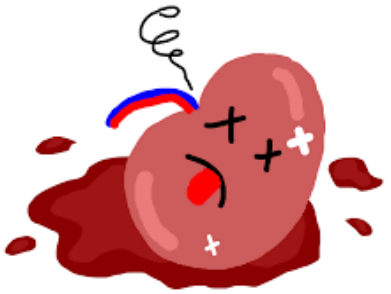
- Creatinine rises throughout childhood
- Normal adult creatinine is only reached once child is post-pubertal and will vary in adulthood
- Creatinine will physiologically rise as the child gets taller and develops increasing muscle mass.
- Creatinine will vary with hydration status, illness, health

Calculation of eGFR in children

- Allows calculation of creatinine in relation to height
- GFR $\frac{\text{Height (cm)} \times 40}{\text{Creatinine umol/L}}$ = GFR (ml/min)
- Many online calculators available

  Nephron.com
- eGFR >90 is normal in children

Presentation of CRF in children



- Creatinine is only part of the picture
- In a small thin child Plasma Cr does not rise until renal function is significantly impaired
- But many of these children will have other features of renal pathology including hypertension, proteinuria, haematuria
- Creatinine often jumps significantly at puberty due to growth spurt and development of muscle mass

Approach to raised creatinine in a child

- **History**
  - UTIs
  - Periods of significant illness in childhood
  - Health and hydration when blood taken
  - Abnormal antenatal imaging
  - Family history of renal pathology
  - Urinary symptoms

- **Examination**
  - BP
  - Height and weight and assessment of muscle mass
  - Pubertal status
  - Urine dip
  - Calculate eGFR

What is normal?

- A well child with 'raised' creatinine but normal eGFR, normal BP and normal urine dip does not require further investigation or monitoring

- Modestly raised creatinine when child unwell or dehydrated should be repeated when child recovered and reminded to drink.

Raised Cr - Workup

- Renal USS
- UE, FBC, LFT, Bone, C3/C4, Immunoglobulins, bicarbonate, PTH
- Urine dip
- BP

Consider

- DMSA
- MAG3

Management of raised Cr in Secondary Care

- Persistently raised creatinine with eGFR <90 should have further investigation / Monitoring
- 6-12 monthly monitoring of bloods, urine dip, BP
- 1-2 yr renal uss
- Lifestyle advice
  - UTIs
  - Hyrdration
  - Voiding
  - Avoid nephrotoxic drugs
- Caution at time of puberty

When to consider referral to tertiary paediatric nephrology

Aims of referral

- Identification of underlying pathology to guide treatment
- Prepare for renal replacement therapy
- Specialist MDT input

When to refer

- Rapidly deteriorating renal function
- Significant albuminuria
- eGFR <40-50 or falling quickly
- Deranged biochemistry

Summary

- Borderline raised creatinine is a common finding and may be physiologically normal
- Significantly raised creatinine or rising creatinine or associated with other abnormal findings are much more likely to have underlying pathology
- Many children can be monitored in secondary care but some will need tertiary referral