Diagnostic Imaging Pathways - Loin Pain (Renal Colic)

Population Covered By The Guidance

This pathway provides guidance on the investigation of adult patients with renal colic, including those presenting for the first time and those with recurrent symptoms.

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Quick User Guide

Move the mouse cursor over the PINK text boxes inside the flow chart to bring up a pop up box with salient points.
Clicking on the PINK text box will bring up the full text.
The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

SYMBOL	RRL	EFFECTIVE DOSE RANGE
	None	0
	Minimal	< 1 millisieverts
	Low	1-5 mSv
	Medium	5-10 mSv
	High	>10 mSv

Pathway Diagram

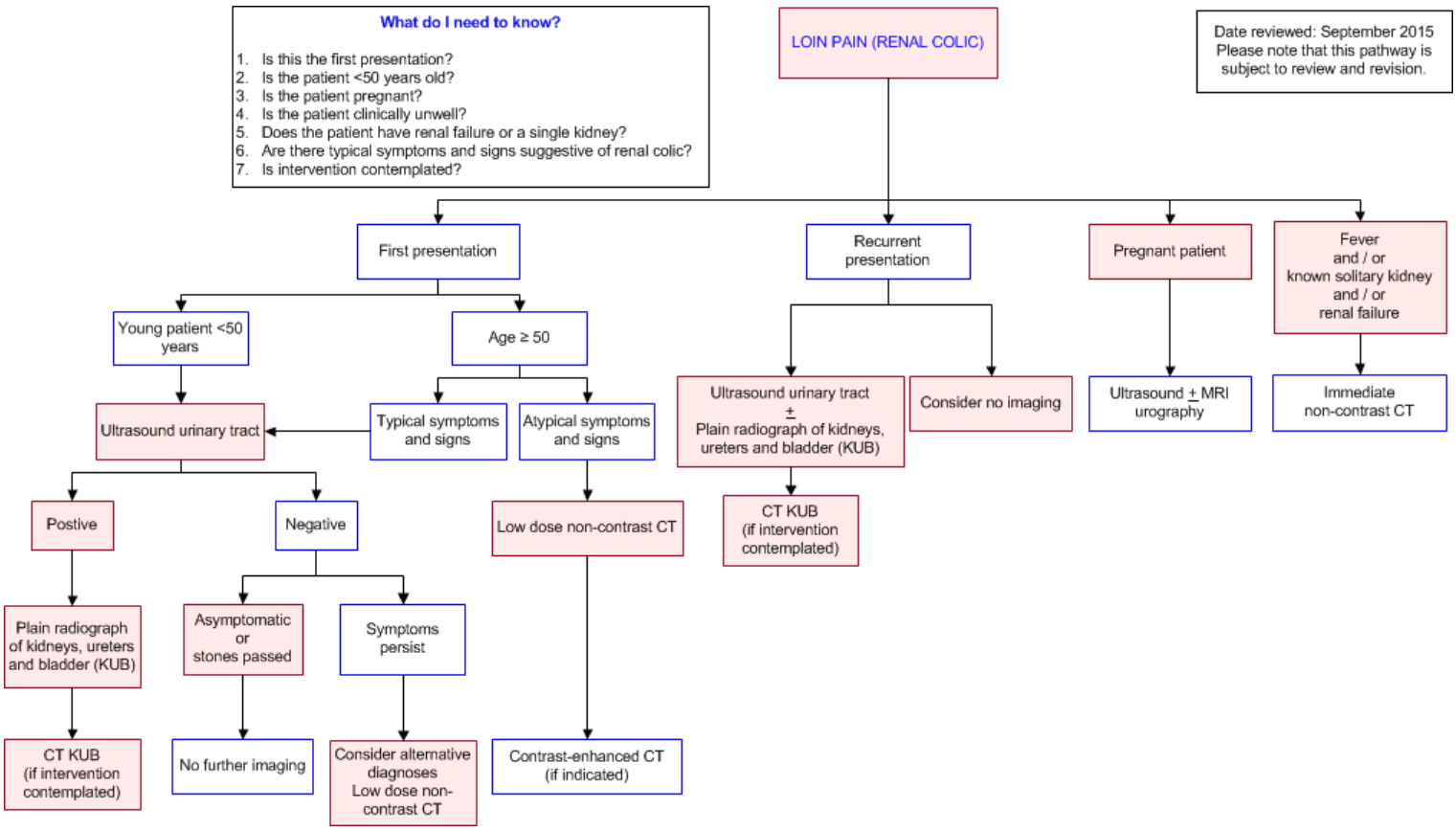

Image Gallery

Note: These images open in a new page

1

Urolithiasis

Image 1 (Plain Radiography of Kidneys, Ureter, Bladder - KUB): An opacity is present (arrow) at the left vesico-ureteric junction.

2

Pelvicalyceal Dilatation

Image 2 (Intravenous Pyelography): No stone is visualised, but there is dilatation of the ureter and pelvicalyceal system on the left side.

3

Staghorn Calculus

Image 3 (KUB): A staghorn calculus is present in the collecting system of the right kidney.

4a

4b

Urolithiasis

Image 4a and b (Computed Tomography): A 10mm calculus is present at the left pelviureteric junction responsible for mild left hydronephrosis and perinephric stranding.

Teaching Points

- Non-enhanced CT is the ‘gold-standard’ for diagnosis of ureteric colic
- Low-dose CT protocols can be effectively used in acute renal colic
- Immediate imaging is required when patients do not improve after treatment and / or when there is fever and / or leukocytosis and / or the patient has renal failure or a single kidney
- However, because of concerns about ionising radiation and because the vast majority of ureteric stones pass without the need for intervention, ultrasound (US) has been increasingly recommended and used as the initial imaging modality, with no sacrifice in patient outcome, thus avoiding the need for CT in about 70% of cases
- Ultrasound is also capable of identifying most of the alternative diagnoses listed as mimickers of renal colic
- US in combination with plain x-ray KUB misses very few clinically important stones
- In pregnant patients, it should be borne in mind that unless a calculus is visualized it may be difficult to differentiate obstructive hydronephrosis due to a calculus from ‘physiological’ hydronephrosis of pregnancy. In selected cases, MRI urography may be then required
- Conventional IVP can now be considered almost obsolete for the diagnosis of renal colic

Loin Pain (Renal Colic)

- Non-enhanced CT is the ‘gold-standard’ for diagnosis of ureteric colic and is used in many institutions. However, despite the introduction of low-dose CT protocols, because many patients are young and have recurrent episodes of renal colic, there is concern about cumulative radiation dose. Therefore, ultrasound (US) has been increasingly recommended and used as the initial imaging modality, with no sacrifice in patient outcome, thus avoiding the need for CT in about 70% of cases. 1 Despite the superior sensitivity of CT versus US, the outcome is the same whether CT or US is used for imaging 2
- Recent European Association of Urology Guidelines on urolithiasis recommend US as the primary imaging modality, 3 quoting a sensitivity of 45% and specificity of 94% for ureteric stones 4
- Because young patients with typical symptoms of renal colic have a low incidence of adverse

outcomes, there is a valid argument for avoiding acute imaging altogether, and deferring investigating only if symptoms persist or the stone has not been known to pass
- Immediate imaging is required when patients do not improve after treatment and / or when there is fever and / or leukocytosis and / or the patient has renal failure or a single kidney
- Predictors for spontaneous passage of ureteric stones include
    - Stone size - the large majority of stones

Computed Tomography of the Kidneys, Ureters and Urinary Bladder (CT KUB)

- Unenhanced (i.e. no IV contrast) CT scan - so called CT KUB or NCCT is the most accurate and widely used imaging investigation for diagnosis of ureteric stones. However, despite the superior sensitivity of CT versus ultrasound (US), the outcome is the same whether CT or US is used for imaging 2
- CT can identify the presence of stones with very high accuracy (>95%), 16 allows accurate measurement of stones (the major factor in determining whether stones will pass without intervention) and, to some extent, stone composition. CT is also able to identify alternative diagnoses that can mimic renal colic in up to 10% of cases, 17 e.g.
    - Pyelonephritis
    - Acute adnexal pathology in women
    - Appendicitis
    - Diverticulitis
    - Abdominal aortic aneurysm rupture or aortic dissection
    - Colonic diverticulitis
- However, it should be noted that US is also capable of identifying most of the alternative diagnoses listed as mimickers of renal colic
- Studies using "low-dose" protocols have shown sensitivities of 93-97% and specificities of 86-97%, when compared to standard dose CT, 18 and radiation doses equal to or lower than that of intravenous pyelogram (IVP). 18,19,20 More recent studies confirm the accuracy of low dose protocols in patients with a BMI30, discretionary increase in CT exposure parameters may be needed
- Earlier studies using "low-dose" multidetector CT (MDCT) protocols reported increased rates of false positive and false negative results in obese patients. 18,20 More recent studies have not reported similar difficulties 19,25
- Despite the above, the adoption of low-dose protocols has not been universal 27
- However, there is concern regarding cumulative dose from repeated studies required for follow-up of calculi, or in patients with recurrent stones 28,29 although this is much less of an issue if low-dose protocols are employed
- There is a trend towards a more discriminate use of CT KUB in patients with clinical uncomplicated acute renal colic, particularly in young female patients, in whom there is a relatively high incidence of negative CT examinations, and in whom radiation is more of an issue 8,9
    - Of the issue of ionising radiation
    - The vast majority of ureteric stones pass without the need for intervention
    - CT in the emergency department rarely alters immediate management 6,7
    - Adverse events are rare among patients

Pregnant Patients

- Ultrasound (US) is the first investigation of choice as it does not involve exposure to ionising radiation. However, it should be borne in mind that unless a calculus is visualized it may be difficult to differentiate obstructive hydronephrosis due to a calculus from 'physiological' hydronephrosis of pregnancy. In selected cases, MRI urography may be required 37

References

Date of literature search: September 2015

The search methodology is available on request. Email

References are graded from Level I to V according to the Oxford Centre for Evidence-Based Medicine, Levels of Evidence. Download the document

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