The Role of Radiation in the Management of Acromegaly

Guest Speaker Dr Anthony Falkov

Written By Dr Catherine Chan

We were extremely privileged to have Dr Anthony Falkov as our first Guest Speaker for the day. Dr Falkov is a Radiation Oncologist with an interest in radiotherapy for pituitary tumours. He is originally from Johannesburg, South Africa. He is currently a consultant at Auckland City Hospital, and he also works in the private sector at Auckland Radiation Oncology ARO, NZ's first private radiation centre. He played an important role in introducing the country’s first private stereotactic radiotherapy unit last year.

The talk began with a bit of radiological anatomy, which showed how tumour tissue can be differentiated from normal tissue in a scan due to its different density. Also the use of Gallium dye during an MRI scan cause tumours to light up brightly on the scan.

Dr Falkov pointed out that according to the latest guidelines, radiotherapy is low down on the list of treatment for acromegaly, often following unsuccessful surgical and medical therapy. (See flow chart)

The first line treatment for acromegaly currently remains to be surgery. Although for macroadenomas (tumours >1cm size) the long term control rate remains low at around 50-61%, given the tumours often have already invaded surrounding structures such as the cavernous sinus or bone. Following incomplete resection or recurrence, radiation therapy and medical therapy can be used in a combined or sequential fashion, this is decided upon in a multi-disciplinary team to evaluate the best effective and least risky therapy on an individual basis. It is interesting to note for those who achieve normal hormone levels after surgery, up to 20% can recur later, as small amounts of tumour cells maybe left after surgery.

Dr Falkov went on to discuss the different types of radiotherapy. Being mindful benefits must always be balanced against inherent risks of new hypopituitarism, visual loss, and cranial nerve deficits.
The first type of radiotherapy available is called **Conventional External Beam Radiotherapy (EBRT)**, this is widely available in most tertiary treatment centres in NZ to treat all types of tumours, and this has been around since the 1920’s.

With this technique the disadvantage is that large volumes of normal tissue get irradiated. (See picture on the right). With EBRT, the rate of hormonal remission varies widely from 5-74%, and can take 5-15 years to achieve. Given the surrounding areas also receive a significant dose of the radiation, it carries a 50-80% risk of new hormonal deficiencies, and an increase stroke risk to that of someone 5 years older. Therefore EBRT use in treatment of acromegaly has dropped significantly in the last decade.

Another type of radiation is called **Stereotactic Radiation**, which has 2 major divisions: Stereotactic Radiosurgery (single large dose), and Stereotactic Radiotherapy (multiple smaller doses)

There are several different types of **Stereotactic Radiosurgery (SRS)**, including Gamma Knife (previously was the Gold standard, currently not available in NZ), Cyber Knife (not available in NZ), and Linac based (available in Dunedin, see later).

The most recent advancement is the use of Image Guided Radiotherapy IGRT with real time CT scan in a Linac linear accelerator, resulting in a frame-less procedure with higher accuracy of dose delivery.

The limitation of radiosurgery is because it is a single large dose treatment, it can only be used if the tumour is at least 3-5mm away from the optic nerves or optic chiasm to avoid the risk of damage and the significant risk of blindness.

The advantage of radiosurgery is that it is quick, with a median time to remission taking 29.8 months only. Also of note is the use of octreotide (Sandostatin injections) may decrease the effectiveness of radiosurgery, and it is usually recommended to stop octreotide at least 1 month prior to radiation treatment.

**Stereotactic Radiotherapy (SRT)** is a variant of SRS radiosurgery where radiation is fractionated (divided) and given in multiple smaller doses over a number of weeks. It has been shown to have equal effectiveness and less risk of side effects compared to SRS and therefore would best suit patients whose pituitary tumours lies too close to the surrounding critical structures such as the optic chiasm, optic nerves, or cavernous sinus.

In recent years the frameless image guidance radiotherapy (IGRT) system allows more precision that is accurately reproducible with <1mm variation. IGRT may be combined with other advanced techniques such as modulated therapy that allows much higher target conformity whilst minimising radiation dose to adjacent normal tissues.

**Conclusion**

Radiotherapy is very effective in management of persistent active acromegaly after surgery. Conventional radiotherapy EBRT achieves good rates of hormonal remission, with a reasonable risk of complications. Stereotactic radiosurgery (SRS) or stereotactic radiotherapy (SRT) provide comparable high rates of tumour control and hormone remission, with low risk of complications. To decide between SRS or SRT the tumour size & proximity to adjacent structures such as the optic chiasm or cavernous sinus are
particularly important. For tumours >3mm away from the optic chiasm SRS is a convenient option. Otherwise larger tumours closer to critical structures SRT is an option with equal rates of control but low risk of complications.

**Additional Questions & Answers**

Dunedin is the only centre in New Zealand publicly funded to deliver Stereotactic radiosurgery & stereotactic radiotherapy. The centre uses a Linac based system including the use of frames.

In late 2012 a second stereotactic radiation centre was opened in the private sector, under Auckland Radiation Oncology, providing an alternative option for patients undergoing SRS or SRT. The machine uses image guidance system and is able to deliver a frameless procedure. Currently this option is not publicly funded.

A very special thank you again to Dr Anthony Falkov for presenting and sharing his expertise with us.

*For more information about radiation therapy, the NZ Acromegaly Society has produced a new Information Booklet, which includes photos of the procedure in Dunedin Hospital. Please see our website [http://www.acromegaly.org.nz/resources/information_booklet](http://www.acromegaly.org.nz/resources/information_booklet)*