

## **Laser surgery**

Laser surgery is a technique which can be used to remove small to medium size cancers of the larynx (voice box). It is an alternative to the use of radiotherapy or open surgery. Most cases which are suitable for laser surgery will be small cancers of the vocal cords, although medium size cancers of the vocal cords and cancers of other parts of the larynx (e.g. epiglottis) may also be suitable.

Because most of the cancers which are suitable for laser surgery are early stage cancers, then there is a good likelihood of being able to cure the cancer, with either laser surgery or radiotherapy. However, any cancer of the larynx may have an unpredictable or aggressive natural biology, and so it is never possible to guarantee success. Nevertheless, success rates for many of these early stage cancers are good.

In choosing the best way to treat an early larynx cancer, the function of the larynx must be considered also. These functions include: voice production, swallowing, breathing, and coughing. It is important to be aware that any type of larynx cancer treatment can impact on any or all of these functions to a variable degree.

Radiotherapy is a well-established treatment for early stage larynx cancer, with good success rates. Disadvantages of radiotherapy include:

- There is usually a wait of at least 6 weeks or more before treatment can commence
- The duration of treatment is daily, for 6-7 weeks
- The effect of radiotherapy on the larynx is to cause swelling, dryness, and scarring. This will have some adverse impact on voice, and may lead to other symptoms such as dryness in the throat, thicker secretions, and higher risk of chest infections.
- Because of the swelling that happens after treatment, and which is generally permanent, monitoring the larynx by laryngoscopy (flexible camera) in the clinic is more challenging, and so it can be difficult to detect recurrences at an early stage
- In the minority of patients who do develop recurrence, because of the swelling, impairment of wound healing, and other issues, the only realistic option left for most patients will be total laryngectomy, which entails complete removal of the voice box and having to breathe through a hole in the neck.
- If you ever develop another cancer in the Head & Neck region, the fact you received radiotherapy before may prevent you being able to receive it again.

The advantages of radiotherapy are:

- It does not require an operation
- Most patients' voices and symptoms are reasonable and acceptable (although some patients will be very bothered by weak voice and / or other symptoms)

Laser surgery is performed through the mouth using a metal tube (laryngoscope) and microscope. In suitable cases, entire cancers can be removed in a single sitting. In many patients this can be done as a Day-case procedure. For larger tumours an in-patient stay for a few nights might be required.

For the surgery to be performed effectively, it is essential to have good access to the larynx with the laryngoscope. In some patients, this may simply not be possible due to the anatomy of the larynx, tongue, or prominent upper teeth. Thus, if you agree to undergo laser surgery, there is a risk the surgeon will not be able to proceed if the

access is poor and the tumour cannot be adequately displayed. It may not be possible to know this until after you are put asleep and the surgeon attempts to display the tumour. If this does happen to you, you will need to be referred for radiotherapy instead.

Advantages of laser surgery are:

- No delay in treatment, done in a single sitting, often as a Day-case
- No long-term swelling of the larynx, dryness or thickness of secretions.
- Most patients have good voices after, but see discussion on vocal outcomes on this below
- The success rates are excellent, at least as good or better than radiotherapy
- Because there is no swelling of the larynx after laser, it is very easy to monitor the larynx by laryngoscopy in the clinic, and any recurrence is usually detected at an early stage.
- In cases which do recur, all re-treatment options are still open, which can include re-laser, open surgery (partial laryngectomy), or radiotherapy. It is highly unlikely total laryngectomy would be required in case of recurrence

Voice outcomes:

The vocal outcome after laser surgery will generally depend on how much vocal cord has to be removed. For small cancers which require minimal removal of vocal cord, vocal outcomes are excellent and many patients may have near normal voices. The more of the vocal cord that has to be removed, and particularly if some of the opposite vocal cord has to be removed also, the greater the likelihood of a poor vocal outcome. Sometimes the extent of vocal cord resection that is required will only truly be apparent intra-operatively, and therefore it is not possible to give guarantees preoperatively regarding what the voice will be like postoperatively. In some cases, your surgeon may advise against laser surgery on the basis that the extent of vocal cord removal that will be required will lead to a poorer vocal outcome than would be likely with the alternative treatment of radiotherapy.

Cancer control success rates:

Because most patients have early stage cancers, good results can be expected with either laser or radiotherapy. Overall survival is probably equal between laser and radiotherapy. The risk of recurrence requiring a total laryngectomy after early stage cancers is also small for both types of treatment; however, because all re-treatment options are still open in patients initially treated with laser surgery, whereas most recurrences after radiotherapy will require total laryngectomy, the risk of ultimately ending up with a total laryngectomy are probably slightly lower in patients whose initial treatment was laser.

What you can expect after laser surgery:

You will have a hoarse weak voice for 3 weeks, until healing occurs. Your voice should then start to improve.

For most patients, swallowing is not affected. Patients with very large tumours or epiglottic tumours may have a different kind of laser surgery which can impact swallowing and require a few weeks of tube feeding. Your surgeon will let you know if this applies to you, but for most patients, this is not an issue.

If it is not possible to remove all the cancer, due to either inadequate access, or the cancer being unexpectedly found to be more extensive than anticipated, then it is possible you may still need radiotherapy. However, for most patients, laser alone will be sufficient treatment of larynx cancer.

Most patients will then be seen in clinic at regular intervals. If the examination in clinic is difficult, or the findings are equivocal, your surgeon may wish to re-book you for laryngoscopy under anaesthesia +/- re-laser, to be 100% sure there is no recurrence. For most patients who return to theatre for laryngoscopy, everything turns out to be fine. However, if you do choose to have laser as your initial treatment for larynx cancer, you should be aware that further examinations under anaesthesia with possible biopsies or re-lasering is a not uncommon scenario.

#### Risks of laser surgery

- Poor voice outcome, if more vocal cord than anticipated is removed
- Anterior web: this is scarring between the front parts of the 2 vocal cords which can inhibit their movement and lead to poor voice. This is a risk after removal of cancers of the anterior commissure. It can be treated with lasering the scar, but there is still a risk of further scar recurrence
- Taste disturbance: if the operative procedure is very lengthy, there may be transient taste disturbance due to prolonged pressure on the tongue by the laryngoscope. This should come back to normal within a few weeks.
- Damage to upper teeth: As the laryngoscope rests on the upper teeth there is always a small risk of damage. We generally use a rubber tooth guard to minimize risk to teeth.
- Bleeding: highly unlikely after removal of small vocal cord cancers, but may occur after removal of larger / epiglottic cancers
- Chest infections: highly unlikely after removal of small vocal cord cancers, but may occur after removal of larger / epiglottic cancers
- Hazards of laser including burns to healthy tissues, ignition or airway fire: These dangerous but extremely unlikely complications are prevented by strict adherence to checklist in the operating theatre before starting the case to check the laser is functioning correctly, and strict adherence to intraoperative protocol including use of laser-safe anaesthetic tubes and instruments, keeping the amount of oxygen in all tubes below a certain level, measures taken to protect the patient from laser damage, and having a dedicated nurse in charge of the laser machine.

Other issues:

#### Field change

Whatever caused the original cancer (usually smoking) may have caused changes in other cells, away from the tumour, that put them at increased risk of developing a new cancer in the future. So-called dysplastic areas can also be removed with the laser. However, dysplastic change can sometimes be present in tissues which look normal, and / or can be widely present throughout the larynx, involving all of both vocal cords, in which case removal of all at-risk tissue is not feasible. In some cases, examination of the removed cancer specimen will show dysplasia present at the margins of excision. The usual management in such cases is generally to follow the patient up very closely, often with repeat laryngoscopy +/- laser after an interval. Patients with extensive dysplastic change (so-called "field change", as the entire larynx is generally involved), may require multiple laser procedures over the course of several years, and still have increased risk of recurrences in the future

#### Smoking

Smoking is the major cause of larynx cancer. It also causes other cancers (including mouth, throat, lung). In fact, the commonest cause of death in patients with early stage larynx cancer treated with laser is actually a new non-larynx, smoking-related cancer, and continuation or cessation of smoking is one of the most significant determinants of survival in patients with early stage larynx cancer. Therefore all patients who have a history of smoking should do their utmost to complete cease smoking.

#### Open surgery

Before the advent of laser, open removal of part of the larynx (open partial laryngectomy) via incisions in the neck was an alternative to radiotherapy for treatment of early larynx cancer which was popular in many mainly European countries. Although these operations are highly effective with excellent success rates, the disadvantages are that they are much bigger operations, cause much more initial disruption of swallowing, and invariably require temporary feeding and breathing (tracheostomy) tubes. However, open partial laryngectomy is still a good option for certain patients, depending on exact location of the tumour within the larynx, their age and general health, and whether or not the tumour is accessible to laser surgery. In general, laser is preferred over open surgery. If your surgeon feels you would be best served by open surgery for whatever reason, he/she will discuss this with you.