



Consumer summary

Holmium laser prostatectomy

To navigate in this document in Word, click on the word (underlined in blue) to link to glossary. When using the PDF version, please scroll to the end of the document for definitions of glossary words underlined in blue.

Introduction

The following information deals with a new surgical technique called holmium [laser prostatectomy](#), which has been developed to treat [benign prostatic hyperplasia](#).

ASERNIP-S has reviewed the available published evidence to compare the safety and effectiveness of this procedure with the conventional surgical technique used to treat this condition.

What is benign prostatic hyperplasia?

The [prostate](#) gland of the male encircles the bladder neck, which is the opening of the bladder to the outflow tube called the [urethra](#) through which urine travels to outside the body (Figures 1 & 2).

Figure 1: Anatomy of the male urogenital system

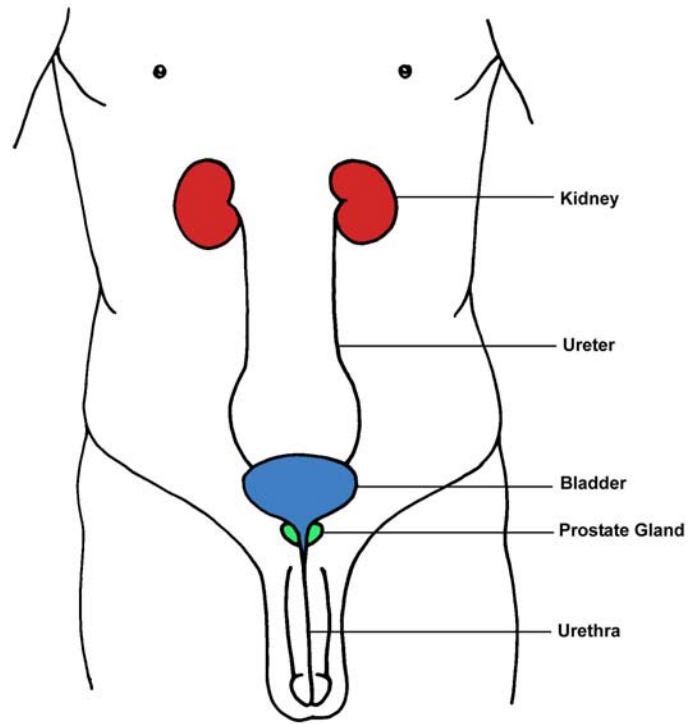
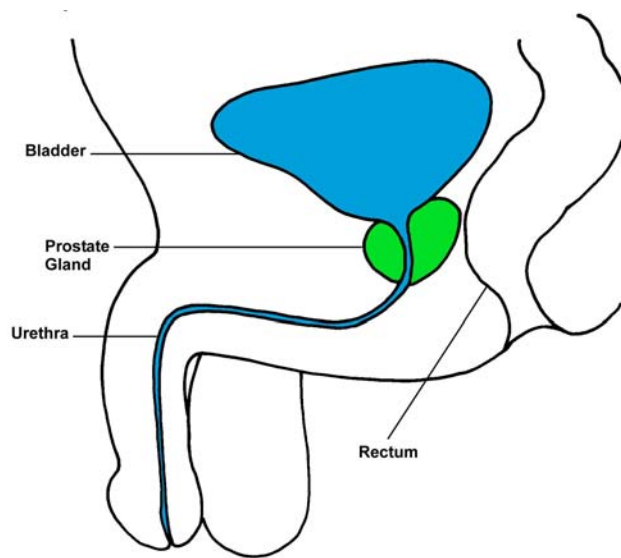


Figure 2: Side view of the male urogenital system



'[Benign prostatic hyperplasia](#)' (BPH) is the non-[malignant](#) enlargement of the prostate. The reason for this growth of the [prostate](#) gland is not clear, but it may be genetic and hormone dependant. As the [prostate](#) gets bigger, it may gradually block off the outflow tube ([urethra](#)) from the bladder, which can cause '[bladder outflow obstruction](#)' (Figures 3a & 3b)

Figure 3a: Normal prostate gland and bladder configuration

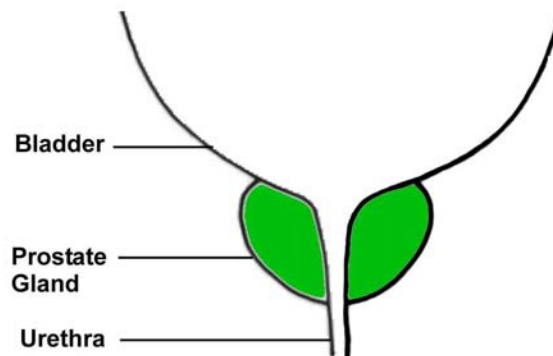
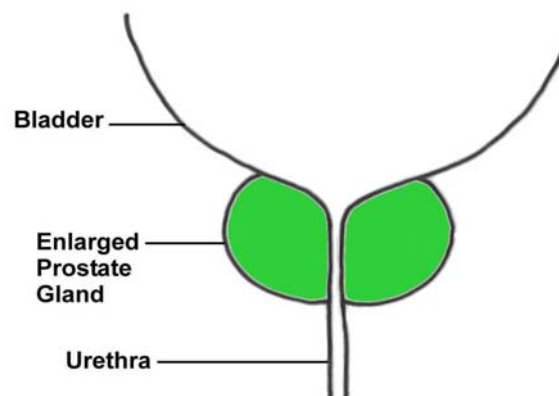


Figure 3b: Benign prostatic hyperplasia causing narrowing of the urethra



The typical symptoms of [bladder outflow obstruction](#) are a weak urinary stream; difficulty in starting to pass urine; incomplete emptying of the bladder after urinating; and having to pass urine more often, especially during the night. If the bladder is not always fully emptied after urinating, urine can accumulate and lead to recurrent

infections known as [urinary tract infections](#) and the formation of stones. In severe cases, the bladder may become totally blocked ([urinary retention](#)), or urine build up in the bladder can cause back pressure up the [ureters](#) and lead to kidney damage. [BPH](#) is a common cause of lower urinary tract symptoms in men older than 40 years of age. Beyond 50 years of age, two out of ten males will eventually require an operation to relieve the symptoms.

Treatments for bladder outflow obstruction caused by BPH

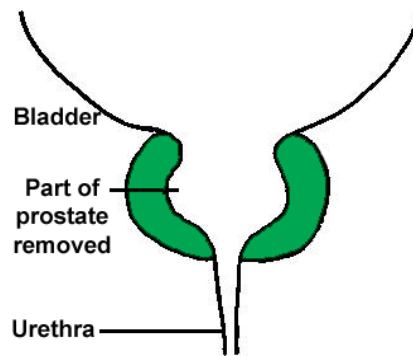
Treatments for bladder outflow obstruction caused by BPH involve the surgical removal of the pieces of prostate blocking the urethra. The removal of some (or all) of the prostate of a patient is called [prostatectomy](#).

Conventional treatments

The conventional technique for the surgical removal of the pieces of the prostate blocking the urethra is performed during an [open operation](#) through a large cut, usually in the lower abdomen. However, this operation is now recommended only for patients with large prostates or who need treatment on their bladder at the same time, and is associated with a high rate of complications.

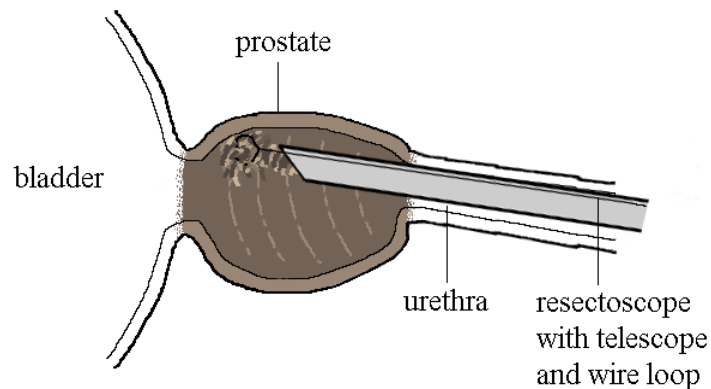
For the last 50 years the most popular surgical procedure for [bladder outflow obstruction](#) has been a [minimally invasive operation](#) called ‘**Trans-Urethral Resection of the Prostate**’ or [TURP](#). In this operation, a telescopic instrument is passed down the penis along the bladder outflow channel ([urethra](#)) to where the enlarged [prostate](#) is. Through the telescope the surgeon is then able to cut out small pieces of the enlarged prostate. This ‘[minimally invasive](#)’ procedure removes the tissue that is blocking the [urethra](#) without removing the entire [prostate](#) gland (Figure 3c).

Figure 3c: Prostate gland and bladder configuration after prostatectomy



The device used in [TURP](#) to cut out pieces of the [prostate](#) gland is a [resectoscope](#) with a wire-loop that has an electrical current running through it (Figure 4).

Figure 4: Trans-Urethral Resection of the Prostate (TURP)



While [TURP](#) remains a very effective treatment, around 15% to 20% of patients develop a significant complication following surgery. A second operation is necessary in 10% to 15% of patients within 10 years. Complications can include [urinary tract infection](#); [transurethral \(TUR\) syndrome](#); not being able to control when you urinate ([urinary incontinence](#)); narrowing of the bladder outflow channel; and bleeding. It is also very common for patients to have problems with having an erection and ejaculation. The risk of dying from [TURP](#) ranges from around 0.2% (2 patients in 1000) for younger men (aged less than 70) to 2.5% (25 patients in 1000) for older men (aged over 85).

New treatments

In an attempt to improve safety outcomes, the following treatments have been developed:

- **Medical therapy** (drugs).
- **Minimally invasive mechanical techniques** (e.g. urethral [stents](#)).
- **Minimally invasive surgical techniques**. Most of these apply heat to destroy and remove the [prostate](#) cells that are obstructing the [urethra](#). One of the ways heat is applied to the cells is through [laser](#) energy, delivered through thin optic fibres. Other ways include high intensity ultrasound, microwave and electrical energy.

Laser energy treatments

Holmium laser prostatectomy

One of the types of [laser](#) recently used to treat the [prostate](#) is the holmium:YAG (Ho:YAG) [laser](#). It's used for two types of holmium laser prostatectomy:

1. *Holmium laser resection of the prostate (HoLRP)*. A [resectoscope](#) with a fibre loop on the end is passed up the [urethra](#) to the opening of the bladder. [Laser](#) energy cuts away small pieces of [prostate](#) tissue, which are released into the bladder and removed by the [resectoscope](#).
2. *Holmium laser enucleation of the prostate (HoLEP)*. In this operation large pieces of [prostate](#) are cut out and then these are mechanically mashed and taken out via the [resectoscope](#).

The advantages of the holmium [laser](#) prostatectomy techniques over other [laser prostatectomy](#) techniques (which shrink or vaporise tissue only) are:

- The procedure can be used for large [prostates](#) of up to 100 grams.
- Holmium [laser](#) can join cut tissue edges together, which limits bleeding and reduces the need for transfusion.
- The technique may also reduce the need for [bladder irrigation](#), decrease the time the patient has a catheter after the operation and is in hospital, and enable samples of tissue to be obtained for testing.

However, holmium [laser prostatectomy](#) involves high initial costs, a steep learning curve for surgeons, and longer procedure times, particularly for larger [prostates](#).

How does holmium laser prostatectomy compare with TURP?

In terms of safety, it was not possible from the available information to compare the risk of dying as a result of the holmium [laser](#) procedures with that of [TURP](#), although one comparative study found no significant difference in these figures. In the included case series, one out of 847 [HoLEP](#) patients died and one out of 1682 [TURP](#) patients died; these deaths were thought to be related to the operations.

One of the main reported benefits of the holmium [laser](#) procedures was that, in general, blood loss during and after the procedure was lower than in [TURP](#). This was measured in terms of:

- Actual blood loss or bleeding, although this was rarely recorded, possibly due to practical and cost factors
- Secondary [haemorrhage](#) after the operation
- Rates of [blood transfusion](#) during and after the operation
- [Bladder irrigation](#) after the operation
- Trans-urethral syndrome ([TUR](#))
- Length of time a catheter was in place (as catheters are removed when blood in the urine is significantly reduced)
- Length of hospital stay (related to length of catheterisation, and complications).

There was no apparent difference in damage caused by the holmium [laser](#) procedures or [TURP](#) to:

- the bladder, bladder lining or [prostatic capsule](#) during the operation ([perforations](#))
- the [urethra](#) or bladder neck during catheterization (resulting in [stricture](#)).

However, in the studies included in this review, injuries to the bladder lining and perforations were only reported in [HoLEP](#) patients, and these occurred when the [prostate](#) tissue was mashed into small pieces with a mechanical morcellator.

In relation to [urinary tract infections](#), there was no significant difference between the holmium [laser](#) techniques and [TURP](#); nor did there appear to be any distinct pattern of differences in relation to [urinary incontinence](#). In relation to sexual function, no conclusions could be drawn comparing the holmium [laser](#) techniques and [TURP](#) due to a lack of data.

In terms of effectiveness, relief from the symptoms of [BPH](#) was similar for holmium [laser](#) patients and [TURP](#) patients. This was determined by measuring factors such as:

- whether the flow of urine was still obstructed
- changes in the symptoms or quality of life of the patient
- temporary [urinary retention](#)
- [urinary incontinence](#).

The holmium [laser](#) techniques were found to take longer than [TURP](#). The [HoLRP](#) technique obtained less tissue for prostate cancer testing than [TURP](#), while the [HoLEP](#) procedure obtained more. There was not enough long-term data available on the holmium [laser](#) procedures to determine their long-term effectiveness.

What is the recommended procedure for treating benign prostatic hyperplasia?

Overall, the available evidence was rated as average. The holmium [laser](#) techniques were found to be at least as safe as [TURP](#) in terms of blood loss and rates of damage to the [urethra](#) or bladder neck during catheterization; however, their comparative safety could not be determined in relation to risk of dying, rates of [perforation](#) and other complications. The holmium laser procedures were at least as effective as [TURP](#) in the short term, although the operations took longer. The holmium laser procedures obtained enough tissue to test for [prostate](#) cancer; however, [HoLRP](#) obtained less tissue than [TURP](#). Lack of longer follow-up meant long-term effectiveness could not be determined.

Acknowledgments

Mr Adrian A. Anthony FRACS

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Important note The information provided is based on up-to-date research. However, it is not intended to replace the advice of your medical practitioner. Please ask your doctor if you have any further questions about the management of this condition.

For further information about ASERNIP-S

Contact Professor Guy Maddern, ASERNIP-S Surgical Director, PO Box 553, Stepney SA 5069, ph. (08) 83637513, fax (08) 83622077, or visit the website at <http://www.surgeons.org/asernip-s.htm>

(For information on the use of figures in health information, click on ‘Help your patients understand risk’ at <https://www.besttreatments.org> – accessed 11/5/04.)

If you would like to provide feedback on this consumer summary, please contact us at consumer.asernip@surgeons.org

ASERNIP-S is a programme of the Royal Australasian College of Surgeons (RACS).

HOLMIUM LASER PROSTATECTOMY

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The ASERNIP-S Classification System

Evidence Rating

The evidence (i.e. studies included in the review) for ASERNIP-S systematic reviews is rated as *Good*, *Average* or *Poor*, according to the:

- quality of the evidence. High quality evidence comes from a study that has a low risk of bias and no other major flaws (such as lack of enough follow-up data or big differences between the patients selected for the groups).
- availability of the evidence. This refers to how much evidence there is to obtain.

Good

Most of the evidence is either from:

- a high quality systematic review of all relevant randomised controlled trials, or
- at least one large high quality randomised controlled trial.

Average

Most of the evidence is from:

- high quality quasi-randomised trials, and/or
- comparative studies, without major flaws, in which the patients are placed into groups without being randomized, and/or
- an inconclusive systematic review based on small randomised controlled trials, and/or
- randomised controlled trials that are of moderate or uncertain quality.

The results of these studies are more likely to be influenced by other factors compared to high-quality randomised controlled trials. However, these studies show to some extent that there is still a reasonable chance (moderate probability) that outcomes are valid.

Poor

Most of the evidence is from:

- case series
- studies mentioned above, with major flaws or a high risk of bias
- studies in which there is not enough evidence.

Safety and Efficacy Classification

SAFETY

- *At least as safe compared to comparator* procedure(s)*
The [systematic review](#) shows that the new procedure is as safe as, or safer than, the comparator.
- *Safety cannot be determined*
There is not enough [evidence](#) to determine the safety of the new procedure.
- *Less safe compared to comparator* procedure(s)*
The new procedure is not as safe as the comparator.

EFFICACY

- *At least as efficacious compared to comparator* procedure(s)*
The [systematic review](#) shows that the new procedure is as effective as, or more effective than, the comparator.
- *Efficacy cannot be determined*
There is not enough [evidence](#) to determine the effectiveness of the new procedure.
- *Less efficacious compared to comparator* procedure(s)*
The new procedure is not as effective as the comparator.

RESEARCH RECOMMENDATIONS

The Review Group may recommend that more data be collected through an [audit](#) or a controlled (ideally randomised) clinical trial.

CLINICAL RECOMMENDATIONS

The Review Group may make recommendations regarding the use of the new procedure in clinical practice to ensure the procedure is performed on appropriate patients by sufficiently qualified/experienced centres.

*A comparator may be the current “gold standard” procedure, an alternative procedure, a non-surgical procedure or no treatment.

Glossary

Audit: in surgical practice this refers to the process of measuring and monitoring the diagnosis, investigation, surgical treatment, resulting outcomes and follow-up of patients

Benign prostatic hyperplasia (BPH): non-cancerous enlargement of the [prostate](#) over time

Bias: The influence of other factors, i.e. those not being measured, on the results of a study.

Bladder irrigation: washing the inside of the bladder with fluid introduced into the body

Bladder outflow obstruction: a block in the flow of urine from the bladder to the outside of the body

Blood transfusion: introduction of blood into the blood stream of a patient

Case series: A series of single patients, usually treated at the same centre within a particular timeframe. This often reflects the historical experience of that centre.

Evidence: the studies included in the review

Haemorrhage: major bleeding that doesn't stop by itself

HoLEP: holmium [laser](#) enucleation of the prostate

HoLRP: holmium [laser](#) resection of the prostate

Laser: a device transferring all the frequencies of light into one beam with immense heat and power

Malignant: A tumour is called malignant if it has the potential to invade other tissue or organs.

Minimally invasive operation: operation accessing the site through small cuts, using a long thin surgical instrument with a telescope on the end, rather than large surgical cuts.

Open operation: an operation accessing the site through large surgical cuts or incisions

Perforations: cuts

Prostate: a gland around the base of the male bladder that adds a secretion into the semen

Prostatectomy: the removal of some (or all) of the prostate of a patient

Prostatic capsule: the outside edge of the prostate

Quasi-randomised trial: A trial using a method which is not completely randomised of placing patients into treatment groups. There is a greater risk of selection [bias](#) in quasi-random trials where placement is not adequately concealed compared with [randomised controlled trials](#) with adequate allocation concealment.

Randomised controlled trial: A study in which researchers randomly place participants in groups. The new surgical procedure will be performed on one group of patients, while the other group of patients will undergo the conventional operation. Researchers measure and compare the outcomes of the patients from the different groups.

Resectoscope: a thin surgical instrument, with a telescope, which is used to cut away pieces of tissue

Stent: a small hollow tube placed in a vessel to keep it open

Stricture: abnormal narrowing, in this case of the bladder or urethra

Systematic review: ASERNIP-S conducts literature reviews on the safety and effectiveness of new surgical techniques before they are widely accepted into the health care system. Each review collects all relevant information, or [evidence](#), on new and standard techniques used to treat a medical condition. The quality of [evidence](#) is assessed. ASERNIP-S then makes recommendations on the safety and effectiveness of the procedures that are then endorsed by RACS.

Transurethral (TUR) syndrome: The body absorbs too much of the fluid used to wash the area around the prostate while prostate tissue is being removed. The patient experiences temporary symptoms as a result, such as mental confusion, nausea, vomiting and increased blood pressure.

TURP: Trans-Urethral Resection of the Prostate. A thin tube-like telescope is passed down the penis along the [urethra](#) to cut pieces of the [prostate](#) gland blocking urine flow.

Ureter: the tube that carries urine downward from each kidney to the urinary bladder for temporary storage

Urethra: the tube leading from the bladder through which urine passes to the outside of the body

Urinary incontinence: people who are unable to hold their urine until they get to the toilet suffer from urinary incontinence

Urinary retention: inability to urinate or empty a full bladder

Urinary tract infection: infection of the urine in the bladder

Urination: the passing of urine from the bladder along the urethra to the outside of the body