Renal colic

This was from a BMJ Clinical Review and much of it will be familiar to you, but there are a few useful points on when to refer or admit and what investigations should be performed (BMJ 2012;345:5499).

Renal colic statistics

- Lifetime risk for men is 1 in 8, for women it is 1 in 16.

Risk factors

- Obesity.
- Dehydration (producing less than 1L of urine a day is associated with a substantially increased risk of stone formation compared with 2L/day).
- Previous stone: risk of a second stone is 30–40% within 5 years.
- Family history (unclear if due to genetic factors or common environmental factors such as low fluid intake).
- Anatomical abnormality of the renal tract, e.g. horseshoe kidney.
- Diseases: hyperparathyroidism, renal tubular acidosis, myeloproliferative disorders, all chronic diarrhoeal conditions including colitis (although it is unclear if this is only when they are having diarrhoea and presumably are a bit dehydrated or whether it applies all the time).

Clinical features

These won’t be a surprise to you:

- Sudden onset severe loin pain often described as being similar to labour pains.
- Occurs around the costo-vertebral angle (where the sacrospinalis muscle crosses the 12th rib – for those for whom the anatomy of the back is a bit hazy; see diagram).
- Pain radiates to flank, groin, testes/labia depending on level. Usually colicky in nature, with waves of pain of varying intensity, followed by being completely pain-free between attacks.
- Patients are often restless with pain – unlike with peritoneal conditions where patients often lie very still.
- If the stone is caught at the vesico-ureteric junction it may cause strangury (the urgent desire to pass urine), frequency, straining, but only small volumes passed. This is caused by the stone irritating the detrusor muscle (smooth muscle of bladder wall).
- Nausea and vomiting are common.
Visible haematuria may occur – it can then be a challenge to work out if the pain is caused by a stone or a clot caused by some other upper renal tract pathology. A concomitant infection may also be present – this may cause fevers and sweats. Take a temperature!

Always examine the testes: scrotal conditions can occasionally present purely with abdominal pain. Be aware that some gynae conditions (ovarian pathology, ectopic pregnancy) can sometimes cause similar pain.

A leaking abdominal aneurysm can mimic renal colic – be particularly aware of this in those over 60 who are vascularpaths.

Remember: although stones are the commonest cause, this sort of pain can also be caused by blood, and sloughed renal papilla (sickle cell disease, diabetes, long-term analgesia use). External pressure on the ureter (e.g. from lymphadenopathy) can also cause pain, although this tends to be milder and more constant.

**STONE clinical prediction score**

But all that aside, it is still hard to know if someone has a stone or not, but now researchers have developed a clinical prediction rule that might help (BMJ 2014;348:g2191). Using over 1000 patients presenting to US secondary care with flank pain who underwent a CT for suspected renal colic, they developed a clinical prediction rule and then tested it on almost 500 patients prospectively.

**STONE score**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Score (maximum 13)</th>
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<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>0</td>
</tr>
<tr>
<td>Male</td>
<td>2</td>
</tr>
<tr>
<td>Timing</td>
<td></td>
</tr>
<tr>
<td>Pain for &gt;24h</td>
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<tr>
<td>Pain for 6-24h</td>
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<tr>
<td>Pain for &lt; 6h</td>
<td>3</td>
</tr>
<tr>
<td>Origin (racial origin)</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>0</td>
</tr>
<tr>
<td>Not black</td>
<td>3</td>
</tr>
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</table>
Score 0-5: low probability (<10% have a stone).
Score 6-9: moderate probability (around 50% have a stone.
Score 10-13: high probability (almost 90% have a stone)

During the prospective validation phase, when they were testing whether it worked or not:

- About 15% of patients were classified as low probability.
- In those with a high probability score, the chance of another significant diagnosis was low (<2%) whereas in those with a low probability score the chance was near 4%. This suggests that you will only miss a small number of significant conditions in the high probability group – in fact the authors think that a CT may be avoided altogether because the chance of a stone is high and the chance of missing something important is very low (or a limited CT with lower radiation doses could be done that looks just for the presence of a stone and measures its size and doesn’t look for other pathology).
- Do remember though these were all people who the clinician thought probably had renal colic – it was not just anyone with abdominal pain – so you need to have reasonable clinical suspicion of a stone before you consider using the STONE scoring tool.

What does this mean in practice?

The STONE scoring system needs to be validated on a larger population prospectively, but this study is promising. If larger studies confirm these findings, this may be a really useful clinical prediction tool that may significantly aid our management of those with suspected renal colic.

Management

If the diagnosis is clear the patient can be managed at home provided that you can provide adequate pain relief and there are no complications (fever, obstruction, known renal pathology such as post-transplant, etc.).

Admit if:

- Diagnosis unclear.
- Unable to control pain.
- Fever.
- Renal colic in someone with a single kidney or post-transplant.
- Suspected bilateral stones causing obstruction.
- Acute renal failure.

Analgesia

<table>
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<th>No nausea and vomiting</th>
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<tbody>
<tr>
<td></td>
<td>Nausea alone</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Vomiting alone</td>
<td>2</td>
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<tr>
<td>Erythrocytes</td>
<td>Haematuria absent</td>
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</tr>
<tr>
<td></td>
<td>Haematuria present</td>
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</tr>
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</table>
Warmth

A small community-based trial showed that warming the flank with an electric blanket improved pain relief compared to no warmth. Although one of my patients did manage to set fire to her house doing this...!

Drugs

NSAIDs are recommended in this clinical review. The authors suggest that NSAIDs tend to provide better analgesia for this sort of pain than opioids and without the side-effects of opioids. A Cochrane review did not show superiority of one NSAID over another.

The use of NSAIDs first line is confirmed by a large RCT based in an A&E department in Qatar. People with presumed renal colic were randomised to either diclofenac (75m intramuscularly) or intravenous paracetamol (1g) or morphine (0.1mg/kg). Over 1 600 people were involved. People with known renal disease were excluded. Treatment was started before the diagnosis was confirmed with a scan. They found that (Lancet 2016;387:1999):

- NSAIDs were the best treatment in terms of
  - Pain relief within 30mins
  - Pain relief beyond 60 minutes
  - Reduced need for any additional medication (only 12% needed a top-up, v 20% in the other 2 groups).
  - Morphine was associated with more side effects than either of the other two medications.

A reminder that NSAIDs are the preferred treatment for renal colic, in the absence of renal disease.

Investigations

The British Association of Urological Surgeons/College of Emergency Medicine suggest the following investigations should be undertaken:

- Urine dipstick. Haematuria present in about 90% of those with stones, BUT 40% of those with haematuria and flank pain DON'T have stones. If dipstick positive for anything, send for MC&S.
- Bloods: check renal function (may not be possible acutely). In recurrent stone formers check serum calcium and urate.
- Biochemical analysis of the stone is suggested in this review for first time stone formers (wee into a sieve or into a jug and then sieve the urine!).
- Radiology:
  - Non-contrast CT is now the investigation of choice. This has similar radiation exposure to an IVU, is quicker and is more accurate.
  - Ultrasound is the first line investigation in children and pregnant women, but it is not as accurate, and is particularly poor at detecting stones in the ureters, but better at seeing them in the renal pelvis and bladder.
  - A plain film plus ultrasound scan approaches diagnostic accuracy of the CT scan, but is not first line for most patients.

Challenging this move towards non-contrast CT is a US study which randomised 2500 people attending A&E with suspected renal colic to either CT or ultrasound (NEJM 2014;371:1100). Those randomised to ultrasound could then have a CT after the ultrasound, if clinically indicated. Frustratingly the paper doesn't tell us how many people this happened to. There were no differences in pain, return visits to A&E/admission or adverse events between the groups, but the ultrasound group had a lower dose of radiation. Importantly there was no difference in the number of 'high risk' diagnoses that were missed – that is diagnoses that you wouldn't want to ever miss, such as a rupturing abdominal aneurysm. Overall the CT scan had a better sensitivity, but this did not result in better clinical outcomes. What does this mean in practice? If in doubt, talk to the radiologists!

What will happen to the stone?

There is mixed evidence on how many will pass the stone spontaneously and can therefore be managed conservatively. This in part depends on stone size and position. One recent trial of over 600 people showed that 86% passed the stone spontaneously although only half did so within 1w, almost 90% had passed it within 1m. Over 40% of stones bigger than 6mm had not passed spontaneously within 2m (at which point they are very unlikely to pass). The review suggests that most units now manage conservatively those with a stone <10mm, provided there is no sepsis or obstruction or other complications.

If a stone is passed, no further imaging is required.

Drug therapies

Drugs (alpha and calcium channel blockers) are increasingly being recommended to encourage expulsion. A meta-analysis of almost 6000 people found the NNT to pass 1 extra stone, was 4 (based on stones of 5-10mm), although the trials were considered to be of low to moderate quality (Lancet 2006;368:1171). The European Association of Urology Guidelines recommend tamsulosin as it may be slightly more effective than calcium channel blockers (European Urology 2007;52:1610).

However a UK based trial of 1136 people with CT confirmed stones less than 10mm in diameter has just been published. People were randomised to tamsulosin, nifedipine or placebo for 4 weeks (Lancet 2015;368:341).

- After 4 weeks, 80% needed no further treatment, regardless of which treatment they had had.
- These findings were not affected by size of stone (< or >5mm), stone location or gender.
- There was also no difference in pain scores and no difference in time taken to pass the stone.
The authors were confident enough to say that because of their calculations on the quality of their trial and its data, no further trials will be needed and drug therapy should no longer be considered.

Surgical treatment/lithotripsy
- The main treatments for stones that are large/do not pass are lithotripsy or ureteroscopy.
  - In lithotripsy a shockwave is generated and focused on the stone. More than one treatment may be required.
  - Ureteroscopy is usually done under general or spinal anaesthetic. A ureteroscope is inserted via the urethra, and through this the stone can be removed.

A recent Cochrane review suggested that ureteroscopy had a better success rate in terms of removing the stone, but involved a longer hospital stay and greater risk of complications.

Preventing recurrent stone formation
- For all stone formers, increasing urinary volume by 500mls/day or to 2l/day reduces recurrence. Any (non-alcoholic!) fluids seem to work, so recommending particular fluids to avoid or to consume is unnecessary (BMJ 2016;352:i52).
- Certain dietary restrictions can help, in part based on the type of stone (BMJ 2016;352:i52).
  - High dietary calcium doesn’t seem to increase the risk of stone formation, in fact in younger people (<60y) a high dietary intake was found to be protective against stones (in older people there wasn’t a clear protective effect, but no harms were found either, important in a population increasingly given calcium for their bones!). This may be because calcium binds to oxalate in the gut making an insoluble compound excreted in stool, and reducing oxalate levels in the urine (a culprit in stone formation). For this reasons if calcium is to be taken with supplements it may be better taken with meals rather than between meals. Conversely the WHI study showed an increased risk or renal stones in women on calcium and vitamin D (we think of the WHI study as a being an HRT study but they also looked at the impact of calcium and vitamin D on fractures, cardiovascular disease, breast and colon cancer).
  - Oxalate intake doesn’t seem to have much impact on urinary oxalate. However chronic diarrhoea, malabsorption conditions can increase the concentration of oxalate in the urine and increase stone risk. Enzyme defects can lead to high levels of urinary oxalate, and in these people strict reduction in dietary oxalate is recommended (this includes avoiding nuts, some vegetables such as chard, beets, some beans, the peel of citrus fruit).
  - High levels of vitamin C supplementation (not dietary vitamin C) increases the risk of stones by increasing urinary oxalate.
  - Urinary citrate inhibits calcium stone formation and high citrate diets (rich in fruit and vegetables) may reduce the chance of developing a renal stone.
  - Low sodium diets have been shown to reduce the chance of stone production (high levels of sodium increase urinary calcium and decreases urinary citrate).
  - Restricting meat and fish consumption (but not dairy protein) can reduce stone formation in those who make calcium oxalate or uric acid stones.
- Drugs can be used to reduce stone formation in some people. For example thiazides can be used in those with hypercalciuria induced stones and allopurinol for uric acid related stone. Treatment should be guided by the specialist.

Do renal stones affect long-term renal function?
- Renal stones can cause obstruction acutely that can cause acute renal failure, but what about long-term renal function?This long-term cohort study of 23 000 people in Canada who developed a renal stone were matched with 3 million people who hadn’t, and followed for a median of 11 years (BMJ 2012;345:e5287). One or more episodes of stones increased the risk of developing end-stage renal disease or CKD 3b or worse (eGFR <45). The risk of developing end-stage renal disease was double that of someone without renal stones (although of course absolute risk is low – 0.2%). The risk of developing CKD 3b or worse was increased about 1.7-fold (HR 1.74, CI 1.61–1.84), with an absolute risk of 4%. The mechanism is unclear, although it may be related to the biochemical abnormality that is causing the stones to form. Impaired renal function was more common in women and those who were younger (<50y) or who had multiple stones. This risk appeared to be independent of other risk factors.

Given the small absolute risk increase the authors do not suggest any additional monitoring but do suggest optimising factors that may affect renal stone formation, including dehydration.

Cautionary advice!
- The authors suggest that letting someone with a known renal stone fly could be very expensive – they suggest that if they developed colic the flight may be diverted and because they were known to have a stone, their insurance may be invalid! That would be very, very expensive!
Renal colic

- Renal colic can be managed conservatively in those without complications or risk factors (for example, fever, known renal disease), however you must be sure of the diagnosis, provide appropriate analgesia and arrange prompt investigations.
- The STONE score may help us better identify those with renal colic
- Neither alpha-blockers or calcium channel blockers aid stone expulsion or reduce pain.
- For larger stones lithotripsy or ureteroscopy may be needed.

We make every effort to ensure the information in these pages is accurate and correct at the date of publication, but it is of necessity of a brief and general nature, and this should not replace your own good clinical judgement, or be regarded as a substitute for taking professional advice in appropriate circumstances. In particular check drug doses, side effects and interactions with the British National Formulary. Save insofar as any such liability cannot be excluded at law, we do not accept any liability for loss of any type caused by reliance on the information in these pages.

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October 2016
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**2016**

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**2017**

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**The Women’s Health Update Course**

This one-day update is a comprehensive guide to understanding and managing common gynaecological problems in general practice. You will meet “the Fallopians”, a fictitious family with more gynaecological complaints than you can shake a speculum at. Using a case-based approach will give you the skills to manage your female patients in a real surgery.

We aim to make the day fun, interactive as well as educational. You will leave the course feeling more confident, knowledgeable and with a much stronger pelvic floor!!! The day is designed for all GPs and GP STs – not just those with a special interest.

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**The Cancer Update Course**

Within the next 15 years the need for cancer care will double and you will look after as many cancer survivors as diabetics.

Shared care follow up will become the norm, secondary care will pass responsibility to us.

A key 2015 Lancet Oncology commission paper warned that: “GPs are inadequately trained and resourced to manage the growing demand for cancer care in high income countries”.

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The Cancer Update Course covers many more topics in much more depth than our GP Update Course. It offers you time to reflect and put your cancer learning into practice.

Cancer care is changing – get ahead with the Red Whale Cancer Update Course.

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Lead. Manage. Thrive! – The NEW management skills course for GPs.

Sometimes it feels like the thriving GP is an endangered species – demands on limited time and resources have never been higher. Our practices run in ever more complex ways and our teams extend beyond the practice walls. Often we get that instinctive feeling that there must be a better way to do things, but creating the space to make it happen can be difficult.

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Our Consultation Skills Courses

One-day small group courses designed for GPs, GP STs and General Practice Nurses.

The courses have a practical focus and lots of engaging exercises allowing delegates to rehearse the most effective consultation behaviours. But don’t worry, there won’t be any role playing in front of everybody!

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The Telephone Consultation Course

With the increased importance of telephone consultations this course aims to deliver practical skills which can be put to use immediately. The telephone is being used more and more by nurses as well as doctors in primary care, for triage, consultation and follow-up; in the daytime as well as out of hours. Our goal is to help you overcome difficulties and leave you with concrete ideas to enhance your own telephone contacts with patients.

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The Effective Consultation Course

The course focuses on behaviours which enhance effective use of time in the consultation. Efficient consultations reduce clinical risk and lower the risk of complaints and lawsuits. The course uses the rich evidence base on which consultation behaviours enhance effectiveness and how to go about learning them. We focus on actions, and you will leave with many practical tips to use in your consulting room the following day.

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Prices

**GP Update Course:**
- GP £195 |
- GP Registrar £150 |
- Nurse £150

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- The Women’s Health Update Course (location).............................................................   (date).........................
- The Cancer Update Course (location).............................................................   (date).........................
- Lead. Manage. Thrive! (location).............................................................   (date).........................
- The Telephone Consultation Course (location).............................................................   (date).........................
- The Effective Consultation Course (location).............................................................   (date).........................
- The GPN (Nurse) Update Course (location).............................................................   (date).........................

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