Ashford and St. Peter's Hospitals
NHS Foundation Trust

Management of a Child with a Solitary Functioning Kidney

Author: Dr Carys Mangan, Paediatric ST5

Supervisor: Dr Tatiana Hyde, Paediatric Consultant

Contact details: c.mangan2@nhs.net tatiana.hyde@nhs.net

Guideline History		
Date	**Comments**	**Approved By**
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1.

Management of a child with a solitary functioning kidney

This guideline looks at the management of a child with a solitary functioning kidney. A single functioning kidney refers to a child with one kidney contributing to the renal function. This may be due to the physical absence of a second kidney, from damage leading to atrophy of one kidney, surgical removal of a kidney or a second kidney not working properly due to poor development or damage.

It is estimated that 1 in 2000 babies are born each year with renal agenesis and 1 in 500 to 1 in 800 have solitary functioning kidneys.

Children with a solitary kidney may be predisposed to hypertension, proteinuria and chronic kidney disease (CKD) as a consequence of hyper-filtration. Therefore, these children require increased surveillance to be able to implement timely prevention strategies. This guideline will outline what the surveillance should consist of.

In the presence of risk factors for any cause of solitary functioning kidney, children require 6 monthly follow up as a minimum which should include:

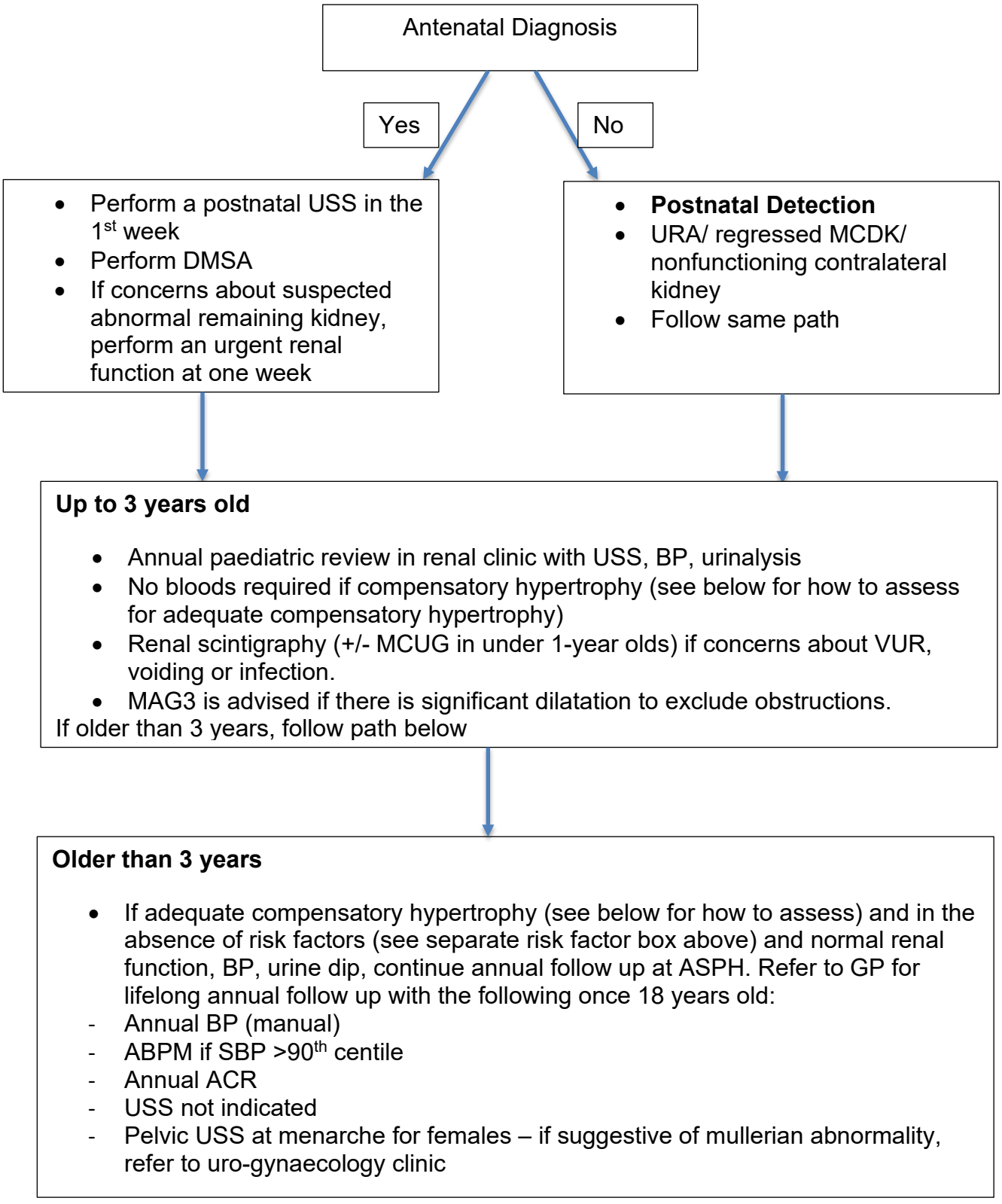
- Manual BP
- Annual ABPM if >5 years
- ACR at each encounter
- Creatinine 2-4 times per year
- USS as indicated clinically
- Pelvic USS at menarche for females – if suggestive of mullerian abnormality, refer to uro-gynaecology clinic

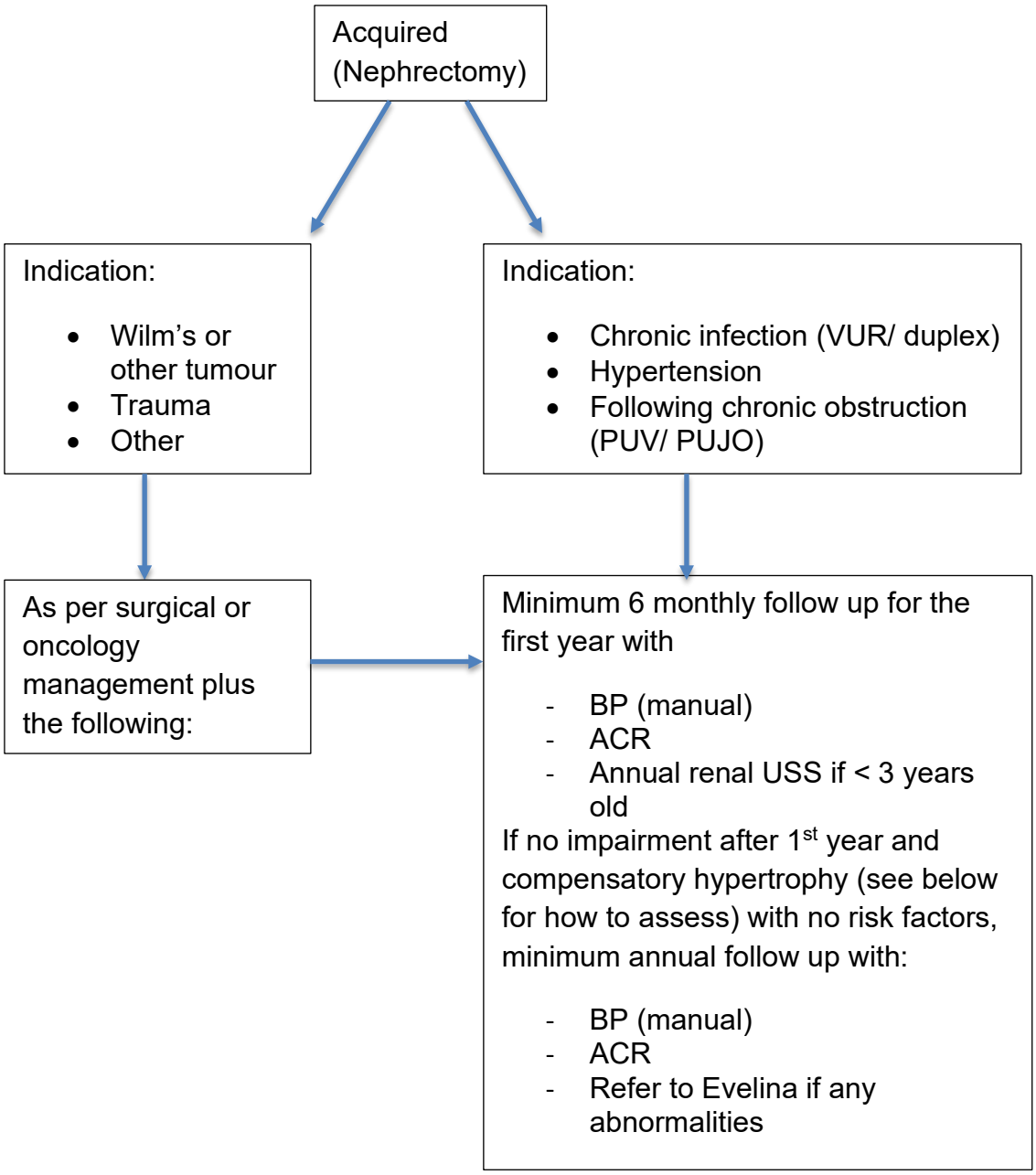
These children should be referred to tertiary renal centres- Evelina renal team.

Risk factors

- Abnormal renal function
- Congenital anomalies of the kidney and urinary tract (CAKUT) in solitary functioning kidney
- Ureteric/ pelvic dilatation of solitary functioning kidney
- Small renal size
- Low birth weight and subsequent growth
- Prematurity
- History of UTIs

Management after detection





Key

URA- unilateral renal agenesis
MCDK- multicystic dysplastic kidney
CAKUT- congenital anomalies of the kidneys and urinary tract
PUJO- Pelvic-ureteric junction obstruction
PUV- posterior urethral valves
MCUG- micturating cystourethrogram
USS- ultrasound scan
ACR- albumin creatinine ratio
ABPM- ambulatory blood pressure monitoring
RAAS renin angiotensin aldosterone system

Assessing for adequate compensatory hypertrophy

Adequate hypertrophy is when the kidney length is more than or equal to 2 standard deviations (>95th centile) above the means for their size. Serial plotting of the growth of the solitary kidney on a kidney growth chart or an online renal growth calculator e.g. (https://www.prevmed.sunysb.edu/jjc/MrNomogram/default2.aspx) will help identify patients whose growth is not showing compensatory hypertrophy.

Key point for investigations and management

- The incidence of solitary kidney is relatively common (1 in 500 to 1 in 800 births) and not all need follow up in tertiary care.
- In the absence of risk factors and in the context of normal renal function, absence of hypertension and proteinuria, with adequate compensatory hypertrophy, annual review with the GP or in outpatients at SPH is sufficient.
- This follow up must be lifelong.
- There is a risk of decline in kidney function during puberty, which persists into adulthood, including during pregnancy for females (pre-eclampsia, gestational proteinuria or hypertension and UTIs).
- Avoid nephrotoxic medications as far as possible and monitor drug levels where applicable.

Monitoring complications including reduction in GFR, albuminuria and hypertension

- **Plasma creatinine measurement**: Surveillance blood tests are not necessary unless risk factors develop or are present. Proteinuria and hypertension act as indications of CKD. Children are particularly vulnerable to risk factors developing during the rapid growth of adolescence.
- **BP monitoring**: Annual blood pressure monitoring is recommended and should be lifelong. If elevated, recheck on 2 further separate episodes (as per European society of hypertension guidelines) and if persistently elevated, ambulatory blood pressure measurement (ABPM) or home doppler measurements to confirm hypertension. If confirmed hypertension, refer to nephrology at Evelina. If elevated >95th centile for age/sex/height, refer without delay. Antihypertensive medication should only be initiated in conjunction with nephrology input.
- **Monitoring for proteinuria**: Along with hypertension, albuminuria is another early marker of glomerular hyperfiltration. The accuracy of urine dips correlates poorly with UACs when assessing outcomes. Perform a first morning void UAC ratio as a screening tool for this during yearly life-long screening visits. If elevated refer to nephrology at Evelina. Treatment should be considered in case of modestly elevated UAC ratios (3.39-33mg/mmol) and is strongly advised in case of a UAC ratio >33 mg/mmol. This should be initiated in conjunction with nephrology input.

Genetic screening

Genetic screening should be limited to children with additional anomalies or a positive family history of renal tract abnormalities. Other associated anomalies include anorectal, bladder, uterine, pulmonary hypoplasia, talipes or cardiac (atrial or ventricular septal defects). Enquire about maternal diabetes mellitus or use of specific drugs (immunomodulatory, anticonvulsants and RAAS inhibitors) during pregnancy.

Screening for Mullerian Tract Abnormalities

The paramesonephric (Mullerian) and mesonephric (Wolffian) ducts are embryologically related. In males, this might manifest as seminal vesicle hypoplasia/ absence of the vas deferens, but this often goes unrecognised. In females, abnormalities may need surgical intervention.

After the onset of menarche, enquire about cyclic abdominal pain. Mullerian abnormalities should be excluded by ultrasound (including obstructed hemi-vagina and ipsilateral renal anomaly (OHVIRA) syndrome and Mayer-Rokitansky-Kuster-Hauser syndromes)

- USS of pelvis assessing internal organs in 1st month of life as baseline and may help understand Mullerian anatomy. This could be combined with 1st postnatal renal scan
- USS of pelvis at menarche to detect OHVIRA group and non-obstructive Mullerian anomaly
- USS pelvis if menarche not achieved by 14 years of age to detect MRKH anomaly

What to tell parents:

As their child only has one functioning kidney, renal injury, of any aetiology, increases the risk/degree of renal insufficiency. Loss of that kidney might result in the need for dialysis or a renal transplant and lifelong medications.

What they can do:

- Ensure their child attends **LIFELONG** annual review of blood pressure, urinalysis plus any further appointments if abnormalities identified.
- Ensure **transition** to adult services if under secondary care follow up
- **Fluid** intake should be encouraged
- **Diet** should be healthy with the aim to keep the child's weight in a healthy range. Avoid excessive salt intake. No evidence for limiting protein intake (children need sufficient protein to grow) but also advised to avoid excess to reduce risk of glomerular hyperfiltration.
- **Constipation** and **dysfunctional voiding** to be flagged so that it can be dealt with promptly
- **Medications**:
    - Avoid NSAIDs. Other drugs may be nephrotoxic and should always be checked before administering.
    - If on an ACE inhibitor for proteinuria or hypertension, to be aware to hold when reduced fluid intake
    - Antibiotic prophylaxis: no evidence that this is valuable in children with a solitary kidney unless it is associated with suspected vesico-ureteric reflux and/ or recurrent UTIs.
- In females, parents should be counselled about the possibility of co-occurring **Mullerian duct anomalies.** Advised to attend GP for USS at the onset of menarche.
- Participation in **sports**: children with a solitary kidney are not at higher risk of renal injury during contact sports, but if an injury occurred it could result in the loss of kidney function and need for dialysis. Renal injuries from motor vehicle accidents are much more common than injuries from sporting activities. Therefore, their child should always be in appropriate care restraints and be aware of pedestrian/ bicycle road safety. Renal injury can result from contact/ collision or limited contact sports, but the risk of head injuries are greater to keep things in perspective. Wearing protective padding during contact/ collision sports +/- limiting contact sports may decrease the risk of renal injury. Cycling, skiing, snowboarding and horse related activities may carry a higher risk than other activities.

References

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- Poggiali IV, et al. A clinical predictive model of renal injury in children with congenital solitary functioning kidney. Pediatr Nephrol. 2019 Mar;34(3):465-474.
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3. Supporting relevant trust guidelines

2. Guideline Governance

a. Scope

This guideline is relevant to all staff caring for all children from 0-18 years old across the emergency department, inpatient ward and outpatient department.

b. Purpose

i. This guidelines aims to facilitate a common approach to the management of children. At times deviation from the guideline may be necessary, this should be documented and is the responsibility of the attending consultant.

ii. This guideline is subject to regular review to ensure ongoing evidence based practice.

c. Duties and Responsibilities

All healthcare professionals responsible for the care of all children 0-18years should be aware of practice according to this guideline.

d. Approval and Ratification

This guideline will be approved and ratified by the Paediatric Guidelines Group.

e. Dissemination and Implementation

i. This guideline will be uploaded to the trust intranet 'Paediatric Guidelines' page and thus available for common use.
ii. This guideline will be shared as part of ongoing education within the Paediatric Department for both medical and nursing staff.
iii. All members of staff are invited to attend and give comments on the guideline as part of the ratification process.

f. Review and Revision Arrangements

a. This policy will be reviewed on a 3 yearly basis by the appropriate persons.
b. If new information comes to light prior to the review date, an earlier review will be prompted.
c. Amendments to the document shall be clearly marked on the document control sheet and the updated version uploaded to the intranet. Minor amendments will be ratified through the Paediatric Guidelines Group. A minor amendment would consist of no major change in process, and includes but is not limited to, amendments to documents within the appendices.

g. Equality Impact Assessment

Background • Who was involved in the Equality Impact Assessment
Author and the supervising consultants.
Methodology • A brief account of how the likely effects of the policy was assessed (to include race and ethnic origin, disability, gender, culture, religion or belief, sexual orientation, age) • The data sources and any other information used • The consultation that was carried out (who, why and how?)
All groups of staff and patients were taken into consideration and there is no bias towards or against any particular group.
Key Findings • Describe the results of the assessment • Identify if there is adverse or a potentially adverse impacts for any equalities groups
There is no evidence of discrimination.
Conclusion • Provide a summary of the overall conclusions
There is no evidence of discrimination.
Recommendations • State recommended changes to the proposed policy as a result of the impact assessment • Where it has not been possible to amend the policy, provide the detail of any actions that have been identified • Describe the plans for reviewing the assessment
This guideline is appropriate for use.

h. Document Checklist

To be completed (electronically) and attached to any document which guides practice when submitted to the appropriate committee for approval or ratification.

Title of the document: Management of a Child with a Solitary Functioning Kidney

Policy (document) Author: Carys Mangan and Tatiana Hyde

Executive Director: N/A

		Yes/No/ Unsure/NA	Comments
1.	**Title**		
	Is the title clear and unambiguous?	**Y**	
	Is it clear whether the document is a guideline, policy, protocol or standard?	**Y**	
2.	**Scope/Purpose**		
	Is the target population clear and unambiguous?	**Y**	
	Is the purpose of the document clear?	**Y**	
	Are the intended outcomes described?	**Y**	
	Are the statements clear and unambiguous?	**Y**	
3.	**Development Process**		
	Is there evidence of engagement with stakeholders and users?	**Y**	
	Who was engaged in a review of the document (list committees/ individuals)?		**Paediatric guideline committee, ELCH renal team and network.**
	Has the policy template been followed (i.e. is the format correct)?	**Y**	
4.	**Evidence Base**		
	Is the type of evidence to support the document identified explicitly?	**Y**	

		Yes/No/ Unsure/NA	Comments
	Are local/organisational supporting documents referenced?	**Y**	
5.	**Approval**		
	Does the document identify which committee/group will approve/ratify it?	**Y**	
	If appropriate, have the joint human resources/staff side committee (or equivalent) approved the document?	**N/A**	
6.	**Dissemination and Implementation**		
	Is there an outline/plan to identify how this will be done?	**Y**	
	Does the plan include the necessary training/support to ensure compliance?	**Y**	
7.	**Process for Monitoring Compliance**		
	Are there measurable standards or KPIs to support monitoring compliance of the document?	**Y**	
8.	**Review Date**		
	Is the review date identified and is this acceptable?	**Y**	
9.	**Overall Responsibility for the Document**		
	Is it clear who will be responsible for coordinating the dissemination, implementation and review of the documentation?	**Y**	
10.	**Equality Impact Assessment (EIA)**		
	Has a suitable EIA been completed?	Y	

Committee Approval (Paediatric Guidelines Group)			
If the committee is happy to approve this document, please complete the section below, date it and return it to the Policy (document) Owner			
Name of Chair	**Alexandra Jones**	**Date**	**13/5/2026**
Ratification by Management Executive (if appropriate)			
If the Management Executive is happy to ratify this document, please complete the date of ratification below and advise the Policy (document) Owner			
Date: n/a			