Top 17 Questions in Urology

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In this chapter, we'll go over common health problems in urology.

1. What does blood in my urine mean?

It can certainly be alarming to be told by your doctor that there is blood in your urine (also called hematuria) after giving a sample. Even more alarming is the actual sight of the blood. Blood is a very strong pigment and it can look like a large amount is in the toilet, even though there may be very little.

The presence of blood in the urine that you cannot see, but is found on urine tests, is called **microscopic hematuria**. Visible blood is known as **gross hematuria**.

Blood can come from any part of your urinary tract, from the small tubules in the kidney, through the ureters, the bladder, the prostate in men, to the very end of the urinary passage (the urethra).

The questions you will be asked and the investigations that are recommended are geared to finding out where the blood may be coming from. Often, however, no clear cause is found even after all of these tests – this should nonetheless be reassuring that nothing very worrisome is happening.

Some causes of blood in the urine:

- Urinary stones (even if you have no symptoms)
- Urinary tract infection or inflammation
- Injuries to the urinary tract (blunt trauma to the kidneys or urinary tract, or as subtle as a small amount of blood escaping after vigorous exercise)
- Benign enlargement of the prostate, very common in men
- Radiation therapy (if you have had radiation for cancers in the pelvis)
- Cancers of the urinary tract (bladder, kidney, prostate)

The most worrisome cause of hematuria is a tumour or cancer of the urinary tract. These are most commonly found in the bladder, but kidney and prostate cancers can also cause bleeding.

If you have blood in your urine, urinary tract cancers are not common, but you should be tested to rule them out, since the blood is often the only sign of the tumour. Bladder cancers often do not have a clear cause, but smoking is a very common cause and some occupational exposures are linked as well. Please see the Bladder Cancer chapter for more information.

What tests do I have to do?

When presenting with blood in the urine, tests are usually recommended to assess the urine, the kidneys and the bladder.

- Urine tests include a **dipstick** test to look at the amount of blood and whether any clues to inflammation of the kidney can be found.
- **Urine culture** will assess for an infection.
- **Urine cytology** tests will look for abnormal cells that are worrisome for cancer.
- An **ultrasound, CT or MRI scan** will usually be recommended as the best way to see the kidneys in detail.
- Many patients will be recommended for **cystoscopy**, in which a small camera is passed through the urethra into the bladder – the best way to look at the bladder lining to check for any abnormalities.

2. Why do I have to go to the bathroom so often?

We take for granted that our bladder habits are very predictable and regular – they don't interfere with our day-to-day lives. When something feels abnormal about our voiding, it can negatively affect our lives. Two common abnormal feelings are (1) having to urinate very frequently or (2) having to urinate very suddenly. These issues can be very frustrating, especially if there is no bathroom nearby.

There are a number of causes that can affect your bladder's ability to completely fill without signalling to us that we need to urinate. Thankfully there are effective treatments to deal with these causes.

One of the most obvious causes of **urinary frequency** is a bladder infection or **cystitis**. You feel this as bladder discomfort between your navel and pelvic bone, frequent or **urgent** voiding and burning pain with urination.

The bladder can also be overactive for a number of other reasons. Please see the Urinary Tract Infections chapter for more information. Urologists have long recognized the phenomenon of **overactive bladder (OAB)** in women, and are becoming more aware of it in men as well.

Urinary frequency (urinating a lot) and urinary urgency (sudden feeling of having to go to the bathroom) are symptoms of OAB. The reasons for it are not well understood, but in these patients the bladder seems to have a "mind of its own," and will create the desire to urinate very frequently. It can be treated with behavioural techniques known as **bladder training**, or with a common class of medications called **anticholinergics**, which reduce the spasticity of the bladder muscle in these cases.

Urinary frequency is also common in men with benign prostate enlargement, who may have difficulty fully emptying their bladders. People with "lazy" bladders may also have the same sensation, because the bladder will become full sooner than if it had been able to empty completely.

Your urologist will also keep in mind that less common causes of overactivity in the bladder might have a **neurological** cause in the brain or spinal cord. Your doctor may ask some questions about seemingly unrelated neurological symptoms to better assess this.

3. Why do I have to get up so often at night to urinate?

Waking up at night because you need to urinate is an especially common and especially bothersome symptom, because it interrupts your sleep and can leave you feeling tired or unrefreshed in the morning and throughout the day. This symptom is called **nocturia**. It is also one of the more difficult urinary symptoms to manage.

The first issue is to distinguish between waking up because of the *need to urinate* and waking up for other reasons and *then deciding to go to the bathroom*. The second problem may be unrelated to urination, and may be best managed by improvements to your sleep and sleep habits.

The issues leading to nocturia may be similar to the issues that affect your voiding during the day. Please see the chapter on Lower Urinary Tract Symptoms and Prostate Health for details. If the bladder empties sluggishly or incompletely during the day, it will likely do the same at night. Other changes at night may contribute to nocturia, however, some of which you can modify to decrease the problem.

Many people will have some amount of fluid in the tissues that pools in the legs or ankles during the day, when we spend our time upright. This may be noticeable as ankle swelling, or may go unnoticed. At night when you lie down, this fluid is no longer trapped in the legs and feet, and can redistribute back into the bloodstream, where the kidneys eventually filter it into urine. Some people may also make less of a certain hormone (antidiuretic hormone or ADH) at night. Both of these problems will result in more urine being produced at night, and consequently the need to wake up to urinate.

The answer may be simpler than this, however. If you drink a significant amount of fluid in the evening before bed, this will result in more urine production during the night. If you do not empty your bladder at bedtime, you will also be more likely to wake in the night. These are hints at a strategy to reduce the amount and burden of nocturia.

If you are bothered by nocturia, then a few steps may be helpful. The first is to limit the amount of fluid intake after dinner. Of course, this cannot always be totally avoided, as in the case of evening medications. Making sure you urinate immediately before bed will ensure as empty a bladder as possible, and the best chance at uninterrupted sleep. Sometimes medications taken to help improve the urinary stream (see the chapter on Lower Urinary Tract Symptoms and Prostate Health) can improve bladder emptying and increase the time before you next have to void. In some cases, changing the amount or timing of other medications you take (such as diuretics or “water pills”) can be helpful in changing your urine production and urination. Always talk to your prescribing doctor before considering this.

Some people have also found that keeping a urinal next to the bed can help. It will not change the number of times you wake to urinate, but it can save the trip out of bed to the bathroom. If you are slow moving in the night or prone to unsteadiness or falls, this may be helpful.

4. Why do I dribble urine after I urinate?

A common problem some men experience is the dribbling of a small amount of urine after you have finished in the bathroom. This can simply be annoying, or can be troublesome if there is enough leakage to make your underwear feel uncomfortable, or to show through your pants.

The cause of this **post-void dribbling** is not perfectly clear, but is likely due to one of a couple of reasons. The first might be that the sluggish urinary flow that many men experience (see the Lower Urinary Tract Symptoms chapter for details) can result in a small pool of urine that becomes trapped in the urinary passage (the **urethra**) at the end of the stream, without the force to be expelled into the toilet. The urethra is shaped in such a way that there can be some retention of urine below the muscle that closes the bladder's outflow (see the Anatomy chapter). As you leave the bathroom, this small pool of urine is shaken and dribbles out. If a man consciously stops his urinary stream before being completely empty, a small amount of urine will leave the bladder but be stopped by this muscle contraction a few centimeters downstream. When this muscle relaxes somewhat in the next couple of minutes, this urine will slip out and leak, causing the sensation of a small squirt of urine in the underpants.

If the urine flow simply peters out very slowly, but not after leaving the toilet, the same slow stream that is common in men may be the cause. The limited flow through the urethra creates a dribbling stream that can seem to take ages to stop. This is called **terminal dribbling**.

In women, the urethra is short and straight, and so cannot contain any urine after voiding. If you dribble after voiding, it may be due to some weakness of the muscles of the pelvis that happens commonly to women (please see the Urinary Incontinence chapter for details) and allows some urine to leak. More rarely, there can be a small cavity that pouches out from the urethra, called a **urethral diverticulum**, which can hold and occasionally leak urine. This phenomenon is often associated with urinary infections and discomfort during urination or sexual activity.

5. My doctor says I need urodynamic studies. What are these and why do I need them?

Sometimes your urination problems cannot be pinpointed to one specific cause or diagnosis. In these cases, special tests called **urodynamic studies** can be used to get more information. The most common are the **uroflow, multichannel urodynamics** and **videourodynamics.**

You may need urodynamic testing:

- To assess the causes of urinary leakage (whether the bladder itself or the supporting tissues around the bladder are the cause);
- To determine whether there may be a neurological problem contributing to your bladder issues; or
- To determine whether sluggish urination is due to a weakened bladder or an obstructed bladder outlet (difficult in passing urine from the bladder to the urethra).

1. Uroflow and **post-void residual studies** (measuring the volume of urine left in your bladder after voiding completely) involve voiding into a special toilet to measure the rate and volume of your urine flow. These can tell whether the flow is truly weakened, or whether it shows evidence of straining to void or start-and-stop voiding. After this, a **bladder scan** can be used to estimate whether the bladder has truly emptied.

2. **Multichannel urodynamics** involves placing very small catheters into the urinary passage (the urethra) and into the rectum. These catheters help control the filling of your bladder and allow us to measure the pressure in the abdomen and in the bladder itself. This helps to assess the bladder's response to filling, and whether there are abnormal contractions of the bladder muscle, changes in the flexibility of the bladder wall (called **compliance**), decreased capacity of the bladder or abnormalities in how you feel when your bladder fills.

   We can also combine these tests with **urinary sphincter** tests (called **EMG**) that assess whether muscles that help control the flow of urine from the bladder are active at abnormal times.

3. **Videourodynamics** are special X-rays that can be done together with multichannel urodynamics. This allows your urologist or urogynecologist to assess what happens to the bladder, the bladder outlet and the support structures around the bladder during filling of the bladder and voiding. This test is often done if you have complicated issues with urinary leakage.

Urodynamic studies, together with your physical exam and symptom assessment, can help us determine the best diagnosis and management plan.

6. Why does my bladder hurt all the time?

A painful bladder is typically felt above the pubic bone and below the navel. There may be many reasons why your bladder is hurting. A urinary tract infection or injury will often be associated with a painful bladder. You may also feel burning or discomfort while voiding. If your bladder pain is due to an infection, you will likely feel better after urination and after antibiotic treatment. An overactive bladder will often include a sense or urinary **urgency**, which can be uncomfortable as well.

When there is a different kind of pain that feels unlike the typical discomfort of a very full bladder, there may be other causes. Before deciding that the bladder is the source, your doctor will have to rule out gastrointestinal issues (such as constipation), gynecologic issues in women (such as endometriosis) or other issues with the skin or genitals.

Some people will continue to have a chronically painful bladder despite thorough testing that rules out other causes. This may be due to a condition called **interstitial cystitis** (inflammed bladder) or **painful bladder syndrome**, which affects women and men. It is characterized by urinary symptoms of **frequency** and **urgency**, but always with a pain in the bladder, and sometimes the genitals, muscles and other tissues of the pelvis. This pain is often made worse by certain foods and drink, and can be made worse in some cases by sexual activity.

Interstitial cystitis may be caused by a deficiency in the protective layer of the bladder, which causes irritation and pain when urine goes through the bladder. The causes of interstitial cystitis are unclear, but several treatments are available.

- Lifestyle changes, such as avoiding of certain foods, can make the symptoms more tolerable.
- Oral and **intravesical** (inside the bladder) treatments can be helpful.

Your urologist will work with you to find the best combination for you, but the disease can be hard to control. You may need many types of therapy to manage the disease. It usually takes a long time to arrive at a diagnosis of interstitial cystitis and to determine the best treatment but you can expect some degree of relief.

7. I have a catheter in my bladder. How can I manage it at home?

It is common to have a bladder catheter to treat many urological disorders and issues. The function of the catheter is to keep the bladder empty, to monitor the urine and to protect the bladder or urethra in cases of surgery or injury.

If you need a bladder catheter at home, it's often because you can't urinate on your own, you need to keep the bladder empty or to protect a part of a surgical reconstruction. The catheter may be temporary or there may be no plan or possibility of removing it. This will depend on the reason for the catheter.

In any case, there are some things you can do to make your life with a catheter easier.

a. Know how to change the **bags** that come with the catheter. The larger bag is best used when you are sleeping or not very mobile. It can fill up with a lot of urine and can be emptied less frequently. The smaller **leg bag** straps to the leg to allow you to be mobile with the catheter. You may be surprised by how many people are out and about with catheters and leg bags – no one could tell they have one!

b. Avoid applying tension to the catheter or it will become uncomfortable. Often it can be secured to the thigh by a special locking device.

c. Practice good hygiene: wash your hands before touching the catheter or the bags, and keep the end of the catheter clean where it exits the body. There can often be a discharge that accumulates there, which is normal. Some small amount of leakage around the catheter is not uncommon, and can be caused by the bladder's reaction to the catheter, which is sometimes to spasm to try to expel it from the bladder. If this is an issue, you can take oral medications or suppositories to calm the bladder wall.

d. Drink enough fluids. If there is bleeding or debris within the tubing, the catheter can become obstructed. This can result in a painful filling of the bladder. This may require flushing of the catheter, and is best prevented by adequate **fluid intake** while you have a catheter. Discomfort where the catheter exits the body is common, and can be managed with lubricants such as petroleum jelly.

e. Get some training from a qualified health professional. You may be able to access **home care** programs. Most people experience minor inconveniences with a catheter; don't be shy to ask for help if you need it.

8. What is a urethral stricture and how would I know if I have one?

A urethral stricture is an abnormal narrowing of the tube that carries urine out of the body (urethra). This can be something you are born with (**congenital**) or something that is the product of an injury or infection of the urethra.

Examples of a urethral stricture include:

- a straddle-type injury that compresses the urethra against the bones of the underside of the pelvis;
- certain sexually transmitted infections, such as chlamydia or gonorrhea; and
- after surgery on the urinary tract.

People with urethral strictures will notice changes in their urination, which can be difficult to distinguish from other causes of urinary obstruction, such as benign prostatic enlargement. There will often be difficulty starting urination, and the stream will be weak and might require straining to help it flow. Strictures near the end of the urethra can be associated with a urinary stream that sprays rather than stays together in a typical column of fluid.

People with a history of injury, infection or surgery to the urinary tract, or young children, with symptoms like those above might have a urethral stricture, and your urologist will keep these things in mind when you are discussing your urinary symptoms.

The best way to assess for a stricture is through **urethroscopy**, when a small camera is inserted into the urethra in the direction of the bladder. A narrowing or stricture will be obvious to the urologist.

9. Do over-the-counter herbal medications help with my sex life or urinary problems?

In recent years, the use of medications for the treatment of sexual problems (such as erectile dysfunction or low sex drive) and urinary problems (such as bladder overactivity and enlarged prostate) have taken centre stage, and have improved many people's quality of lives, and spared more invasive surgical treatments. It follows that some people seek the same benefits as these medications, but in a form they may consider more "natural." There is no shortage of these herbal treatments for sexual or urinary problems, and in some cases the biological explanation of their worth seems very reasonable. The list of these is far too long for this chapter to cover adequately.

There is also no doubt that there are men and women who have taken these supplements or remedies and have noticed an improvement in the problem they sought to treat. The difficulty arises, however, in truly finding the reasons why the treatment seems to have worked. Modern evidence-based medicine holds that a therapy should be shown to have the desired effect when compared no active therapy (the **placebo**) or to the **current standard therapy** (these are called controls). The key to these trials is that neither the provider nor the patient should be aware if they are taking the new treatment or the control (this is called **double-blinding**), and that the patients are **randomized** to treatment – that is there is no ability to purposely select a particular patient to receive either the study drug or the control. These trials ensure that the new treatment is effective and that it is safe, when compared to no treatment or to the current best option.

Several small trials have shown benefit for some herbal treatments. Few, if any, large trials have shown benefits for herbal or "natural" medicines in these conditions. In fact, a number of large and well-controlled studies have shown that some of the more common herbal treatments are no better than placebo. If ongoing studies or new studies do find a benefit, then these medications will find their role among physicians.

Since high-quality studies are lacking for most herbal treatments, safety issues can be important. Important side effects may be unknown, and interactions with existing medications may be unknown. Prescription or not, these are indeed drugs, and should be treated the same as prescription medications. It is important that your physician and pharmacist are aware of any non-prescription supplements or medications that you choose to take.

It is also important to distinguish so-called "natural" therapies from a generally healthy lifestyle. Certainly a high-quality diet and exercise regimen can be expected to improve your health, and in the case of erectile issues, it is the foundation of effective treatment and improvement.

To summarize this complicated and often emotionally loaded issue: most herbal treatments for urinary or sexual health problems are unproven against placebo or conventional treatment, but seem to be associated with symptom improvement in some men. If you consider taking one or more of these, please make sure that your doctor and your pharmacist are aware, that you feel that you are clearly benefitting from the treatment, and that the costs associated with their purchase are affordable to you.

10. Is it safe to have a vasectomy?

A vasectomy is very common. It is a permanent contraception in men. Like any surgical procedure, it does have its own set of risks, but it is safe. It is not associated with adverse effects on the testicles, including uncomfortable sperm build-up, does not result in any hormonal changes in the man, and is not known to be the cause of any cancers. Some people believe there is a link between getting a vasectomy and prostate cancer. There are no plausible explanations for this except patients who have had a vasectomy are more likely to access the health care system and more likely to have tests that might uncover prostate cancer. You should not be concerned that having a vasectomy increases your risk of developing prostate cancer.

Vasectomy involves interrupting the vas deferens on each side of the scrotum, therefore stopping the flow of sperm out of the testicles. This is typically done through some combination of clips, physical cutting of the vas deferens, **electrocautery** to seal the open ends, and stitches to separate the ends.

Potential complications with a vasectomy

- Bleeding (common): this can be avoided by limiting physical activity for a short period after the procedure.
- Bruising (common): larger bleeding episodes are rare.
- Infection (very rare when done with a sterile technique).

- Pregnancy (failure of the vasectomy) (uncommon), except in rare cases when the surgeon fails to identify the vas deferens. A semen sample obtained three months after the procedure will check to see if any sperm remains. A large number of sperm are "upstream" from the testicle in the **seminal vesicles**, and these can cause pregnancy in the early period after vasectomy. You should use contraception until a semen sample is clear of sperm.
- Pain is expected in the very short term after vasectomy, as with any surgical procedure. This is usually easily managed. Longer-term pain syndromes can happen, but these are very rare and should not be anticipated.

11. Can I have my vasectomy reversed? What is involved? Will it work?

You must think of a vasectomy as a permanent form of contraception. There are circumstances, however, that may cause a man to wish to have the procedure reversed.

Surgical procedures have been developed that can re-establish contact and patency of the vas deferens, to attempt to allow sperm to pass again. The testicles retain the ability to make sperm after vasectomy. These procedures, known as **vasovasostomy** and **vasoepididymostomy**, are complex procedures performed by experts using microsurgical techniques. They are longer and more involved surgeries than the vasectomy itself and are generally done under a general anaesthetic, and are not typically covered by provincial health insurance plans.

They can be successful, and the chances of success will depend on the techniques used, evidence from the operating room that sperm expression is possible, and the time that has passed since the initial vasectomy.

12. Why do I have pain in my testicles?

Scrotal or testicular pain is common and unfortunately poorly understood. Getting to a specific diagnosis and finding the right management plan can be hard and frustrating for you and for your urologist. Usually, testicular or scrotal pain is not life-threatening.

Your doctor will first try to uncover specific causes of your pain, such as infectious causes, hernias, injuries, or, more ominous diagnoses, testicular masses or torsion (twisting of the testicle on its own blood supply). This will be followed by a careful physical exam that assesses the anatomic elements of the scrotum: the testicles themselves and the structures around them, including the epididymis, which stores and transports sperm; the spermatic cord, a set of structures which bring blood, nerves and sperm to and from the testicles; and the inguinal areas (the groin) where hernias develop.

A common diagnosis of scrotal pain is known as **epididymo-orchitis**, or epididymitis. This is an inflammation or infection of the **epididymis** or testicle. In some people, for reasons poorly understood, a **chronic epididymitis** can develop. This can be particularly difficult and frustrating to treat, and can result in impairment of social or occupational function.

Often your doctor will also recommend an **ultrasound**, which will provide a more detailed look at the structures in the scrotum, and the blood flow to them.

Treating scrotal pain depends on the expected diagnosis. There are rarely simple diagnoses, and sometimes many treatments may be tried. The main treatment includes **antibiotics** if an infection is considered. **Anti-inflammatory** medications and pain medications are common, and occasionally the treatment course is longer than with other infections or pains. You may find it helpful to have some scrotal support while you walk – this may relieve the pain. For chronic cases, treatments, such as nerve blocks and, more rarely, surgery, may be required. Scrotal pain often does, however slowly, get better over time.

13. What does blood in my semen mean?

Blood in the semen can be very surprising and alarming, but it is almost always non-threatening. Blood in the semen, or **hematospermia**, commonly occurs after a biopsy of the prostate. The needles cause blood to escape into the ducts and glands that make up the prostate, and the blood then may enter the semen with an ejaculation. Also, after a prostate biopsy, the blood in the semen can last for a month or more, and often goes through a colour change, from red to darker colours, and occasionally can look like black streaks or tar. This is similar to the colour changes you see with a deep bruise on any other part of the body. This happens because the blood pigment breaks down and is reabsorbed by the body.

It is often difficult to find other causes of blood in the semen. Cancer and other threatening diseases are very rarely the cause. Infection or inflammation of the prostate, whether you have symptoms or not, is the most common cause. There is usually little to do, but a thorough history of the symptom, an examination of the genitals and of the prostate, and some urine tests. There is rarely a need for more invasive tests, like blood tests or ultrasound of the prostate. In most cases, the blood disappears on its own.

14. What might cause a rash, spot or sore on my penis?

The skin of the penis is very much like the skin of the rest of the body, and is therefore subject to the same lumps, bumps and rashes. Some genital sores or lesions need special attention.

Malignant lesions of the penis are very rare; they can be dangerous and are different than cancerous skin lesions elsewhere on the body. Most develop in men who are uncircumcised. Lesions are uncommon in men who carefully care for their foreskin and practice good penile hygiene.

Cancers of the penis will present as painless and firm growths, often on the head of the penis, and occasionally causing the foreskin to become stuck. A foreskin that does not retract normally is only *very rarely* caused by penile cancers, so if you are having foreskin troubles, don't automatically think of cancer. **Premalignant** lesions of the penis will often have sharp borders and be velvety in texture.

Lesions or sores can also spread by physical or sexual contact. If a new skin change appears on the penis, consider your recent sexual history.

- Common lesions include those from **herpes virus**, which will often appear as small blisters called **vesicles**, and will often come with or after flu-like symptoms. These are painful and red areas of the penile head or shaft skin.

- **Condylomata**, or **genital warts**, are also common, and typically have a flat, whitish appearance. They can be considerably larger in some cases, and have a cauliflower-like appearance.
- More rare sexually transmitted infections with characteristic penile lesions include **syphilis** and **chancroid**.

It is important to have these problems identified and treated; you also must inform your sexual contacts.

There are other non-threatening causes of skin changes of the penis. Other infections and masses, such as **yeast infections** or **sebaceous cysts** (blockages of the hair follicles that fill with the body's natural oils) are common. Also common and seen in some men with foreskin issues is a whitish, indistinct process of the head of the penis called **BXO**. This is relatively common and benign, but can cause local problems with the foreskin or narrowing of the **urethral meatus** (the hole the urine comes out) and, in rare cases, can be followed by the development of malignancy.

15. I have a hydrocele. What can be done about it?

Hydrocele is very common; it is a fluid-filled sac the size of one half of the scrotum.

In babies and children, the causes can be different, as there can be a persistent connection from the abdominal cavity (the space between the abdominal wall and the spine) to the testicles.

In adults, hydroceles are usually within the scrotum, and are caused by some imbalance of the fluid that lubricates the space between the testicle and the rest of the scrotum, lined by a membrane called the **tunica vaginalis**.

If an infection or injury (or some other cause not identified) causes an imbalance between the production and the body's reabsorption of this fluid, it builds up around the testicle. Hydroceles are almost always benign, and are not a sign of defective testicles. The existence of hydroceles make it harder for your doctor to examine the testicles because the hydroceles hide the testicles.

Hydroceles are relatively small and don't cause symptoms. They can, however, become large, can occasionally become tense or painful, and can get in the way of physical activity or even sitting. In these cases, you may want to consider surgery. In a mild, small or painless hydrocele, surgery is not recommended because of the small, but real, risks associated with the surgery.

In large, painful hydroceles, treatment is usually corrective surgery. If you cannot tolerate surgery, the contents of the hydrocele can be withdrawn by syringe (**aspiration**), with or without injecting an agent to cause inflammation and prevent the fluid buildup (**sclerotherapy**).

Surgery generally involves no hospital stay, and an incision made on the scrotum. The **hydrocele sac** is isolated from the scrotal wall and incised, and the fluid drained. The lining of the hydrocele can then be flipped around the other side of the testicle (like undoing your jacket and doing it up again behind your body), or it can be collapsed on itself with stitches, like an accordion.

Both of these are meant to prevent the fluid from collecting again in a closed space and recreating the hydrocele. These repairs are very effective, but there are small risks of bleeding, which can be difficult to control in the scrotum. This is why the surgeon will counsel against physical activity for a short period and may place a temporary but uncomfortable dressing to immobilize the scrotum. The scrotum will generally always feel somewhat different after a hydrocele repair.

16. Why is there so much controversy about PSA? Should I have one drawn?

The role of PSA (**prostate-specific antigen**) is a very complicated and controversial one. In people without a diagnosis of prostate cancer, PSA is a blood test used to help screen for a higher risk of prostate cancer, and therefore the need for a biopsy of the prostate to find out. The problem is that PSA is not perfectly specific to prostate cancer, and so can be raised in other conditions, which creates confusion when assessing a high or rising PSA. If you have an enlarged prostate, it will be expected to make more PSA, resulting in a higher number. Other things associated with an elevated PSA include infection or inflammation of the prostate (**prostatitis**), biopsy or vigorous massage of the prostate, ejaculation, prolonged bicycle riding, and no doubt many others. Some men simply seem to have higher or highly variable PSA levels for unexplained reasons.

The above reasons are why there is no true “normal” value for your PSA to be compared against. In deciding whether to worry about a PSA, your urologist will take many things into accounts, including the above list, as well as your age, health status and family history of prostate problems, including cancer. The PSA level at previous times can also be very helpful in assessing risk.

One complaint you may have encountered is that PSA testing leads to too many prostate biopsies, too much anxiety among patients and the discovery of small prostate cancers that were never destined to harm the patient. It is certainly true that the discovery and use of PSA has increased the number of men diagnosed with prostate cancer, and that these diagnoses occur earlier in the progress of the disease than before the "PSA era." It is also true that all prostate cancers are not created equal, and that indeed some may never require treatment (please see the Prostate Cancer chapters in this book).

These issues aside, there is little question that since PSA was discovered, the rate of death from prostate cancer has decreased, and that PSA, used appropriately, is a helpful test. The important part is finding the best time to use the test.

Should you get a PSA test? The Canadian Urological Association has said that PSA testing should be offered at age 50 to every man who is expected to live more than 10 years, and to those of African descent or who have a strong family history of prostate cancer starting at age 40. The two important points here are that a man should be of good health and long life expectancy. Prostate cancer in its most common forms is a slow-growing disease with a very long course between diagnosis, symptoms, complications and death (which may never come due to the disease). Many more men die *with* prostate cancer than *of* prostate cancer. Diagnosing a man with prostate cancer who has medical issues or advanced age that are a bigger threat to his life than the cancer itself is not helpful, and would only be expected to create anxiety and risk to that man. The other important point is that the test is offered, not mandatory. After your discussion of the risks and benefits of screening, if you feel that you would not accept a prostate biopsy, or would not allow yourself to be subjected to any treatment or surveillance protocol for prostate cancer (please see the Prostate Cancer Treatment chapter for details), then it does not make sense to have the test performed. Having a frank conversation with your doctor or urologist is important in this decision.

17. I have to have surgery for a urological problem. How long will it take me to recover from it?

After urological surgery, the first and most important thing to do is to heed your urologist's advice about recovery and your physical limitations. Generally, recovery depends on the type of surgery. There are many urological surgeries, and any incisions often affect your recovery.

a. **Endoscopic procedures** may have relatively short recovery times, particularly if no incision has been made on the inside, such as an uncomplicated treatment of a kidney stone. If tissue is removed, such as a bladder tumour resection or a reaming out of the prostate (**transurethral resection of the prostate – TURP**), even though there is no incision on the outside, there has been cutting on the inside and you should limit your physical activity and abdominal straining for a time to prevent bleeding.

b. After **outpatient procedures**, such as minor penile and scrotal surgeries, you should limit your activity for a short time to prevent bleeding. Sexual activity is often restricted for a time after penile surgery.

c. **Major incisions of the abdomen or pelvis,** for operations on the kidneys, bladder or prostate, will often require a hospital stay and a longer recovery. This is because your abdomen has been opened by the incision. You will be encouraged to walk soon after surgery and should continue to do so at home, but you should avoid exertion or heavy lifting as your incision heals. This will take longer for incisions that cross the body under the rib cage (for kidney surgery most often) than for incisions in a straight line from top to bottom, which will often avoid cutting through the abdominal muscles. In either case, walking and good deep breathing will speed the healing process and help reduce lung complications, like local lung collapse and pneumonia.

d. **Laparoscopic or keyhole surgery** procedures are distinct. Their purpose is generally to spare the pain and potential complications of major incisions, and to decrease recovery time. Still, remember that major surgery has gone on underneath the surface, so there are still some risks.

e. Other important considerations have to do with setting up your home. If you live alone or have many stairs, you may want to consider getting help for your first days at home. You will generally not be sent home until you are considered safe there, but having friends or family nearby can be very helpful.

These are very general guides to help you. Your surgery is unique to you and you should follow your surgeon's advice about your recovery timeline and expectations.

Visiting the ER for your urological problems: When to go and what to expect

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Let's look at why you would go to the emergency room (ER) for a urological problem.

Each section is divided by:

- The problem;
- The symptoms (what you'll feel, see and what the doctor can see);
- The tests you may have in the ER; and
- The treatment.

Finding the cause of your emergency is the first step to finding solution just for you.

Kidney

1. Kidney stones

The problem: Stones that block the drainage tube from the kidney down to the bladder (or obstructing ureteral calculi) are the most common cause of severe back and side pain (or flank colic) seen in the ER. Renal colic is the name for the pain caused by passing a kidney stone. The kidneys play an important role in eliminating waste products from the body. These are usually dissolved in the urine. About one in 10 Canadians will develop a kidney stone sometime during their life. More men than women get kidney stones; children rarely get them.

Symptoms: Pain from a kidney stone is felt on the side where the kidney stone is located. Its exact location either in the kidney or in the ureter may change as the stone moves down the ureter toward the bladder (Figure 1). Renal colic will often start in the flank (between the ribs and hip) or lower back, but it can also be felt in the lower abdomen, groin, genitals or inner thigh. You may feel mild to severe cramping or stabbing pain which may lead you to the hospital.

The pain may increase and decrease in severity, coming and going with episodes of pain lasting 20 to 60 minutes. You may try to ease the pain by moving around and trying to find a comfortable position, but this rarely works. Nausea, vomiting and/or a frequent urge to urinate, which may be painful, often occur. You may also experience blood in the urine (hematuria) when you have kidney stones.

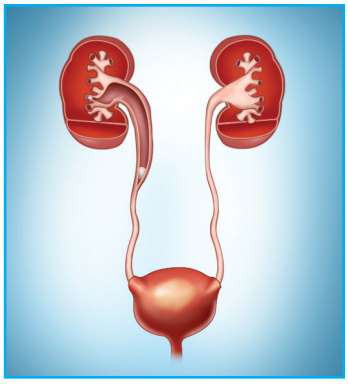

Figure 1. A look at the ureters and where a kidney stone may lodge itself.

Tests: Your doctor may suspect renal colic because of the pain you describe and by simple blood and urine tests, and by imaging tests to get a detailed picture of your kidney, ureter and bladder (simple X-ray called a kidney/ureter/bladder [KUB] or computed tomography [CT] scan) to determine the size and location of the kidney stone. A stone-protocol CT scan, which uses less radiation than a normal CT scan, is common, although an ultrasound may also be used. Another rare test is the dye test (intravenous pyelogram [IVP]), which is another type of X-ray that takes pictures of the urinary tract after a dye is inserted. Many kidney stones are seen on a KUB X-ray – this is a useful test that allows your doctor to follow the progress of the stone through the ureter.

Treatment: The severity of your pain due to the kidney stone will often bring you to the ER. Once the doctor confirms the diagnosis, your pain can be controlled with oral painkillers (like acetaminophen with codeine) or intravenous medications, such as morphine. Anti-inflammatory medications (like indomethacin or diclofenac) in tablet or suppository form (in the rectum) may also be useful. Many kidney stones are small enough to pass out of your body on their own with the urine in a few days.

You can also wait for the stone to pass (also called expectant therapy). If you are taking this route, you will need pain relief, an antispasmodic agent and/or anti-inflammatory drugs, adequate hydration and antibiotics (if there are signs of a urinary infection). Drink plenty of water (2 to 3 litres per day); this will make you go to the bathroom and may help pass the stone. Your doctor may recommend a daily oral medication called an alpha-blocker (e.g., tamsolusin or Flomax) to relax your ureter muscles to make the stone passage easier.

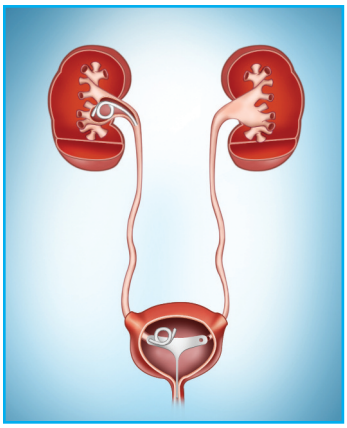

Figure 2. A ureteric stent.

Depending on how sick you are and the size, number and location of the stones, your doctor may place a nephrostomy tube (external drainage tube into the kidney through the skin of the back) or an internal ureteral stent (internal drainage tube called a double J stent), with stone disintegration and/or removal of the stone, at the same time or later.

If your pain becomes hard to manage, if the stone becomes lodged and fails to pass, or if you have fever (greater than 38.5ºC) or have the chills (which is a sign of infection), the situation becomes more urgent. In this case, your stone itself may not be dealt with because you are getting sicker. The doctor may place a ureteric stent or nephrostomy tube to relieve your pain, decompress the urinary system and allow the kidney to drain urine.

The ureteric stent (Figure 2) may cause blood in the urine, bladder discomfort (spasm), increased frequency and urgency of urination or flank (kidney) pain with urination or a full bladder due to back pressure. These symptoms can increase with activity, but resolve shortly after the stent is removed.

There are many ways to treat a stone causing renal colic. Treatment depends on your general health, as well as the type, size and location of the stone. Ultrasound shock waves can break a stone into smaller, more easily passed pieces. A stone trapped in the ureter can often be removed with the help of a small fiberoptic telescope passed through the urethra (urinary channel) without any incisions. More difficult stones may require surgery that includes a introducing a nephroscope (kidney telescope) through a small puncture through the skin over the kidney or a small incision. This is rare.

2. Kidney trauma

The problem: Although the kidneys are well-protected from injury because their location, damage can happen from blunt trauma (especially with children) or penetration injuries (like stab or gunshot). Almost 90% of kidney injuries result from blunt trauma. This is our focus.

What you'll feel and what the doctor may find: Blunt trauma happens because of a direct blow to the flank (back) or abdomen. In children, minimal obvious trauma (like snowboarding injury, hit by a softball, fall from play structure) can cause a kidney injury. In adults, a car accident is a common cause. Blood in the urine after a blunt injury requires a visit to the ER. Flank pain and bruising are signs of a kidney injury.

Tests: If there is blood in the urine, a significant drop in blood pressure, or if the doctor suspects injury, you will have a CT scan to get a picture of the kidney, a check for urinary leaks if there is a tear in the kidney or ureter or if there is bleeding from the kidney.

Treatment: Rarely is urgent surgery needed for blunt trauma. Your blood pressure will be monitored and you will be given pain medication and fluids. Your urine output will also be checked (which should become clear once bleeding from the kidney stops). Bed rest or limited movement is often recommended for the first few days after blunt injury. For penetrating trauma, surgery is almost always necessary.

Bladder

1. Acute urinary retention

The problem: The function of the bladder is to store urine until we are ready to urinate (emptying or voiding). When we suddenly cannot urinate or have difficulty doing so we have to visit the ER. The term for this is acute urinary retention (AUR). Your urine passage may be blocked due to:

- An enlarged prostate (in men as they get older, also called benign prostatic hyperplasia, BPH);
- A urinary tract infection;
- Medications (side effect of narcotics, over-the-counter cold preparations or sympathomimetic ephedrine derivatives, like Pseudafed, anticholinergics);
- Decreased mobility after surgery or constipation;
- A stricture in the urinary passage (scar tissue or narrowing);
- Neurological conditions (such as multiple sclerosis, herniated discs or Parkinson's disease);
- Diabetes; or
- Cancer (prostate or bladder).

What you'll feel and what the doctor may find: You will feel pain when you cannot empty your bladder, or even when a small amount of urine is emptied at a time.

Tests:

- An exam of your abdomen or a digital rectal examination (DRE) may reveal an enlarged bladder, full of urine.
- Many times your doctor will check your nervous system (also called a neurologic check-up) to rule out nerve injury as the cause.
- Your doctor will also take some blood and urine to test for infection.
- An ultrasound or bladder scan will give your doctor an estimate of the amount of urine in your bladder.

Treatment:

- The most common way to treat AUR is by placing a catheter (e.g., a Foley cathether) into the bladder. A catheter is a hollow tube, and is moved along the urinary channel (for men via the opening at the tip of the penis and for women the urethral opening located in the vulvar area).
- A lubrication jelly, often containing some anesthetic to decrease the discomfort of passing the catheter, is placed into the urinary passage; this is done via a blunt-tip applicator, not a needle.
- For men with an enlarged prostate, a special catheter with a tip like a hockey stick may be used to help get by the blockage caused by the prostate (Coude catheter).

Once the bladder is emptied, you should experience immediate relief of the pain. You will be monitored in the ER for a few hours (to check the amount of urine, to check kidney function with a blood test and to make sure you are getting enough fluids).

After your discharge from the hospital, you would make an appointment with a urologist for a follow-up. If a catheter cannot be placed due to blockage, a cystoscopy (using a fibre optic telescope) can be performed, allowing for a catheter to be placed with the help of a guidewire (no incisions needed), or a catheter can be placed through the skin of the low abdomen directly into the bladder (with a small incision or puncture through the skin).

To treat AUR once and for all, you may need long-term medications (like alpha blockers and other agents which shrink the prostate) or you may have to go through surgery to remove the obstructive prostate tissue located in the urinary channel.

Penis

1. Priapism

The problem: Priapism is as an erection lasting more than 4 hours that is not caused by sexual desire. It is a urological emergency; if untreated it can lead to:

- A lack of blood flow in the penis (or irreversible penile ischemia);
- Death of the tissue on the penis (or necrosis); or
- Scarring of tissue that expands and fills with blood during an erection (erectile dysfunction that may not respond to pills or injections).

Priapism is serious; you must go to the ER immediately. Any delays is seeing a doctor about this can lead to serious complications. At this time, there are no pills to treat priapism.

There are 2 types of priapism:

1. Ischemic priapism occurs when there is a lack of blood flow to the penis.

2. High flow priapism is a result of an injury or trauma and is not an urologic emergency.

Ischemic priapism happens in men of any age, including newborns. It peaks between the ages of 5 and 10, and 20 and 50 years.

Causes include:

- Sickle cell disease
- Self-injection of erectile dysfunction medication, trazadone and other psychotropic and recreational drugs (including alcohol and cocaine)
- Certain cancers

In half of all cases, there is no cause to the priapism. Sickle cell disease and leukemia are the most common causes of priapism in children.

Myth watch: It is extremely rare to get priapism by taking Viagra, Levitra, Cialis or Staxyn, unless you already have the other causes listed above.

Symptoms: Ischemic priapism is the most common type.

- Priapism is usually painful and does not stop after an orgasm.
- Pain may be delayed until 6 to 8 hours have elapsed.

If untreated, the result is increased lack of blood flow to the penis and lack of oxygen (or acidosis), with pain and inflammation, with subsequent death of the penis tissue, fibrosis (internal scarring) and erectile dysfunction.

Tests: There may be different causes of your priapism. Your doctor will perform the following to determine the exact cause of your priapism:

- Your doctor will take a complete history and physical exam at first. Your doctor will pay special attention to any medication you may be taking or any recreational drug use, as well as any sickle cell anemia.
- Your penis will be hard and painful; the head of your penis will be soft (soft glans) in cases of ischemic priapism.
- A blood test will show your complete blood count, electrolytes and indicate any sickle cell anemia.
- Your doctor will exam your urine (through a urinalysis) and may examine your urine for illicit drugs (or a urine toxicology test).
- You may get a needle into the side of your penis to get a blood sample to determine oxygen levels and confirm ischemic priapism.

- Alternatively, a colour duplex Doppler ultrasound may be used. This uses sound waves to assess the level of your blood flow. Unfortunately, many centres do not have this type of ultrasound.

Treatment: Treatment will tackle the main cause of your priapism (if the cause is found). Mainly, the doctor is focussed on relieving your pain, reversing the erection and preventing damage to the penis (which could lead to permanent erectile dysfunction – something can can happen months after your diagnosis).

- Before you agree to any treatment, you need to understand that about 50% of men have some form of erectile dysfunction after treatment (regardless of the type of treatment you choose). If your erection has lasted for more than one day, this chance goes up to 90%.
- Conservative treatment rarely works and is not recommended (there is no proof that pills, ice packs, exercise or cold showers work).
- Other treatments include:
    - needle aspiration of the corpora (suction removal of fluids);
    - injection of vasoconstrictive agents (to narrow your blood vessels so that more blood can flow in your penis); or
    - surgery.

How treatment works:

- A local anesthetic, also called a penile nerve block, is injected at the base of the penis (where it attaches to the body) before starting the priapism treatment.
- The first treatment your doctor will try is to inject medicine directly into your penis; this may irrigate and remove old hypoxic blood (or blood with no oxygen). The needle is usually placed into the side of the penis. The medicine most often used in Canada is called phenylephrine – this acts like a "decongestant" for your penis and allows more blood to flow through it.
    - The medicine is injected, then there is a wait of 3-5 minutes, the blood from the shaft of the penis is removed; this pattern is repeated every 3-5 minutes until the erection is gone.
    - Your blood pressure will be checked this procedure.
    - Common side effects are pain in your penis, headache, increased blood pressure, bradycardia (slowing of the heart rate), palpitations and sweating.
- If you have sickle cell disease, the main focus will be on:
    - Relieving your pain (with an analgesia)
    - Increasing the oxygen in your penis (also called oxygenation)
    - Tranfusing your blood (or exchange transfusion)
    - Increasing your fluid intake (or hydration)

- Also, during each priapism episode, you will be given therapy on top of the other medicine to treat your other disorders that may have caused your priapism.
- If these treatments fail, you may need surgery.

Surgery: What to expect?

- The goal of surgery is prevent ischemia (lack of blood flow) and fibrosis (scarring) of the penis.
- After surgery, it is likely that you will experience partial or complete erectile dysfunction.
- Surgery for priapism involves creating a new path for the blood to drain from the penis (also called a fistula or shunt).
- Right after surgery, your penis may look partially to fully erect again because of swelling and increased blood flow (also called post-ischemic hyperemia). An ultrasound of your penis and a blood sample from your penis will ensure that fresh blood is flowing.

A note about high-flow priapism:

- If your erection is a little or not at all painful, your priapism happens because there is too much blood flowing in your penis. This causes your penis to get hard.
- Your erection may also be caused by an injury to perineum (the area between your anus and scrotum) or direct blow to your penis. In these cases, your priapism is rarely painful.
- Sometimes, the only symptom you have is a little hardness in your penis.
- Most of the time, men likely see a doctor much later for this.
- To confirm the diagnosis, colour Doppler ultrasound will show a high blood flow in your penis.

Treatment includes:

- Watchful waiting: which means your doctor will closely monitor you;
- Hormone therapy;
- Embolization: a way to plug the artery to reduce blood flow; or
- Open surgical ligation: a way to tie off the artery that is causing the massive blood flow.

High-flow priapism can be safely followed conservatively (meaning with watchful waiting) for months with the hope that the artery will close on its own.

2. Penile fracture

The problem: A penile fracture happens when your penis is injured during sex. The injury causes a hole (or fracture) in the wall of your erection (also called erection chamber) (Figure 3).

- The hole usually happens when your partner is on top; something goes wrong and you hear a "pop" sound, you feel a lot of pain and you have some bruising (or combination of all of these).
- This can also happen when you penetrate your partner from behind and you miss; this causes your penis to bend.
- Masturbation rarely causes a penile fracture.

Figure 3. A fractured penis; notice the black/blue bruising and the swelling.

Symptoms:

- Pain
- Swelling
- Bruising
- If your penis is an eggplant-colour or if there is blood your urine after the injury, you should go to the ER.

Tests: Your doctor will suspect a penile fracture when there is blood at the tip of your penis or blood in your urine (these also hint at a possible injury to your urethra as well).

- An ultrasound will pinpoint the site of the injury and will determine the type of surgery, if available.
- If there is even a suspicion of a fracture, your doctor will operate and repair the damage immediately.
- If the doctor suspects an injury to your urethra or if you cannot urinate, you will be given a retrograde urethrogram to check out any damaage (a catheter is placed in the tip of the penis and dye is injected into the urethra; your penis is then X-rayed to look for any leaks or tears). If there is a tear or leak, it will be repaired.

Treatment: Surgery is most successful when it is done soon after the injury.

- Your penile fracture may lead to erectile dysfunction or a deformed penis.
- The doctor may close the "fracture" or "burst" areas with a cut along the foreskin (also called a circumcision incision) to find the damaged areas; in some cases, you may have a straight-line cut at the bottom of your penis.

3. Circumcision complications (in children)

The problem: In newborns, circumcision is performed under local anesthesia and without stitches. Serious complications are rare, but local infection and bleeding may require a trip to the ER.

Symptoms: Bleeding is usually venous oozing, and may respond to local pressure. Swelling, drainage of pus, fever, or difficulty urinating may occur.

Tests: The doctor will review the baby's birth history and exam the baby. Blood and urine samples may be taken if the doctor suspects an infection.

Treatment:

- Pressure on the area.
- If the doctor suspects the bleeding is abnormal (beyond the average bleeding with a circumcision), then the baby will get a blood test and may be given vitamin K.
- If the baby's urinary tract is blocked from the healing or if there is scarring, the doctor may have to unblock the urinary opening (this is a small procedure).
- Infection, although rare, may lead to a blood infection and fever (also called neonatal sepsis); in this
  - In general, babies under a month old who have fever will be admitted to the hospital for a short course of intravenous (IV) antibiotics until blood cultures are negative.
- Older babies (who are otherwise well and feeding) may receive antibiotics if the doctor does not suspect a blood infection.

4. Foreskin problems

The problems:

A. One problem is when the foreskin tightens over the penis (Figure 4), which makes it hard to pull the foreskin back – this is also called phimosis (Figure 5).

- The condition slowly gets worse in middle-aged to older men. Men will come to the ER because they cannot go to the bathroom; their foreskin completely covers the penis.

Causes:

- Local trauma
- Infection (higher in men with poorly controlled diabetes)
- Poor hygiene
- Chemical irritation

In children, phimosis happens because of circumcision (due to insufficient tissue removal).

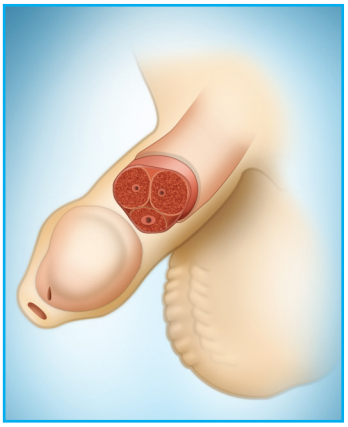

Figure 4. An illustrated look at the penis, including the foreskin.

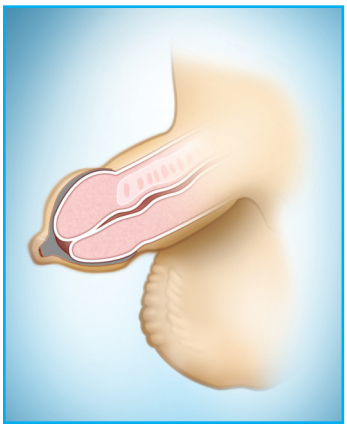

Figure 5. Phimosis: non-retractile foreskin.

Special note: Infants normally have phimosis; by 3 years old, children usually are fine. Most (90%) of the phimosis is easily retracted; by adolescence most phimosis is gone.

Symptoms:

- Inability to urinate;
- Red and swollen foreskin with little to no visible opening; or
- In children, there may be blood in their urine or they may have a hard time urinating.

Tests:

- It may be hard to pull back the tender foreskin. The doctor may have to gently pull it back to examine you.
- Forced retraction may cause future adhesions and narrowing of the passages in the penis (or strictures).
- There are no diagnostic tests.

Treatment:

- When you cannot go to the bathroom, you must go to the ER and see a urologist.
- If your urine is not drained, the doctor may have to cut along the top of your foreskin.
- You will be followed up by a urologist; in some cases, you may need a circumcision.

B. Paraphimosis is the opposite of phimosis; this happens when the foreskin cannot be pulled over the head of the penis (Figure 6). If the retraction stays for a long time, you may not be able to drain your penis and it will swell.

Causes:

- Infection;
- Trauma;
- Masturbation; or
- Not returning the foreskin to its normal position during an medical exam.

Symptoms:

- Painful swollen and trapped foreskin.
- Symptoms can develop within hours.

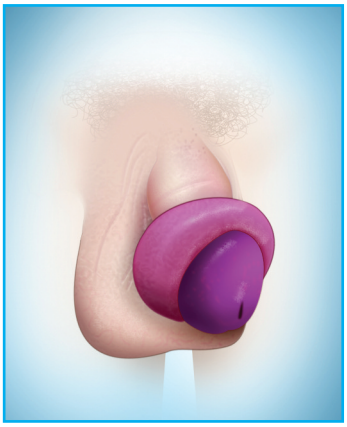

Figure 6. Paraphimosis: non-reducible (return to normal position) foreskin.

Tests:

- History;
- Physical exam; or
- X-rays may be needed if the doctor suspects there is a trapped foreign object.

Treatment:

- To successfully reduce the swelling in the foreskin, the doctor may apply pressure around the foreskin or may puncture it with a 21-gauge needle many times to drain the trapped fluid.
- This procedure is an urgent one.
- If the swelling is not reduced, your veins may be dangerously squeezed, the tissues in your penis may die (necrosis or gangrene).
- If these efforts do not reduce the swelling, you may need surgery (dorsal slit procedure or urgent circumcision).

5. Penile trauma (including animal bites)

Accidental injury to the penis usually happens because of an animal attack. The doctor will:

- Clean the wound;
- Irrigate and close the tear; or
- Consider medication to protect against rabies.

You may have to see a urologic plastic surgeon to care for the penile skin that is partially or completely detached.

Watch out for toddlers:

- Toddlers are also prone to injury to their penis or scrotum from a falling toilet seat while potty training and or by a zipper.
- Parents should not attempt to pull on the zipper because tissue may be torn even more.
- In the ER, the zipper is released by cutting the median bar of the zipper mechanism.

Amputation:

- If your penis is amputated, place the cut off part into a clean (preferably sterile) bag placed on ice for transport.
- The doctor can reattach the penis up to 18 to 24 hours after injury.
- Few places have the technical capability to perform a reimplantation of urethra, blood vessels, erection chambers, nerves and skin; it is likely that you will need to be taken to a specialized hospital.

Scrotum

- Pain in your scrotum can happen when you have an inguinal hernia – when soft tissue (usually your intestine) bulges through your lower abdominal wall.
- This is a emergency that may also present as an acute scrotum, especially if this happens in the first year of life.
- Significant overlap exists in the clinical signs and symptoms for scrotal pain. You may need an imaging test to identify the problem.

Finding the cause of severe scrotal pain with a physical exam is hard to do; you are in a lot of pain and the exam itself causes you more pain.

- If your scrotum is painful and swollen, you should go to the ER.
- This type of pain is common in men of any age, although it occurs most frequently in young adults and middle-aged men.
- In general, scrotal pain that begins suddenly and severely is testicular torsion (until proven otherwise). If you have scrotal pain, you will also likely experience urinary symptoms (like frequent urination, painful urination).

Types of problems:

- Testicular torsion (the most common), or twisting of the testicle that causing the blood flow to stop and the testicle to "die" from lack of circulation (Figure 7);
- Acute severe infections of the testicles or epididymis;
- Trauma causing the testicle to burst or rupture; or
- Fournier's gangrene (a life-threatening infection).

1. Testicular torsion

The problem: Testicular torsion is a true urologic emergency, in which time is of the essence to prevent possible testicular loss.

- If the history and exam suggest testicular torsion, surgical consultation and plans for immediate exploration should be initiated without delay. In 90% of cases, testicles can be saved if surgery is done within 6 hours of the start of your pain.
- Testicular torsion peaks in the pubertal and newborn periods (1 in 4000 men get it in their lifetime).

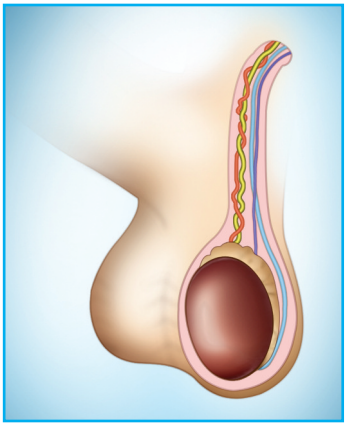

Figure 7. Testicular torsion.

Symptoms:

- Sudden pain in your testicles;
- Nausea; and
- Vomiting.

Tests:

- If you have had testicular torsion before, you don't need tests to confirm the diagnosis.
- If not, you will likely need a colour flow Doppler ultrasonography. This will see if you have testicular torsion and also find a cause for your scrotal pain.
- To see if there is any blood flow to the your testicle, you may be given a **radionuclide scan**. You either swallow the radionuclide or inject it in your arm. The gamma rays produced by the radionuclide will assess your blood levels.
- If your doctor suspects you have an infection, you may have to give a urine sample.

Myth watch:

- Prehn's sign, or relief of pain with scrotal elevation, was historically taught as a way to differentiate epididymitis (pain relief with scrotal elevation) from testicular torsion. This "test" is totally unreliable and has not been proven.

Appendage torsion:

- If you have appendage torsion (a small piece of tissue on the outside of the testicle), this is not a surgical emergency.
- Appendage torsion mostly occurs in children between eight and 11 years old. It is treated with pain relief medications, possibly nonsteroidal anti-inflammatory agents, and limiting activity.
- It takes about one to two weeks for the pain to subside.

Treatment:

- Surgery to untwist the testicle and to fasten both testicles in place (or pexing) to prevent the twisting from happening again. This surgery is called orchidopexy.
- In the ER, manually untwisting the testicle (or manual destorsion) by the ER doctor may allow your blood to flow again in the testicle (or reperfusion).
    - The blood flow to your testicle can be obstructed with a little twist, so it is important that your doctor explore the outcome surgically before a successful manual detorsion.
    - You may need regular follow-ups to check the testicles after surgery; your primary doctor or urologist may do the follow-up.

2. Acute epididymitis and orchitis

Acute epididymitis is when the epididymis suddenly becomes inflammed. Your epididymis is the coiled tube on the back of your testicle.

Symptoms include:

- Sudden pain in your testicle
- Swelling of the testicle
- Fever
- Abdominal or pelvic pain
- Nausea
- Vomiting

Possible causes:

- Often there is no known cause of the inflammation – it is sometimes caused by an infection.
- The infection may be acquired sexually (in sexually active adults) or from a urinary infection (especially in young boys and elderly men).

It's hard to distinguish acute epididymitis from acute orchitis.

Acute orchitis is the swelling of one or both testes. Infection from the bladder, urethra or prostate can lead to the swelling.

Possible causes:

- Bladder or kidney infections
- Underlying abnormalities of the urinary system in infants and boys
- A sexually transmitted infection in sexually active men
- An enlarged prostate in older men leading to difficulties in emptying their bladder emptying
- Urinary or prostate infection

Acute epididymitis and acute orchitis peak between ages 19 and 35.

Symptoms include:

- Sudden onset severe pain in the scrotum
- Swelling
- Urinary symptoms (painful urination and urgency)
- Fever
- Nausea
- Vomiting

Tests: The diagnosis of acute orchitis or epididymitis can often be made based on:

- Noted symptoms of scrotal pain
- Your physical exam
- Urine tests or urethral swabs
- Ultrasound of the scrotum: to distinguish it from testicular torsion or other possible causes

Treatment:

- If acute orchitis or epididymitis due to bacterial infection is suspected, a course of antibiotics should relieve your symptoms and cure you with a week.
  - Swelling may often take several weeks to resolve.
  - Anti-inflammatory medications, such as ibuprofen (e.g., Advil™) and painkillers, such as acetaminophen (e.g., Tylenol™) may decrease your pain and fever.
- Bed rest and use of a scrotal support may help.
- Most patients are managed out of the hospital.
- Surgery is rarely needed.
- If your infection gets in to your bloodstream, you may need intravenous (IV) antibiotics and you may need to stay at the hospital.
- If your case is severe, you will need IV pain medication and you'll need to be closely monitored.
- If your infection is due to sexual activity, you should tell your partner to get treated as well.

3. Blunt scrotal trauma

The problem: A sign of a blunt scrotal trauma is a painful, tender, scrotal mass resulting from the accumulation of blood (or hematocele).

Blunt force injury may cause your testicle to bruise (testicular contusion) or may cause a break in the covering of your testicle (or the tunica albuginea).

Tests:

- Ultrasonography assesses the blood flow and anatomic integrity of your scrotum.
- CT imaging is also often used to uncover other injuries if there is concurrent pelvic trauma.

Causes:

- Athletic injuries
- Straddle injuries
- Falls
- Major trauma

Treatment:

- You will need surgery to repair your scrotum if:
  - The covering of your testicle (tunica albuginea) is broken; or if
  - You have a large accumulation of blood in your scrotum (hematocele).
  - Any delay in the diagnosis and treatment can lead to an increased risk of losing your testicle.
  - All but the most superficial penetrating scrotal injuries will require specialty consultation for possible surgery.

4. Fournier's gangrene

Fournier's gangrene is a type of infection that kills your tissue. It usually affects your perineum (the area between your anus and scrotum).

Fournier's gangrene is a rare but life-threatening infection that is extremely challenging to treat. Despite the fact that antibiotic therapy combined with surgery and intensive care surveillance are standard treatment, death rates are high.

Symptoms:

- Nausea
- Vomiting
- Chills
- Fever
- Confusion
- Scrotal pain

Important considerations:

- Fournier's gangrene should be considered in the elderly, diabetic or otherwise immune-compromised males.
- Early surgical consultation and administration of broad-spectrum antibiotics is indicated in all suspected patients.
- Surgical removal of the gangrenous tissues and intensive care support is the definitive treatment.
- CT scans may help assess the degree of the infection (it may affect your abdominal wall, buttocks, armpits or thighs).
- Any delays in diagnosis and surgery can be life threatening, so imaging should not delay surgical consultation.

Prostate

1. Prostatitis

The problem: Prostatitis is the inflammation and/or infection of the prostate and sometimes the area around it.

- Acute bacterial prostatitis, the least common type, is a severe urinary tract infection associated with fevers and chills. If this is what you have, you have to go to the ER immediately.
- It may affect any age group.
- Although many prostate infections may be nonbacterial, anti-inflammatory agents and selected antibiotics are often prescribed.
- Some experts also subscribe medication (usually alpha-blockers) to get rid of any blockages of your urinary outlet.

The problem:

- Fever
- Chills
- Painful or severe burning during urination
- The inability to empty your bladder
- Pain in your lower back, abdomen or pelvic area

You are at risk if:

- You have had a catheter or other instrument inserted into your urethra;
- You have an abnormality or blockage in your urinary tract; or
- You recently had a bladder infection.

Tests:

- Urine sample
- Bloodwork
- Physical exam (may include a digital rectal examination [DRE] - the finger exam of the prostate).
  - The DRE is a simple exam in which your doctor inserts a lubricated, gloved finger into your rectum. The prostate is located just in front of the rectum and below the bladder.
  - The DRE allows the doctor to easily press and feel the prostate. It is extremely important to make sure the symptoms are not from other conditions, such as bacterial or urethral infections, an enlarged prostate or rarely cancer.

Treatment:
Antibiotics, usually for a minimum of 14 days and may be continued up to four weeks.

If the infection has spread to the blood or if your symptoms are hard to manage at home, you may need to go to the hospital and get intravenous (IV) antibiotics.

- A urinary catheter is sometimes needed if you have a hard time urinating.
- You must take the complete dose of your antibiotics and not stop them as soon as your symptoms end (if you do so, you are at a high risk of getting the infection again).

Will an apple a day keep the urologist away? Dietary considerations in urology

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"Should I drink 8 glasses of water a day?"

"Can I barbeque? Will it give me cancer?"

It's hard to come up with a solid diet to make a difference in your urological health. Everyone has their own opinion on diet; you get some advice from grandparents, parents and friends. All this needs to be taken with caution. In this chapter, we demystify the diet maze for you. We identify dietary changes that may improve your urological health, based on the best available research.

Two things to keep in mind when you're listening to the advice of others:

1. If two factors are related this does not mean that one caused the other (this is the "causation versus correlation" difference).
    - Research shows that diet soft drinks "cause" obesity compared to regular soft drinks. On the surface, this does not make sense because there are fewer calories in diet soda and therefore it should not increase body fat. What was not well studied by researchers were the other foods that people ate in addition to their choice of soft drink. We have all experienced this when we step up to our favourite fast food restaurant counter, order up a greasy meal, and top it off with a diet soda, perhaps either subconsciously or consciously to make us feel better about our health. Multiply this by "100 billion served" and we may have a bias that the research has not taken into account. Diet soda does not cause obesity, rather it is more likely associated with it.
2. Our natural tendency is to base future decisions on either our own direct experiences or experiences of members of family or friends. For researchers to come to a "true" conclusion about a study, they need to have enough patients to mathematically show that their results are strong enough to recommend one thing over another. Sometimes, this may mean hundreds of thousands of patients are required to show a difference in one thing over the other, particularly if the benefit to patients is small. If you want to improve your urological health, you should discuss recommendations with those familiar with diet research and search out the "best evidence" before taking on the advice.

What parts of a diet are important to consider?

The food and beverages we eat and drink constitute our daily diet. Our diet is influenced by our personal preferences, cultural background, health status, economic status and a variety of other factors. Our food choices have different amounts of energy (measured in calories), nutrients and other substances.

The goal of a healthy diet is to meet the needs for energy, vitamins, minerals and other nutrients and reduce the risk of diseases and have a healthy lifestyle.

- Macronutrients are nutrients required in large amounts that can be used to provide our body with energy. There are three types of macronutrients: carbohydrates, fats and proteins.
- Water is also an important nutrient our body needs. Micronutrients, such as vitamins and minerals, are nutrients required in small amounts that do not provide our body with energy. Micronutrients and water help with a lot of activities and reactions in the body.

Macronutrients

1. Carbohydrates

- About half of all the energy our body uses on a daily basis comes from carbohydrates in our body, glucose and its storage form, glycogen.
- Dietary carbohydrates can be simple (sugars) or complex (starches and fibres).
- Complex carbohydrates are found in whole grains, whole-wheat bread, beans, legumes, vegetables and fruits.
- Simple carbohydrates include soft drinks, candies, desserts and white and processed grain products.
- Complex carbohydrates are preferred over simple carbohydrates.
- Dietary fibres can either dissolve in water (soluble fibre; associated with lowering of cholesterol and glucose levels) or cannot dissolve in water (insoluble fibre; promoting bowel movements and alleviating constipation).
- The recommendations for fibre are 25 g per day for women and 38 g per day of men. See the next page for the recommended amount of daily carbohydrates and other macronutrients.

2. Fats

- The other half of the body's energy comes mostly from fats. Fats exist in different forms: saturated, trans, and unsaturated.
- Saturated fats are most often believed to raise bad (LDL) cholesterol and come mostly from animal products, such as meat, dairy, butter, and from vegetable sources, such a coconut and palm oils.
- Trans fats raise bad cholesterol, and they also lower good (HDL) cholesterol.

- Therefore, saturated and trans fats should be limited; go for lean meats and low-fat dairy products. Unsaturated fats are present in olive, canola and other vegetable oils.
- Omega-6 and omega-3 fats are essential polyunsaturated fats that our bodies cannot make and thus must be supplied by the diet. The requirements of omega-6 fats are usually met through a regular diet. However, you need to eat omega-3 rich foods, such as having two servings of fatty fish, such as salmon, mackerel, and tuna, per week.
- The recommendation for omega-3 fats is 1.1 g per day for women and 1.6 g per day for men.

3. Proteins

- Proteins, or amino acids, have many roles.
- Our body cannot make some amino acids in sufficient quantity to meet its need so they must be supplied by the diet.
- Most people in North America ingest more protein than they need. Proteins are not just found in meat, but can also be found in milk, eggs, legumes, and many grains and vegetables.
- Since everyone consumes different amounts of calories, there are recommended macronutrient distribution ranges (see Table 1).

Table 1. Recommended macronutrients for a 2000-calorie diet

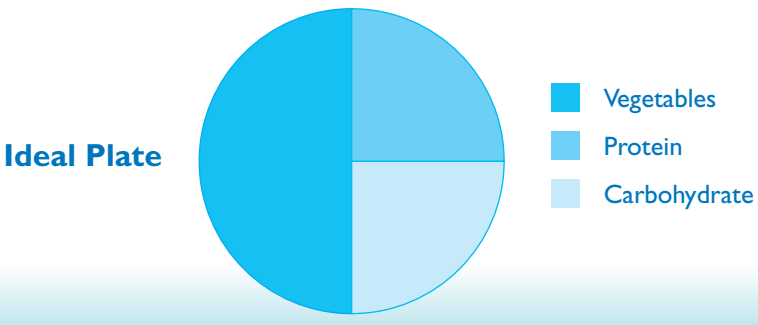
Macronutrients	% of total energy intake	Number in grams
Carbohydrates	45–65%	225 to 325 g
Fats	20–35%	44 to 78 g
Proteins	10–35%	50 to 175 g

Note that 1 gram of carbohydrate or protein is equal to 4 calories, and 1 gram of fat is equal to 9 calories.

A simple way to think of these ranges is to have meals consisting of:

- ¼ protein
- ¼ carbohydrates
- ½ vegetables

This is also known as the "Ideal Plate." Fruits should be consumed as snacks or desserts.



Micronutrients

Vitamins and minerals

Vitamins can either dissolve in water (water soluble) or dissolve in fat (fat soluble).

- Water soluble vitamins include the B vitamins (thiamin, riboflavin, niacin, biotin, panthotenic acid, vitamin B_6, folate, and vitamin B_{12}) and vitamin C. These are removed in the urine if consumed in excess. Fat soluble vitamins are vitamins A, D, E and K, and are stored in the cells associated with fat.
- Minerals include sodium, potassium, calcium, phosphorus, magnesium, iron, zinc, selenium, copper and manganese.
- Some vitamins and minerals act as antioxidants, defending the body against damage caused by free radicals that cause diseases and cancer. Dietary antioxidants include vitamin C, vitamin E, beta-carotene (a form of vitamin A), selenium, copper, manganese, and zinc.
- Sodium (found in salt) is necessary for the body, but we tend to eat way too much of it!
  - A typical North American diet goes beyond the upper limit level of 2300 mg (some people eat up to 6000 mg per day!), while the daily recommended intake is only 1500 mg.
  - In addition, North Americans have a low potassium intake, which is related to high blood pressure and kidney stones. By eating more whole, fresh foods and limiting processed, pre-made foods, potassium intake in increased, and sodium intake is decreased.

A healthy, well-balanced diet following Canada's Food Guide, which is rich in fresh vegetables and fruits, whole-grains lower in fat, sugar and salt, low-fat milk and dairy products, lean meats, meat alternatives, and fish should provide all the necessary vitamins, minerals and nutrients our body needs.

Eating well with Canada's Food Guide

Despite our government's efforts to start us out on the right foot (remember Canada's Food Guide from elementary school?), our society is basically eating more unhealthily as time goes on. If everyone followed Canada's Food Guide each day of their life, our society would be overwhelmingly healthier, and possibly, happier.

What does the ideal diet look like? Take a look at the Health Canada's Food Guide: (**http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php**).

Even making small changes will improve your health.

Diet and Urology: How can we do better with our diet?

In this section, we'll go over specific urological concerns and describe how our diets can affect them.

A. Infections

You've heard that cranberry juice (or cranberry supplements) can reduce bladder infections. Is there some truth to this?

In 2011, two studies looked at 500 women who had bladder infections to see if cranberry juice or cranberry capsules reduced the number of infections. Unfortunately, cranberry juice was no better than a juice similar in flavour but having no cranberries in it for the first study, and was worse than a small dose of antibiotics daily for the second study in preventing infections.

What to do?

- Most of the time, a short course of antibiotics will fix the problem.
- Depending on your age, gender and other medical problems, you may need more tests.
- If you get bladder infections often, speak with your family doctor who may refer you to a urologist.

B. Inflammation

Two major urology conditions fall under the "inflammation" category: painful bladder syndrome or interstitial cystitis (PBS/IC) and chronic pelvic pain syndrome (CPPS) or prostatitis. For more on these, go to the specific chapter. Here we'll review the diet in PBS/IC and CPPS.

1) PBS/IC: Up to 90% of patients with this condition report difficulties with specific parts of their diet. The most common foods that may make symptoms worse are: citrus fruits, tomatoes, vitamin C, artificial sweeteners, coffee, tea, carbonated and alcoholic beverages, and spicy foods.

2) CPPS/Prostatitis: A recent study identified that patients who had a diagnosis of CPPS/Prostatitis had a higher intake of carbohydrates, milk, cheese or milk products as well as a lower intake of vegetables and fruits. Other studies suggest that some of the same foods associated with PBS/IC (see above) can worsen symptoms.

What to do?

- There is no specific diet recommended for PBS/IC or CPPS. Many health professionals recommend an "Elimination Diet."
  - Make a diary of all food and drink items, as well as symptoms, for one week.
  - The second and third week involves eating and drinking items that are considered least bothersome (for a list, a suggested website is **www.ichelp.org**), recording intake and symptoms again.
  - As a last step, re-introduce foods one at a time, and keep track of your symptoms to identify potential triggers.
  - A waiting period of three days between each new test item is recommended.

C. Fertility and Sexual Function

We assume that our diets affect both our fertility and sexual function. Most people have heard that saltpeter (known by its chemistry name potassium nitrate) may have been used in institutions (such as prison) to calm down sexual drive (an interesting story but really has no scientific evidence!). But what foods do affect our sexual health?

1) Fertility

a. Males: This is poorly understood. Studies looking at men who had difficulties getting their partners pregnant suggest that things males eat may affect their sperm quality and pregnancy success.

   i. Factors that may impair sperm's ability to fertilize the egg are: alcohol, coffee, weight loss diet, obesity, and frequent intake of meat (and/or processed meat).

   ii. Factors that may enhance the sperm's ability to fertilize the egg are: vegetables and fruits, and whole grains and cereals.

b. Females: There has been much more research done with females who have difficulty getting pregnant, but there is still much work to be done. Several dietary factors have been identified. They can be separated into macronutrients (foods that provide energy: fat, carbohydrates, and protein) and micronutrients (small parts of the foods we eat that our bodies cannot make themselves but are required for life).

   i. **Macronutrients:** Greater intake of carbohydrate foods and higher protein intake (specifically animal protein) seemed to impair pregnancy success. Fat intake overall was not shown to affect this success rate. There is a suggestion that the "Mediterranean diet" is better for pregnancy success than the common diet of North America. The Mediterranean diet typically consists of abundant plant foods such as vegetables, whole grains, legumes, beans, nuts, seeds, and fresh fruit as the typical daily dessert. Olive oil is the principal source of fat. Fish and seafood is consumed often, at least two times per week. Poultry, eggs, cheese, and yogurt, are consumed in low to moderate amounts, daily to weekly. Red meat and sweets are consumed in limited amounts, no more than a few times per month. Although wine is typically on this list, females should not drink alcohol if they are trying to become or are pregnant.

   ii. **Micronutrients:** There is a suggestion that taking a multivitamin increases chances of success for pregnancy. It is well known that all women should take folic acid (in the form of a small pill) prior to trying to get pregnant as it decreases the chances of having a baby with a birth defect known as "neural tube defect" that affects a baby's nervous system.

What to do?

For males:

- Maintain a healthy weight.
- Eat vegetables, fruits, and whole grains.
- Minimize alcohol and coffee intake.
- Eat low amounts of red or processed meat.

For females capable of becoming pregnant:

- Take folic acid 0.4 to 0.8 mg every day (at least one month before trying to get pregnant).
- Add in a multivitamin.
- Follow a similar diet to the Mediterranean diet, minimizing animal meat, while maximizing vegetables and fruits.

For both men and women:

- Speak to your family doctor or obstetrician (a doctor who specializes in the health of pregnant women) about what changes you can make to your diet to improve your success in having a baby.

2) Male Erectile Dysfunction

The cause of erectile dysfunction in men as they age is still being researched. This type of erectile dysfunction is different than that seen after surgery or radiation, which has another reason. It is likely that the same cause for hardening of the arteries (atherosclerosis) is related to a man's decreased ability to get a firm enough erection to have sex. Because of this, there is a suggestion that by using the same strategy to decrease hardening of the arteries, ***you can increase the chances of hardening of the penis!***

Regular physical activity helps erectile function. The Canadian Physical Activity Guidelines suggest that healthy adults should get at least 150 minutes per week of moderate-to-vigorous activity in bursts of at least 10 minutes, and to add muscle and bone strengthening activities using major muscle groups, at least two days per week. People who have issues with their health or are older can modify their activities to make them safe to do, but some physical activity is essential for everyone.

By comparing men who have problems with erections to those that don't, common dietary factors are seen. Men who eat a high amount of vegetables, fruits, nuts, whole grains, and fish, but low amounts of red and processed meat, have lower chances of having problems with erections.

What to do?

- Eat a high amount of vegetables, fruits, nuts, whole grains, and fish, but low amounts of red and processed meat.
- Maintain a healthy body weight.
- Speak to your family doctor or urologist about ways to avoid erectile dysfunction as you age.

3) Female Sexual Dysfunction:

Up to 76% of females describe some problem with their sexual function. Researchers are only recently starting to look at factors that can affect female sexual problems. Obesity may be a cause.

What to do?

- Maintain a healthy body weight through decreased food intake.
- Increase your physical activity.

4) Libido

Trying to enhance the desire for sex (and performance) has a long history. Most food "aphrodisiacs" (named after the Greek goddess of sexuality and love, Aphrodite) have a colourful story behind them, but most have not been scientifically proven.

Chocolate is thought to modify women's genital functioning. However, studies don't back this up. We do know that alcohol decreases inhibition, or the natural restraint of acting on sexual urges. However, some studies don't back this up either.

Other examples of "aphrodisiacs" from all over the world are kebobs (barbecued beef) in Middle Eastern culture, spicy food and chili, oysters, snakes, shark components, rhinoceros horns, dried tiger penises, snake blood, and melted camel hump fat. It is likely that they have come to be known for enhancing sexual desire because they either look like penises or vaginas, or they make you sweat and turn red, similar to the act of having sex. No scientific research has been completed to see if these increase sexual desire and performance.

There are a number of remedies, not usually found in regular diets, that have been studied. These include sperm whale stomach contents (ambergris), toad skin and glands, beetles (Spanish Fly), bark from an African tree, Horny Goat Weed, Brazilian herbs, Saw Palmetto, Ginseng and South American tree roots. Although the purpose of this chapter is to review diet and urological health, caution is the best advice if you are considering taking these. Many do have active ingredients that may have undesired effects and may interact with your current medications. You should talk to your family doctor or urologist before trying these remedies.

What to do?

- Speak to your doctor about using medication – some help and some don't (and may hurt you).
- Speak to your family doctors or urologist to make sure the quality, science and safety of the remedies are validated.

D. Water and Urological Health in Healthy People

- ***Do we need to drink 8 glasses of water a day to keep our kidneys healthy?***
- ***Why don't drinks that contain caffeine or alcohol count?***
- ***When I am thirsty, am I already too late to catch up on my water intake?***
- ***Can I tell the airport security that I am allowed to bring this bottle of water on the plane because it is necessary for my health?***

For most people (those who are healthy, live in comfortable climates, and are not doing vigorous exercise), it is a myth that you have to drink eight glasses of water a day. There has never been even one research study that supports this! Yet the advice continues to be given and followed by everyone from health care professionals to celebrities for many years. Even the diuretic (something that increases urination) effect of caffeine and small amounts of alcohol are uncertain.

Other studies state that drinking when you're thirsty is the best way to make sure you have enough fluids, rather than forcing yourself to drink all the time. It is quite unlikely that "Mother Nature" equipped us with bodies that need constant water or fluid intake.

What to do?

- Maintain a healthy diet (that also has natural sources of water like in vegetables and fruits).
- Drink moderate amounts of fluids to keep your body and kidneys healthy.
- **Note:** If you live or visit places with extremes of weather, exercise vigorously, or have problems with your health (like in the next section!), you may need to adjust the amount of fluid you drink.

E. Kidney Stones

Many people who have suffered from kidney stones say it is the worst pain they have ever experienced. There are certainly some diet changes you can make to reduce your risk of stones reforming and causing problems. The most important part is to identify things in your diet that may cause certain types of stones to form. A simple test can be done in the lab. About 80% of all stones that form are calcium based. If you do form stones that are not calcium based, there are more specialized diet changes and medications that can help. Talk to your urologist.

What to do for calcium-based kidney stones?

1) Drink enough fluids to make 2 litres (2000 ml) of urine per day. A good rule of thumb is to make sure that you drink enough fluids to keep your urine light yellow to clear. Experts are a little less certain as to what type of fluid you should drink, but there are some hints.
    a. Grapefruit juice: It may increase the risk of forming calcium-based stones. It is reasonable, although not completely clear, to avoid grapefruit juice to reduce your risk of stones.
    b. Coffee, tea, and alcohol: Studies have shown that these types of fluids are linked to less kidney stones. This is the opposite of what most people believe. Therefore, patients should not try to avoid these fluids if they enjoy drinking them in moderation.
    c. Cranberry juice: There is no research that cranberry juice reduces kidney stones. If you drink a lot of cranberry juice (greater than 1 litre per day), there is a suggestion that this may increase the risk of forming stones. Small amounts are unlikely to be harmful though.
    d. Soft drinks: There is a suggestion from one study that reducing the amount of soft drinks in your diet may help reduce the risk of forming new stones.
2) Avoid large amounts of animal protein in your diet. One large study suggested that diets high in animal protein increased stones in men, but not in women. Another trial suggested that reducing animal protein in your diet can reduce the risk of kidney stones.
3) Eat more vegetables and fruits.

4) Avoid foods with a high amount of oxalate. Oxalate is a part of what usually makes up calcium kidney stones. Some foods have very high oxalate content (spinach and rhubarb). Avoid these. A list can be found at: **http://urology.ubc.ca/wp-content/uploads/2007/06/oxalate-2007.pdf**. Having said this, low oxalate diets have not been found to reduce the risk of kidney stones.

5) Lower your intake of salt (or sodium). This has been shown to decrease the risk of kidney stones.

6) Avoid foods that are high in sugar (sucrose and fructose).

7) Maintain a normal calcium intake (about 1000 mg per day, for most adults). Interestingly, both high and low intakes of calcium are linked to stone forming. If you need extra calcium in the form of a pill/supplement and form frequent kidney stones, a kidney specialist would be able to help adjust the amount.

F. Cancer

There has been an explosion of research trying to identify dietary links with the risk of getting cancer. About 35% of cancers may be prevented by choosing a healthy lifestyle, including diet and exercise. Here is a list of diet recommendations for urology cancers. For more information, see the Canadian Cancer Society website: **http://www.cancer.ca/Canada-wide/Prevention/Nutrition%20and%20fitness.aspx?sc_lang=EN**.

1) Prostate cancer

a. Meat: Cooked meats are high in chemicals called heterocyclic amines (HCAs). Barbecuing meat causes the most HCAs to form. There are both animal and human studies that show a link that HCA's may cause prostate cancer. Although unclear, a diet high in meat, particularly well done meat, may increase your risk of prostate cancer.

b. Isoflavones: Examples of foods that have isoflavones are soybeans, lentils, chick peas, kidney beans, and peanuts. Interest in these foods is due mainly to the high intake of soy in Far Eastern countries where men have lower rates of prostate cancer. A number of studies have been completed to address this. Currently, most research suggests that a diet rich in isoflavones may protect against prostate cancer.

c. Vegetables: Cruciferous vegetables (for example, broccoli, cauliflower, and brussel sprouts) have a very important anti-cancer component called isothiocyanates. Studies, although limited, suggest that they may play a protective role against prostate cancer.

d. Omega fats: Both omega-3 and omega-6 fats are important to get in your diet. Omega-3 fats are in oily fish such as salmon, trout, sardines, and tuna. Omega-6 fats are in eggs, avocado, and vegetable oils. These omega fats have shown to play a protective role in reducing prostate cancers in men. Even in men who have been diagnosed with prostate cancer, these foods have been shown to help fight the cancer.

e. Tomatoes: Lycopenes are pigments that give the tomato its red colour. Although there has been much excitement over the role of tomatoes and lycopenes in reducing the risk of prostate cancer, further study is required.

f. **Dairy:** There is a common belief that dairy products can increase the risk of prostate cancer. The actual research on this does not show a clear link however. It is currently unknown as to whether dairy foods affect a man's risk of prostate cancer.

g. **Fats:** Presently there is little research to suggest that a diet high in fat increases the risk of prostate cancer. Interestingly though, in patients who have been diagnosed with prostate cancer, a reduced fat intake combined with a healthy diet and exercise can reduce the progression of the cancer.

h. **Sugars:** The role of sugars (or carbohydrates) and prostate cancer is unclear. There have been a number of animal studies that suggest sugars can increase the risk of prostate cancer. It is too early to say, however, whether or not this link is true.

i. **Vitamins and minerals:** There have been huge studies looking at the role of additional vitamins and minerals in the diet in an attempt to reduce the risk of prostate cancer (for example, vitamins A, B, C, D, E, K and selenium). There has never been a good quality study that shows that any extra vitamin or mineral intake reduces the risk of prostate cancer. There is even a suggestion that taking vitamin or mineral supplements may increase the risk of prostate cancer, although this is unclear.

2) Kidney cancer:

Diets rich in vegetables and fruits, in large studies, are linked to a lower risk of kidney cancer. Animal meat intake has shown mixed results in most studies. Fried and baked foods has shown a weak link to increased risk of kidney cancer. Daily moderate alcohol intake (beer, wine, and liquor), on the other hand, has shown a decreased risk of kidney cancer. Perhaps most importantly, maintaining a healthy weight may be the key to reducing your risk.

3) Bladder cancer:

Although no high quality studies have been completed to link diet to bladder cancer, a number of associations have been identified. Decreased risk of bladder cancer has been suggested by eating carrots, cruciferous vegetables (broccoli, cauliflower, brussel sprouts), and fruits. Increased risk of bladder cancer has been suggested in diets high in pork, barbecued meat, fat, soy and coffee.

Putting it all together

Changing your diet and leading an active, healthy lifestyle is an easy thing to say, but can be hard to do. Our lives and responsibilities can sometimes get in the way. If you can make changes, you will see a difference in your health (not just in your urological health). A few small changes today, next month, and next year are possible.

An apple a day may help keep the urologist away!

Anesthesia: What to expect when you go under

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Surgery – what?

Most of us are anxious at the thought of it. But we have less to fear — fortunately anesthesia and surgery are safer now than at any other time in history. We fear the unknown, so let's know more about anesthesia and surgery. I'll go over information you need to know before you have surgery — we'll walk down your path together. Hopefully, the information will reassure you and calm your fears about anesthesia. We'll also go over ways to improve your outcome after surgery and decrease your chances of problems and side effects.

If you need more information, don't be shy to talk to your surgeon, nurse or other caregiver. *Let's begin our journey.*

What is anesthesia?

Modern anesthesia began in the 1840s with the use of chloroform, ether and nitrous oxide to reduce pain and awareness during surgery. Although these were imperfect, their benefits cannot be overestimated. It's hard to imagine what surgery must have been like before them.

The introduction of anesthesia and the development of antiseptic techniques later in the 19th century arguably were the catalysts for the development of surgery as we know it. Of the three original agents used only nitrous oxide is still used in the western world.

Anesthesia is defined as "lack of sensation." Most people think of it "being asleep" but this refers to "general anesthesia." Other types of anesthesia you may have heard of include:

- sedation (sometimes called neurolept).
- local anesthesia (freezing or numbing the area of surgery).
- regional anesthesia (often referred to as a nerve "block" because sensation to part of the body is blocked).
- central nerve blocks (for example, a spinal or epidural anesthesia).

Sedation and local anesthesia techniques are often used for "minor" surgeries or procedures. A procedure that seems "minor" to the doctors is often a very big deal to you and may make you very anxious.

- Whichever type of anesthesia is used, you will be closely watched and your vital signs (such as blood pressure and pulse rate) will be monitored and recorded. Your anesthesiologist will be there during your surgery.

Is general anesthesia the same as sleep?

Sleep and the anesthetic state are only very superficially the same. The most important differences are that you cannot be woken while under general anesthesia by sound or touch as would be the case if you were just asleep. Another difference is that under general anesthesia the sensations of touch and pain are not processed in the normal way by the brain and cannot be recalled after the surgery.

A better description of general anesthesia is that drugs are used to induce a reversible unconscious state, while the anesthesiologist maintains and supports the normal functions of the body (blood pressure, breathing and heart rate among others).

Frequently asked questions

1. **Will I wake up during the operation?**

   Anesthesiologists refer to this as "awareness under anesthesia." This is extremely rare with modern general anesthetics (and much less common than was implied by the Hollywood film "Awake"). If sedation is being given for surgery, you are less deeply "asleep" though comfortable and relaxed and may remember some part of the operation.

2. **Will I wake up after the operation?**

   Waking up after surgery is automatic and often fast once the procedure is finished. With longer operations the body "soaks up" more drugs and waking up can be slightly slower. This also is true for older patients and patients with kidney or liver disease (in whom the elimination of the drugs by the body is slower).

3. **How does the anesthesiologist know how much to give and that I am properly "asleep"?**

   The anesthetic level is assessed against clinical information and data from the monitors showing how your vital signs react to the drugs. In addition, drug concentrations are directly measured in your lungs and brain. Technology is being developed to monitor brain waves during anesthesia as a measure of the depth of anesthesia.

4. **Will I die during the operation?**

   This almost never happens with modern anesthesia. Of course, there are risks associated with anesthesia. These are discussed later.

5. **Will I tell staff any secrets or embarrassing details?**

   A major myth around anesthesia is that you will talk and give away secrets either while going to sleep or waking up. In my 20 years of practice, I have never seen this happen.

6. **Will I dream during the anesthetic?**

   Possibly. We don't fully understand this yet. Some of the "dreams" that you may remember probably happen at the end of the anesthetic as you are waking up.

What are the goals of anesthesia?

- To permit safe surgery
- To eliminate patient distress
- To minimize any discomfort

Sometimes all that is needed is local numbing or freezing of the operation area, with or without a small amount of sedation or neurolept. If you are having urological surgery, you may need a spinal or epidural "block." This effectively and thoroughly numbs the lower half of the body.

Spinal anesthesia

Spinal anesthesia, around since 1896 (when they used cocaine!), has an impressive track record for safety. The injection of a small amount of local anesthetic into the fluid surrounding the spinal cord numbs or freezes the nerves of the lower half of the body. This provides excellent analgesia for surgery and will usually last 2-3 hours.

During this time, the nerves supplying the muscles of the legs are also frozen and you will not be able to move your legs by yourself until the spinal wears off.

Often morphine or a similar painkiller is injected at the same time. This acts on the spinal cord and helps with pain relief for up to 24 hours but without affecting the muscles.

How does spinal anesthesia compare to general anesthesia?

The decision to use either a spinal or general anesthesia depends on:

- Your health
- The type of surgery proposed
- The preferences of the individual anesthesiologist

Most patients expect to "go to sleep" and fear having a needle inserted in their back. Often this is fear of the unknown. The risks of spinal anesthesia are low. Usually you can get relaxing medication as well as a spinal which, in addition to sedating you, can limit any memories of the procedure!

Depending on your general health, your anesthesia provider may recommend a spinal anesthetic (for example, if you have poor lung function). You will not be forced against your will to have a spinal as opposed to a general anesthetic. However, it's wise to take into account the advice of the doctors.

There used to be advantages of spinal over general anesthetic. But with advances in drugs and patient monitoring techniques, the advantages are equivalent with both types. Take a look at Table 1 for the advantages and disadvantages of spinal anesthesia.

Epidural analgesia

This is similar to a spinal anesthetic but with certain technical differences. The local anesthetic drug is injected slightly less deeply than for a spinal anesthetic such that the spinal fluid compartment is not entered. Usually a very thin plastic tube is inserted into this space and can be left in place for several days. This can have local anesthetic and other painkillers slowly and continuously dripped down it and can be used to relieve the pain of major surgery. Epidurals are usually placed before you are given a general anesthetic and then used for pain relief after the surgery.

Table 1. Advantages and disadvantages of spinal anesthesia

Advantages

From the patient's view:

- Reduces nausea and vomiting after surgery
- Patients can eat and drink sooner (depending on type of surgery)
- Residual postoperative analgesia - often for many hours
- Faster initial wakeup and recovery

From the anesthesiologist's view:

- Decreased blood loss for certain major surgeries
- Decreased rate of leg blood clots after certain major surgeries
- Allows verbal communication with patient
- No atmospheric pollution with anesthetic gases
- Less expensive
- Avoids risk of very rare complications of general anesthesia
- May be better for patients with lung diseases

Disadvantages

From the patient's view:

- Patients often prefer to be asleep
- Fear of the unknown
- Anxiety about environment in the operating room (noises of instruments)
- Potential for discomfort for long cases from lying on the operating room table
- Legs may be weak or numb for several hours after the surgery
- Fear of insertion of needle into back

From the anesthesiologist's view:

- Occasionally causes fall in blood pressure
- Difficulty passing urine occasionally in immediate postoperative period
- Occasionally difficult to perform in elderly or arthritic patients
- Rare potential for nerve damage

What to look for in your anesthesia provider

Different countries have different models of anesthesia care. In North America your general anesthesia or spinal/epidural anesthesia provider will be a highly qualified doctor. These doctors are usually known as anesthesiologists (though, confusingly many anesthesiologists in Canada are still known as anesthetists).

- Specialist anesthesiologists first qualify from medical school and then undergo five or six years of specialist anesthesia training.
- Local medical governing bodies and medical societies also are involved in granting licenses to practice medicine and maintaining hospital standards within their own jurisdictions.
- In many hospitals in the United States, certified registered nurse anesthetists (CRNAs) may administer your anesthetic with the support and supervision of medical anesthesiologists.
- In smaller communities and hospitals in Canada, your anesthesiologist may be a family doctor who has undergone additional training in anesthesia enabling them to offer safe anesthesia for your surgery – albeit perhaps in a more limited range of surgical operations than those carried out in larger hospitals.
- Often anesthesiologists work within and lead what is being called an Anesthesia Care Team. In this model, the anesthesiologist will lead and direct your anesthesia care; your caregiver (either a specially trained nurse or respiratory therapist) will be there too. This model is more common for the other types of anesthesia than for general anesthesia.
- In university hospitals, medical students (known as residents) may be involved in your care. At all times these residents are being supervised and directed by a fully qualified anesthesiologist.
- If your surgery is considered "minor," your surgeon may administer the local anesthetic or "freezing" themselves with or without some sedation. If sedation is given, your vital signs will be closely watched.

How safe is it?

Rest assured that your anesthesiologist (and your whole care team) has your safety as the highest priority.

Anesthesia and surgery are not to be taken lightly and there are always potential risks. Better training of anesthesiologists, advances in monitoring techniques, organ support and newer anesthetic drugs have made surgery safer for an increasingly elderly and sick population.

In addition, anesthesiologists undergo a process of lifelong learning and strives to maintain their skills. Anesthesiologists increasingly have to demonstrate to their licensing bodies that they are undergoing continuing professional development. The development and implementation of practice guidelines, both locally and nationally, and other systematic approaches to reduce error all contribute to developing a culture of safety in hospitals.

Improvements in general medical care and improvements in surgical techniques should share some of the credit for the advances. For example, the trend towards minimally invasive surgery with smaller surgical incisions has been a major advance in surgical patient safety.

What are the risks?

Risk can be defined as the potential for harm. Few of us completely understand risk. When pressed, we will usually acknowledge that nothing in life is completely risk-free. So, obviously there are risks attached to surgery and anesthesia, though anesthesia is often perceived as being especially risky.

Fortunately these risks are now so low that it is almost certainly the case for most people that the riskiest part of the operation is the journey to the hospital! Somehow we don't consider car journeys as a risk because it is something we face every day. So we "ignore" these sorts of everyday risks and attach more importance to the risk of something outside our usual experience, such as an operation.

We weigh the potential benefits against the potential risks. To make this decision, you need to understand the risks involved. Your surgeon and your anesthesia care provider will discuss these risks with you in language you can understand as part of the "consent" process.

One way of picturing how real these risks are to think of them as happening to one person in a community. For example, 1 in 30,000 could be considered as one person in a small town experiencing the complication if everyone in the small town underwent the procedure!

Bound up in the question of risk versus benefit is whether you are "fit" for the anesthetic. There are ways to determine this. Your doctor will consider the following questions in your case:

- What are the risks of anesthesia and surgery for you?
- Are you in optimal condition?
- If not, can your risks be reduced (for example by losing weight, stopping smoking, treating high blood pressure, treating a chest infection)?
- If so (and the operation is not an emergency operation which needs to be done immediately), your risks may be reduced by delaying surgery until the problems have been addressed. This will improve the risk versus benefit calculation. You should also consider the risks of not having the surgery.

The risks of anesthesia and surgery relate to:

- The anesthetic itself.
- Your medical condition.
- Your age. The risks are higher in the very old and very young.
- The surgery proposed. In particular, the magnitude and duration of surgery will influence risk. Operations with long surgical incisions result in more pain afterwards and more breathing complications, especially if those incisions are on the abdomen or chest. "Keyhole" surgery is usually better tolerated than "open" surgery.

Risks of "going to sleep" (general anesthesia)

Common side effects and complications, such as nausea and sore throat are discussed later. Here are seven risks of general anesthesia:

1. Damage to teeth, lips and tongue

Teeth (mostly the two upper incisors) may occasionally be damaged when the airway tube is inserted. They are more likely to be damaged if they have crowns, bridges or veneers on them. Most injuries to teeth happen in people with teeth in poor condition or with failing dental work. Injury to teeth is also more likely if the airway tube is placed in an emergency situation or if insertion of this tube is difficult. Minor trauma to the lips or tongue is quite common and will almost always resolve over a couple of days without treatment.

2. Injury to eyes

Serious eye problems are uncommon and can be caused by awkward positions (facing down for surgery). Minor scratches to the cornea are slightly more common, although your anesthesiologist will take steps to protect your eyes and make sure they are closed during surgery. These scratches can be uncomfortable (treatments are available), but the discomfort is short-lived.

3. Inadequate anesthesia or "awareness"

Dreaming around the time of an operation is not awareness. Awareness refers to conscious recall of some events during the operation – with or without the experience of pain. Modern anesthesia is associated with an overall risk of awareness of 1 in 15,000. Many of these will just recall snippets of conversation. Recalling pain is much less common – about 1 in 45,000 anesthetics. Of course, some patients will be at higher risk (like the very sick patient especially undergoing emergency surgery).

4. Serious allergic reaction to the anesthetic

It's hard to know the exact number – our best estimate is that a life-threatening allergic reaction to an anesthetic (or other drug given during anesthesia such as antibiotics) occurs in 1 of every 20,000 anesthetics. A small percentage (5%) of these reactions may lead to death.

5. Equipment failure

There are strict guidelines covering the servicing and regular checking of all equipment used in the delivery of anesthesia and the monitoring of the anesthetized patient. It is the responsibility of the anesthesiologist to be satisfied that all the checks have been carried out satisfactorily and that any back-up equipment is available and also checked. Equipment failure during anesthesia is rare.

6. Death under anesthesia

Deaths because of anesthesia have fallen from 1 in 10,000 anesthetics to 1 in 300,000 anesthetics over the last 30 years. It has been estimated that non-emergency surgery carried out on a previously healthy patient should carry a risk of dying as a result of the anesthetic and surgery combined of no more than 1 in 100,000. More than 90% of deaths that occur after surgery are not directly caused by the anesthetic.

7. Brain damage

Brain damage after anesthesia and surgery is rare. The exact chances are not known. Strokes after surgery are usually unrelated to the anesthetic and occur 2–10 days after surgery. However, the risk of developing a stroke may be increased in the elderly, in those who have had a previous stroke or in those having surgery to the brain, head and neck, carotid artery surgery or heart surgery.

Risks and side effects of spinal anesthesia

Some local tenderness and bruising is common around the injection site in the back. Persistent backache is rare.

The most common side effect of spinal anesthesia is headache (from internal leakage of spinal fluid into the area surrounding the spinal space). This occurs in 1–2% of patients with modern spinal needles and the chances of headache are less as we get older.

You may be worrying about nerve damage and more serious problems after spinal anesthesia. When we look at the chances, the best estimates for these are:

- Direct nerve damage: 1 in 10,000–30,000. Most recover within a few weeks to few months.
- Permanent paralysis: 1 in 50,000–100,000
- Spinal hematoma: 1 in 150,000–220,000 (blood clot)
- Spinal infection: 1 in 100,000–150,000

These complications are very rare.

Common illnesses and anesthesia

Patients with severe medical conditions who would have been thought unfit for surgery in the past will usually tolerate anesthesia. Sometimes such patients need further assessment and investigations to define their disease state and the reserves of the body organs involved.

In general, if you have a well-controlled medical disease you will do better with anesthesia and surgery than those whose illnesses are poorly controlled. Further medical treatments may be recommended to reduce your risks; sometimes surgery may be delayed to make sure your other disease is controlled.

1. Heart disease

Well-controlled hypertension (high blood pressure) or angina is usually not a barrier to surgery and anesthesia. It is important in most cases that you don't miss your usual doses of your blood pressure medication. Occasionally there are exceptions to this rule and you will be advised by your surgeon or during the pre-admission process.

Many patients with severe heart disease safely undergo general anesthesia for major surgery every day. With severe angina, heart failure or recent myocardial infarction (heart attack), the risks of anesthesia or of getting another heart attack may be increased compared to people having the same operation without similar heart disease. Nevertheless, your doctors will assess the situation.

2. Diabetes

You will be advised as to whether to take your usual blood sugar medication on the day of surgery. In most cases you should not take these medications as you will not be eating as normal on the day of surgery. If your diabetes is not well-controlled, there will be an increased risk of complications after surgery (like infections). Discuss this with your surgeon or family doctor.

3. Asthma

Unless you are very sick at the time of the surgery (for example, have an infection), most patients with asthma have few problems with anesthesia. This is partly because most anesthetic drugs actually relax the airways!

4. Other chronic lung conditions

If your lung condition is severe, it may be difficult for you to breath during and after the surgery. Occasionally, your anesthesiologist may advise a spinal anesthetic or simple sedation to reduce the irritation to the airway and lungs that can be caused by the artificial airways used during general anesthesia.

5. Sleep apnea

Sleep apnea is becoming more common and its exact implications for anesthesia and surgery are still unclear. Again, you may be advised to have a spinal anesthetic or sedation to avoid general anesthesia. Many hospitals admit patients with sleep apnea overnight, especially if severe, if having a general anesthetic. This enables your healthcare team to keep a close watch on your breathing on that first night. If you use an aid to breathing, such as a CPAP machine, you should bring it with you to the hospital or clinic unless advised not to do so.

Anesthesia for children

More and more children undergoing surgery are cared for in specialist children's units or hospitals. The environment and facilities are tailored towards making the whole process more "child friendly" and less intimidating and frightening. Often a parent may stay with the child and accompany her to the operating room. Many hospitals will allow the parent to stay with the child during induction of anesthesia to try and distract and comfort the child. The anesthetic is similar to that for adults, though obviously a lot of the equipment is scaled down in size!

Children tend to like needles even less than adults and many anesthesiologists still use "gas" to get the child initially off to "sleep." This is called an inhalational induction and is not as bad as it sounds – modern "gas" is much quicker and less pungent than gas used in the past. The whole process is much easier than it used to be.

Anesthesia for the elderly patient

As the average age of the general population ages, so the proportion of elderly patients requiring anesthesia and surgery increases. Modern anesthesia is very safe — even in the elderly despite the increasing presence of other coexisting illnesses in this age group. Some elderly patients are a little confused and disorientated after anesthesia and surgery for a short while. This can be distressing for both the patient and the family. Avoiding hospitalization (meaning, going home on the day of surgery) reduces the chance of developing this problem. Some known and treatable causes of confusion after the surgery are infections, poor pain control and dehydration.

Recently, we have found subtle impairment of intellect, memory and concentration in some elderly patients after surgery and anesthesia. The causes of this are still being investigated; it seems more common in the very old, those with previous ill health, poor mobility, poor memory or previous high alcohol intake. For most patients, this will improve with time.

Your path to surgery

We'll go over the usual steps in your journey so that you'll know what to expect from the anesthetic and surgery. This is a general path and may not be applied to everyone — your path may change slightly depending on your individual needs. In general, this path applies to planned surgery (or elective surgery). If you are admitted to the hospital as an emergency, you may bypass many of these stages. *Let's start:*

1. The clinic visit

This starts with the decision by you and your surgeon that surgery is necessary. At this time, your surgeon will often complete the consent form for you to sign. This form gives the surgeon permission to operate and include consent for the anesthetic (it's rare to have a separate form for the surgery and the anesthetic). If you need specialized anesthetic techniques or monitoring, then you may need to sign a separate form.

2. Investigations and blood tests

If you are in good health, you may not need any special pre-surgical investigations, such as electrocardiographs or blood tests. Other patients may have such investigations performed at the clinic visit, or more commonly, at a later pre-admission visit. This is especially likely if you are having major surgery or have other medical illnesses. These investigations are often considered routine for certain types of surgery and should not be a cause for alarm.

3. Pre-admission screening

You will usually undergo pre-admission screening. This may take the form of questions during a telephone call from a pre-admission nurse. These questions will explore your general health, medications you take and any problems with previous anesthetics. You should tell the nurse if there are any family problems with anesthetics (especially rare problems such as malignant hyperthermia). Particular attention will be given to any allergies, especially allergies to medications.

You may also be asked to attend the pre-admission clinic for more assessment. The reason for this is to identify problems, predict your risk for the proposed surgery and suggest ways and treatments that may reduce this risk. This is also a useful opportunity to ask questions and for the staff to give you information about the process and events on the day of surgery.

4. Medicine and anesthesia consults

You may need to see an anesthesiologist or an internal medicine doctor for further assessment and necessary interventions to decrease your risk of complications. If you have severe cardiac disease, you may need to see a cardiologist. Alternatively, these consults may be proposed as a result of your responses to the screening questionnaire. In many hospitals, the anesthesiologist in the pre-admit clinic will be different than the one on the day of your surgery.

5. Taking medications before surgery — which to take or not take

If you normally take medications, you will be instructed which, if any, to take on the day of surgery. Your doctor is considering the following things when making this decision:

- Most drugs do not directly interfere with the anesthetic, but some may have other implications (bleeding during surgery).
- It's best to minimize the drugs taken on the day of surgery, where possible.
- It's best not to miss doses of drugs taken for cardiac conditions, high blood pressure or epilepsy.
- Drugs for diabetes and diuretics (water pills) are probably best avoided on the day of surgery.
- Taking certain medications (such as blood thinners) will depend on the reasons for taking them (underlying illness and on the nature of the proposed surgery).
- You will be told to fast before the surgery; generally, you'll be allowed to take your medications with a sip of water to help you swallow (unless specifically told otherwise).
- For major surgery, you may be asked to take special laxatives to "clean out" and prepare the bowels before anesthesia.

6. Fasting

Different hospitals have different policies regarding how long you should fast before anesthesia or sedation. Often you will be allowed to drink clear fluids (fluids with no milk or other solids) until close to the operation time. This also applies to chewing candy or gum – the act of chewing itself causes the stomach to fill with acid.

These instructions are important — the stomach must be as empty as possible at the time when anesthesia or sedation is being administered. Otherwise there is a risk that you may vomit and inhale some of the stomach contents into your lungs.

7. Admission

Unlike in the past, it's rare for you to be admitted to the hospital the day before surgery. On the day of surgery, you will be asked to attend the hospital or clinic prior to your booked time of surgery – often several hours before the time of surgery.

Different settings have different models of care. At my own institution, patients present themselves at the admission area where the admission paperwork is prepared and health coverage details noted in the chart. Patients are then instructed to go to the Surgical Day Care Unit (SDCU) where more paperwork is completed, including all the papers necessary for the charting of the operation, anesthesia and associated nursing care. Several checks will be carried out to confirm that the right patient is having the right operation. The same questions will often be asked on several occasions. This may seem a little irritating, but the system is focused on patient safety and regular checks to avoid mishap.

A nurse will explain the processes and procedures and answer any questions. At some point you will be asked to undress and your clothing and other personal items secured. A hospital gown will be provided and a plastic identity band placed on your wrist. Relevant allergies will be highlighted with a second wrist band.

The surgeon or his/her delegate will often make a mark with ink on the correct operative site especially for left or right areas of the body – less common in urology!

An intravenous infusion will usually be sited in one of your arm veins. This is required for anesthetic and other sedative drugs to be given intravenously (through your veins) for the procedure and also for antibiotics and other drugs that may be needed.

At some point in this admission process, you will meet your anesthesia care provider who may check your general health and specific issues relevant to your anesthetic. The surgeon or delegate will answer any last minute questions regarding the proposed procedure.

At the appropriate time, you will be taken to the operating room or clinic room for the surgery.

8. The operating room

You will likely have your surgery in an operating room at a hospital. However, more and more people are having surgery at freestanding clinics and other facilities that offer surgery. Minor procedures may be performed in your surgeon's office – often only with some local anesthetic freezing. The operating room will have the operating table, an anesthetic machine, monitors and various trolleys, trays of operating instruments and other devices.

9. Administering the anesthetic

Usually, you will be asked to lie on the operating table before being given the anesthetic. Final patient checks are carried out (this includes a Surgical Safety Checklist). Promoted by the World Health Organization, this checklist formalizes much of what was already standard in North America. It includes formal acknowledgment by members of the team of the patient identity, consent for surgery, whether the antibiotics have been given, whether the instruments and monitors are all available.

Various monitoring devices are then attached. The anesthesia care provider, once satisfied with the information given to him/her by the monitors, will usually administer oxygen from the anesthesia machine to you via anesthesia tubing and a face mask. The mask may smell of rubber but this is not the anesthetic. The anesthetic drugs are given into the intravenous tubing which then goes into your veins. This is called the induction of anesthesia. Apart from a brief period of feeling lightheaded or dizzy, the induction is usually very quick and not too unpleasant. Occasionally, there may be a little stinging in the hand or arm where the intravenous tube is inserted during the passage of these drugs. Although this can be unpleasant it does not have any serious implications. Once you are asleep, an artificial airway or breathing tube will often be used to permit ongoing administration of the anesthetic. Other monitors or a second intravenous line may be inserted. Many different intravenous drugs and anesthetic gases are given for an individual anesthetic. Some of these drugs may be painkillers or anti-sickness drugs for afterwards.

Once you are fully anesthetized, you skin will be cleaned, sterile drapes will be applied and the operation may proceed. Fortunately, you will be unaware of all of this!

Induction through the intravenous line is the most common way that anesthesia is induced; sometimes anesthesia gas is given from the anesthetic circuit to induce anesthesia. This is more common in children.

In some countries the anesthetic is administered in an induction or anesthetic room immediately adjacent to the operating room. Once anesthetized, the patient is wheeled into the operating room for surgery.

If the chosen anesthetic is a spinal anesthetic, this will either be performed in the operating room or occasionally in a different area of the operating suite where similar procedures are performed. The injection in the back can be done while you are sitting upright or, less commonly, while you are lying on your side.

In either case the anesthesiologist will take precautions to reduce the chance of infection (by using sterile gloves, facemask, sterile instruments and drapes).

Your skin will be cleaned and some local anesthetic will be injected to numb the area before the spinal needle is inserted. This numbing injection itself stings prior to going numb! A very fine spinal needle is inserted into the spinal space and the local anesthetic injected. The onset of the spinal block is very rapid and complete over a large part of the lower body. Sedation and often oxygen via a clear mask can then be given if you desire. Even if no sedation is used, it is unlikely that you will see anything of the operation because of the screens and drapes.

10. Monitors

The most important “monitor” is the vigilance of the anesthesia care provider who is constantly there during your operation. In addition, devices to monitor your condition are routinely used during anesthesia and sedation – it is not that we expect problems but it’s part of our culture of safety.

These monitors are usually combined in one box built into the anesthetic machine. In addition there are important monitors and safeguards built into the function of the machine itself (for example monitoring pressures within the airway and lungs). See Table 2 on next page for a list of monitors and what’s being monitored.

Table 2. Vital signs and monitors

Vital sign monitored	Monitoring device employed
Heart rate and rhythm	ECG machine
Blood pressure	Automatic blood pressure machine and cuff
Oxygen levels in tissue	Pulse oximeter
Carbon dioxide in expired air (adequacy of breathing and confirming airway position)	Capnograph (carbon dioxide monitor)
Patient temperature	Electronic thermometer

For major surgery or for patients with cardiac and other health problems, blood pressure may be monitored by means of a small tube inserted directly into one of your arteries. Local anesthetic will be given before the tube is inserted. Similarly, a small tube may be inserted into one of the main veins in the neck (known as a central line) for major surgery. This gives information on the need for intravenous fluids and on the function of the heart.

11. Awakening

When the surgery is finished and dressings applied, the anesthetic is stopped and you will wake up. This is often quite fast – especially after short operations. Any airway or breathing tube is removed at this time. During this awakening, you will be closely monitored. Once the anesthesia provider is satisfied that you are sufficiently awake, you will be taken to the recovery unit or the Post-Anesthesia Care Unit (PACU).

12. Post-Anesthesia Care Unit

Usually, you spend at least 30 minutes in the Post-Anesthesia Care Unit. You will be checked to make sure you have sufficiently recovered from the anesthetic before you move on to the next stage in your journey. Any surgical wounds and sutures will also be checked at this time. Oxygen by clear plastic mask is often given and intravenous fluids, analgesics and other drugs given as required. Blood pressure, heart rate and other vital signs are monitored during this time. Once a certain degree of recovery is achieved as indicated by scoring of vital signs and degree of wakefulness, you will be either discharged to the Surgical Day Care Unit if you are going home that same day or admitted to a hospital bed if you are staying in the hospital.

13. Admit or discharge?

About 70% of patients in North America go home the same day as their surgery – what we call ambulatory surgery (literally walking surgery).

The benefits to the hospital and health care system are largely economic (it's cheaper to send you home rather than keeping you in the hospital). Most patients also prefer to sleep in their own beds and be with their family. Also, avoiding hospitals may reduce the chance of developing an infection after surgery!

Patients admitted to hospital after surgery tend to have other medical conditions or are having major surgery requiring special after-surgery (or postoperative) care.

Going home

If you are going home after your surgery and not staying at the hospital, recovery from anesthesia and surgery are checked in the Surgical Day Care Unit for the final time. Any medications will be prescribed (painkillers) and any postoperative instructions will be discussed. You may get something to drink and possibly something light to eat.

Often, you will be given a paper with instructions. Examples of instructions for going home the same day after anesthesia and surgery include:

- no driving for 24 hours
- no operating machinery for 24 hours
- no alcohol for 24 hours

Although you have recovered from the anesthetic and may feel well, some of the anesthetic is still in your body for up to 24 hours. This is enough to have a subtle effect on reflexes and coordination – hence the "no driving" rule.

When the hospital paperwork is completed, you may dress and leave – escorted and driven by a responsible adult if a general anesthetic or sedation has been given.

When you get home, you should rest for the remainder of the day. Fatigue is common for days after surgery – longer after major surgery. There is a tendency to blame the anesthetic for this but, in truth, much of this is due to changes to the chemistry and hormones of the body resulting from the surgery itself.

Common problems after surgery

1. **Nausea and vomiting:** These side effects are less common than in the past. This is because of better anesthetic drugs and also because anti-sickness drugs are commonly given during the procedure by the anesthesiologist. You may also be given anti-sickness drugs to take home with you after major surgery.

   - The risk of nausea and vomiting is about 20-30% in all patients (10% in low-risk patients and up to 80% in patients with specific risk factors).

2. **Sore throat:** The artificial airways used during anesthesia can cause sore throat and hoarseness after surgery. This usually responds to simple painkillers and oral fluids.

3. **Shivering:** A brief period of shivering is quite common after anesthesia and surgery. This is not always due to you being cold (anesthesiologists use warming blankets to keep patients warm during longer operations).

4. **Headache:** This is common after surgery and usually responds to simple painkillers.

5. **Drowsiness and fatigue:** This is common during the first 24 hours.

Pain after surgery

The anesthetic includes painkillers and some of these are intended to last into the postoperative period. Minor operations and procedures are often associated with minimal discomfort afterwards. After operations performed on an ambulatory basis, you will be prescribed oral painkillers to take at home.

If you are staying at the hospital, you will be given a mixture of painkillers both orally and by injection. These painkillers will act on a number of different aspects of pain and will often include combinations of morphine type drugs, aspirin type drugs and other novel types of painkillers.

Pain following surgery is taken very seriously by all health professionals. At various times after surgery, you will probably be asked to rate your pain on a score of 0 to 10 with 0 being no pain and 10 being the worst pain you can imagine. Your answers are useful to help guide your ongoing pain management.

Many hospitals have set up "acute pain teams" to improve the management of pain after major surgery and to improve patient comfort. A mainstay of such teams is the use of patient controlled analgesia (PCA) pumps. These pumps infuse small amounts of painkillers (usually morphine or a similar drug) directly into the intravenous fluids and directly into your vein. The drug then works fast. You control the release of this drug by pressing a button on a handset attached to the pump. This is important as every patient is different and only YOU know how much pain YOU have and this way you can have pain medication when YOU need it, not when I or anyone else thinks you need it. Some patients worry that they will take too much, but the pumps have built-in controls. You cannot overdose on the drug even if pressing the button without knowing it while half asleep. Another fear is that you will become addicted to the drug, but this rarely happens in the context of an acute operation.

Reducing the risk of complications

If you are due to undergo anesthesia and surgery in the near future, take steps to reduce your risk of complications and/or improve their overall experience.

If you are in poor health, your chance of complications and problems related to your anesthetic and surgical operation are increased. However, almost everyone can do something to reduce these risks – though if there is only a short waiting period prior to surgery this may be limited. Some high-risk patients may have their surgery delayed until they take these steps (losing weight).

Before surgery

This is mostly common sense, but here are some general things to keep in mind:

- Lose weight if you are overweight and stop smoking.
- Consult with your family doctor and other specialists to ensure that your medical illnesses (such as high blood pressure) are adequately controlled.
- Make sure you eat well. Good nutrition is important before surgery so that your body is prepared for the changes and the healing process.

- Try to exercise (time permitting) to improve your general strength and aerobic fitness. Evidence is accumulating that those who are physically fit do better after major surgery.
- Take vitamin D and antioxidants to reduce the oxidative "stress" associated with surgery (this is controversial). Follow the manufacturers' dosing guidelines as some vitamins can be toxic in very large doses.
- Get enough sleep!
- Be informed. Being an informed patient makes you less anxious. Anxious patients have been found to suffer more pain from surgery than non-anxious patients.

After surgery

To make sure your recovery is as smooth as possible and to help you get back to normal, please:

- Follow your doctors' and nurses' postoperative instructions. They are given for a reason. If these are unclear, please ask for clarification.
- Eat a good quality, high protein, palatable diet (including nutritional supplements if necessary or advised) as soon as possible. After major surgery, follow advice as to when and how diet should be resumed. After major surgery, you may be only able to take fluids by mouth at first.
- Follow a graded mobilization exercise program as advised.
- Especially after major surgery, perform deep breathing exercises and chest physiotherapy as advised to reduce the chance of postoperative chest infection and other complications.
- Take painkillers as recommended. There are no medals for bravery and being in pain can slow your recovery.
- Finish all courses of antibiotics that are given to you even if you feel well.

For more information:

You can get brochures and more information from these societies:

Canadian Anesthesia Society: **http://www.cas.ca/English/Patient-Information**

American Society of Anesthesiologists: **http://www.asahq.org/For-the-Public-and-Media.aspx**

The Royal College of Anesthesiologists (in the United Kingdom): **http://www.rcoa.ac.uk/patients-and-relatives**

Getting the right picture: Imaging options in urology:

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If you are getting help from a urologist, you'll likely be referred for medical imaging. These images will allow your doctor to confirm your diagnosis and guide your management or follow-up. In this chapter, I'll summarize the types of medical imaging you may need during your care. You should contact your urologist for any specific questions about your personal imaging needs.

In most cases, every effort will be made to make sure the radiation dose you receive is as low as possible. The good news is that over time the amount of radiation exposure you will need to get high quality images will decrease as advances in technology increase. This will minimize your long-term risks.

The risk of medical imaging must always be weighed against the potential benefit of diagnosing and treating a particular condition. Table 1 gives you a quick list of which imaging tools expose you to the risks of radiation.

Table 1. Different types of imaging and exposure to radiation risks

Type of imaging tool	Would it expose me to radiation?
Plain radiography	Yes
Computed tomography	Yes
Nuclear imaging	Yes
Ultrasound	No long-term consequences
Magnetic resonance imaging	No long-term consequences

Risks associated with medical imaging can be divided into those related to radiation and those related to the use of contrast materials. If you have concerns about the risks associated with medical imaging, discuss these with your urologist before getting these images done.

Radiation risk

Radiation exposure is measured in units referred to as millisieverts (mSv), named after a Swedish medical physicist who performed work on radiation exposure.

In general, without any exposure to medical imaging, the average person in North America is exposed to 1-3 mSv of radiation per year.

Table 2. Risks linked with medical imaging: Related to radiation

Plain x-rays (or plain radiography)	Has the least amount of radiation exposure Associated with the least amount of risk
Computed tomography (CT) scan (a scan that generates a 2-dimensional image)	Often requires that you be scanned 2-3 times Associated with more radiation exposure
Nuclear scanning (injection of radioactive elements to analyze blood flow)	Has the same radiation exposure as CT scans

While there is no safe dose for radiation exposure, medical personnel who receive occupational exposure to radiation are recommended to limit their exposure to under 50 mSv per year.

Radiation exposure during a KUB (or kidney, ureter, bladder, which is a plain x-ray of the abdomen typically used for patients with stones) ranges between 0.1-1 mSv which is lower than radiation exposure following a non-contrast CT scan of the abdomen which ranges from 1-10 mSv.

An enhanced CT scan of the abdomen done in 3 phases: (1) before intravenous contrast; and (2-3) two times after the injection of the contrast material. This injection carries a radiation exposure of 25-40 mSv. Contrast material is opaque to X-rays and allows your radiologist to examine the organ or tissue that it fills.

Radiation exposure to the eyes, ovaries and testicles is more significant impact than exposure to other tissues in the body. Over time as technology improves, radiation exposure from CT scans will likely be significantly reduced.

There is no safe dose of radiation exposure. Your exposure should be limited, as much as possible. You should discuss the risks, benefits and goals of any radiation-based medical imaging study with your urologist. Your doctor will discuss the harm associated with radiation and balance it with the potential benefits of diagnosis and the risks of not diagnosing your particular urologic condition.

Contrast risk

To make sure the doctor can see as much detail as possible, contrast material may be used during plain radiography, CT scanning and MRI scanning.

The contrast material used for plan radiography and CT is iodine-based, whereas the contrast for MRI is gadolinium-based. If you've had a reaction with the iodine-based contrast, you may need MRI contrast. If you have any questions or concerns about possible reactions, discuss these with your urologist or family physician.

Reactions to iodine-based contrast can range from minor to life-threatening.

You are at risk of reactions if you have:

- a past reaction to iodine-based contrast
- a history of asthma
- iodine allergy
- severe heart disease
- poor kidney function
- dehydration
- sickle cell anemia
- some rare tumours, which can affect the adrenal glands or other sites in the body, known as pheochromocytoma

Minor and severe reactions to iodine-based contrast

Minor reactions

Nausea

Vomiting

Flushing of the skin

Itching

Headache

Pain at the site of injection (typically the arm)

These reactions can be treated with over the counter antihistamine medications.

Severe reactions

Reduced blood pressure*

Spasm of the airways*

If you are taking metformin for diabetes mellitus, you may be asked to stop taking it for 48 hours after receiving the iodine contrast.

Contrast-induced nephropathy (kidney disease)‡

Impaired function of your kidneys‡

*You can treat these with steroids or with the medication over the counter antihistamine medications.

‡These reactions are rare if you have a normal kidney; if you are elderly, have chronic kidney disease, diabetes, are dehydrated, have heart failure or high blood pressure, these are potential reactions.
You may need a blood test to check your kidney function before receiving iodine-based contrast.

Minor and severe reactions to gadolinium-based contrast*

Minor reactions

Coldness, warmth or pain at the injection site

Nausea

Headache

Dizziness

Itching

Severe reactions

Nephrogenic systemic fibrosis (NSF) and occurs in patients with advanced renal dysfunction.

Involves skin thickening, itching, contraction of joints

May effect organs such as the lungs, heart and esophagus

Symptoms may progress within a few days to months of exposure and can result in death

Depending on the degree of renal dysfunction, the risk of NSF may be quite low and acceptable to obtain the information required from the MRI with contrast

*Adverse reactions after receiving gadolinium-based MRI contrast are least frequent and typically milder reactions than those of iodine based contrast for CT or plain radiography.

Types of Imaging

Types of imaging

Imaging method

Radiography or plain X-rays

Reason for using it:

- To diagnose and manage kidney stones (80% of stones are easily visible on plain x-ray)
- To allow your urologist to find calcium-based stones in your urinary tract
- To examine your lungs to see if there are underlying lung conditions that may complicate anesthesia before surgery, or to determine if there is any spread of a cancer to the lungs
- With contrast injected in the tip of the penis, to assess for urethral stricture (narrowing of the urinary passage through the penis from the bladder) or to assess any injuries to pelvis to make sure the urethra or the bladder has not been damaged

Reasons to use other imaging methods:

- If there are overlying bowel contents or stone types, such as uric acid, which is not visible on plain X-ray, other imaging tools may be needed
- If your kidney stone is hidden
- If your pain is likely due to a kidney stone, you will have a CT scan of the abdomen and pelvis
  - A plain KUB (which stands for kidneys, ureters and bladder) + a CT scan may be needed to track the movement of the stone and to guide your treatment options
- If you have a history of kidney stones and they've been seen with a KUB, you can ask for another KUB instead of a CT scan – this will reduce your exposure to radiation.

Radiography or X-rays

If your doctor is considering shock wave lithotripsy, a non-invasive treatment that would send shock waves and destroy the stones, you need to know whether the stone is visible on KUB. Plain X-ray is usually used within the lithotripsy unit to target the stone for treatment and to follow the passage of any stone fragments.

Plain radiographs may be used in addition to the injection of intravenous contrast or the injection of contrast directly into the urinary tract. Intravenous pyelograms (IVP) were once commonly used to diagnose kidney stones. IVP tests are now rarely done and have been replaced by non-contrast CT scans for diagnosing kidney stones. They are still used in some remote areas where CT scans are not available.

Retrograde pyelography involves the direct injection of radiocontrast into the urinary system. This is useful to check your urinary system for any obstruction, stones or tumours. It may be performed as an outpatient in a cystoscopy unit or while under general anesthesia as part your surgical treatment for stones. Retrograde pyelography is mostly used in patients who are being assessed or treated for urinary stones, hematuria. It is also used in patients with a history of bladder cancer to check their renal collecting system (or the reservoir within the kidneys). A loopogram is similar to retrograde pyelography. This is performed by injecting contrast into the stoma, or opening on the skin, of patients with urinary diversions. Again this is typically used to assess for any evidence of obstruction of the urinary tract.

Computed tomography (CT scan)

With a CT scan, you need to be able to lie still on an x-ray table as you move slowly through a "doughnut" or gantry. The x-ray beam is generated on one side of the gantry and detected on the other side as you move through. The end result provides your doctor with a series of images that look at the body in cross section.

Excellent detail of the kidneys, ureters, and bladder can be obtained on CT scans.

Types of imaging

Imaging method
Computed tomography (CT scan)

Reason for using it

Non-contrast CT:

- To diagnose urinary stones

Enhanced CT scans with intravenous contrast:

- To assess patients with blood in the urine
- To check for a mass in the kidney
- To assess the spread of prostate, bladder and testis cancer

If you review your CT scan images with your physician, it will appear as though your body has been converted to a loaf of bread and on the computer you can move through the body frontwards to backwards or top to bottom one slice at a time. Occasionally 3-dimensional reconstructions can be completed using special software which may better demonstrate certain types of the anatomy to your physician. CT scans have a wide variety of use within urology and can be completed without intravenous contrast, a non-contrast CT, or with intravenous contrast, contrast-enhanced CT.

CT scans are associated with more radiation than plain radiographs and as such should be used judiciously. For example, if a stone is visible with a KUB, it is better to follow the progress of the stone and manage it with plain radiographs than with CT scanning to avoid unnecessary exposure to radiation.

CT scans may be used in follow-up after treatment of urologic cancers. For example, if you are treated for kidney, bladder or testis cancer, you could expect to have a number of CT scans per year based on the follow-up protocol for your cancer. You should discuss other ways to manage your cancer (other than with a CT scan) with your doctor so that your exposure to radiation is as small as possible.

Ultrasonography

Ultrasonography or ultrasound is a relatively inexpensive and almost universally available. This technique uses the interaction of sound waves, produced by a transducer which is placed in contact with the body, with tissues in the human body to produce images. This type of investigation is often performed with an ultrasound technician with or without a radiologist or urologist.

The technician places a gel on the skin which allows the sound waves to be transmitted into the body. Without the gel, the sound waves are dispersed within air between the transducer and the skin and images cannot be obtained.

Ultrasound does not expose you to any radiation. Minimal heating of the tissue in the region of the ultrasound may occur and in addition you may feel pressure if the ultrasonographer needs to push harder on the skin to get a better image.

While undergoing ultrasound of the kidney, the ultrasonographer may be directed to look at other structures within the abdomen, including urologic organs as well as the urinary bladder. The urinary bladder may also be assessed by small portable hand-held ultrasounds to make sure that the bladder is emptying properly. This is common in men with enlarged prostate and hospitalized patients with problems emptying the bladder after surgery.

Types of imaging

Imaging method
Ultrasonography

Reason for using it

- To assess the kidneys, bladder emptying, prostate, testicles and penis
- To check for any hydronephrosis or blockage of the kidney
- To determine whether masses in the kidney discovered on CT scan are solid, which are more concerning for cancer, or cystic, fluid-filled structures which are less concerning for cancer
- Used after treatment of kidney stones, to ensure that the kidney is draining properly and to follow solid or cystic lesions in the kidney

Imaging method
Transrectal ultrasound (placing the ultrasound probe within the rectum through the anus)

Reason for using it

In men:

- To estimate prostate size
- To guide biopsy of the prostate to diagnosis prostate cancer
- To assess the penis to see if there is any scarring or plaque present (common in cases of Peyronie's disease, where the penis is curved on erection and there is pain)
- To rule out testicular torsion, a condition in which the testicle loses its blood supply due to twisting of the spermatic cord
- To assess erectile function

In women:

- To better assess pelvic organs including the cervix, uterus and ovaries

In both men and women:

- To assess blood flow to the kidney and drainage of urine from the kidney following renal transplantation

Magnetic Resonance Imaging (MRI)

MRI scanning produces similar cross sectional images to those obtained with CT scans. In certain cases, MRI provides an advantage in assessing soft tissue in the body over CT scanning. It does not always require the use of contrast, and can be used in patients who cannot receive radiographic contrast required for CT scanning.

MRI scans can be obtained with contrast as well; however, the contrast utilized is different than that for CT scans.

With MRI scanning, you need to lay still on a table which is moved into a large magnet. The magnet is very close to you; if you have anxiety or claustrophobia, you may need to be sedated. There is no radiation exposure during an MRI. MRI scanning obtains pictures in a complex manner by the alignment and realignment of water molecules in the body when the magnet is turned on and off.

MRI is not as available as ultrasound. The wait list to receive an MRI in certain regions can be long. Remember that in many cases, MRI images are not necessarily better than CT images and may not be needed in most cases.

Some MRI scans require the administration of contrast which is gadolinium-based. This is different than the contrast used and plain radiography or CT scanning. Care must be taken when giving gadolinium-based contrast to patients with poor kidney function due to the risk of NSF (discussed in the section on risks of imaging).

Types of imaging

Imaging method

Magnetic resonance imaging (MRI)

Reason for using it

- To assess solid and cystic masses in the kidney
- To see if there is any spread of kidney tumours into the vena cava
  - The vena cava is a large vein which runs along the back of the body and receives drainage of blood from both kidneys. Sometimes kidney tumours invade this vein – doctors need to know this before they surgically remove your kidney. If your CT scan showed a possibility that your vena cava is affected, you may get an MRI.
- To monitor patient's with small renal masses
- To assess the adrenal glands and the prostate.
  - Adrenal glands, located above the kidneys, are small glands which produce hormones. Certain tumours involving the adrenal glands are well seen on MRI scans.
- With a component placed in the rectum, to diagnose prostate cancer

Nuclear scintigraphy

Nuclear scintigraphy or nuclear scanning involves injecting radioactive substance intravenously. After the injection, you must lay still under a special camera which detects the radioactive substance.

The most common type of blockage this test is used to assess is called ureteropelvic junction, or UPJ, obstruction. In this condition there is a blockage where the drainage system of the kidney meets the ureter, the tube through which urine drained from the kidney to the bladder. A nuclear scan may be used to diagnosis this condition and also to follow progress after treatment. In addition, nuclear renal scan may be used to assess function of transplanted kidneys.

Bone scans are special nuclear scans to check for any tumour spread to the bone, most commonly in prostate cancer. It should be noted that not all bone scans that are positive, meaning showing an abnormality, are cancer. Other conditions such as a trauma, arthritis, surgery and infection can show abnormalities on bone scan.

Types of imaging

Imaging method
Nuclear scintigraphy

Reason for using it

- In combination with a diuretic (a medication to increase your urine output), to determine if there is any obstruction or blockage of the urinary tract
- To assess urologic cancers

Imaging method
PET scanning, or positron emission tomography
(an advanced nuclear test in which a radioactive sugar molecule is injected intravenously; any concentration of this sugar may be a sign of cancer)

Reason for using it

- To assess testis cancer

Putting it all in perspective

Advances in medical imaging are responsible for improved care and survival of patients with a variety of urologic diseases.

The risks associated with imaging, exposure to radiation or contrast agents, must always be balanced with the harms associated with not identifying a diagnosis because no imaging was completed. This may exposure you to as much or often more harm associated with the relatively low risk of significant complications related to medical imaging.

New contrast agents and new imaging acquisition and processing are constantly changing. The result of this is that many risks are likely to decrease in the future. Try to limit your risk to radiation as much as possible.

If you have any questions about your risks or questions about imaging alternatives, discuss this with your urologist before you undergo the test.