

LDR prostate brachytherapy

Introduction

Low dose rate (LDR) prostate brachytherapy is a modern, effective minimally invasive treatment appropriate for many men with early prostate cancer. I perform this with Dr Andrew Potter from Adelaide Radiotherapy Centre and it offers at least comparable survival and local control to surgery and external beam radiotherapy for properly selected patients. Seed implantation is normally a day surgical procedure taking about 1 – 1 1/2 hours to perform with most patients resuming normal activities almost straight away. The seeds are placed directly into the prostate and can deliver approximately 50% more radiation to the prostate gland when compared to external beam radiotherapy with a very favourable side effect profile compared to alternative treatments.

Eligibility criteria

Unlike the alternative treatments of external beam radiotherapy and radical prostatectomy, there are a number of eligibility criteria that have to be met. These relate to disease and prostate factors. Specifically, the Medical Benefits Schedule restricts rebates to men with a PSA of 10 or less and a Gleason Score of 7 or less. Brachytherapy is an effective treatment with a PSA up to 15 but at these levels it needs to be self-funded though some private health funds will contribute towards the cost on an individual patient basis. Post implant voiding difficulty or even urinary retention is experienced more often in men with significant prostatic obstruction and so a reasonable voiding flow rate is required to qualify for brachytherapy. Men who are otherwise suitable for brachytherapy but have poor flow rates <13 mls/sec can be treated with surgical bladder neck incisions or minor transurethral prostate resection first. Prostate size is important and large prostates may need to be shrunk with hormonal treatment or other drug treatment for a few months in order to meet the size restriction, <50 cc.

History

Modern prostate brachytherapy was developed in Seattle USA in the late 1980's and has been practiced for a number of years interstate in Australia. The Adelaide Brachytherapy Group began implanting in March 2004 with Radiation Oncologists from Adelaide Radiotherapy Centre at Calvary North Adelaide Hospital. A public brachytherapy service was started at the Royal Adelaide Hospital in September 2004.

Ig 125 brachytherapy seeds

Prostate brachytherapy involves placing tiny titanium capsules containing radioactive IodineR 125 impregnated silver wires directly into the prostate gland. They continuously give off low level radiation that is biologically effective for approximately 6 months. The radiation continues to decay with a half life of about 60 days and eventually the inert tiny seeds remain unnoticed in the prostate. Each seed is 4.5 mm in length, 0.7 mm thick and arranged in a strand of a dissolvable Vicryl suture.

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Prostate volume study



Prior to a prostate brachytherapy seed implant, a flexible cystoscopy to inspect the urethra, prostate and bladder and a prostate volume study need to be performed to finally confirm suitability and plan the implant. At Calvary North Adelaide Hospital these are performed as a brief day surgical procedure under a general anaesthetic after a minor bowel preparation using two microlax enemas on admission to clear the rectum. A transrectal ultrasound is performed with cross sectional images of the prostate down

loaded into a computer program that makes a 3 dimensional model of the prostate. The number, position and dose of the seeds are planned, ordered from Atlanta and shipped out preloaded in needles ready for implantation a month later. At the Royal Adelaide Hospital the flexible cystoscopy is done as part of the initial workup and only one admission to hospital is required with real time dose planning and immediate seed implantation performed as one longer procedure.



Planning

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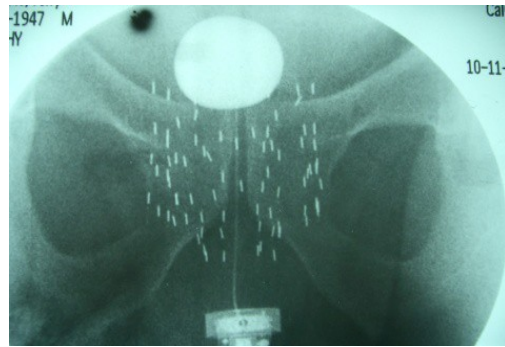
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Seed implantation

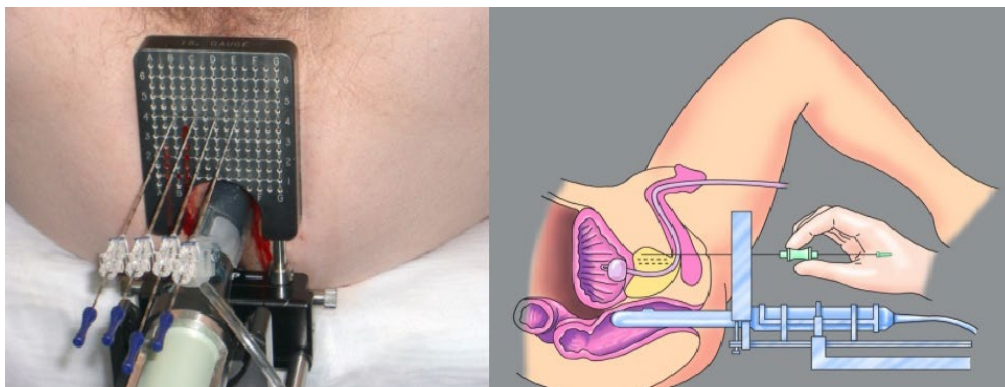
The implant procedure does not require a surgical incision. In the lithotomy position, lying face up with the legs elevated in stirrups, a urethral catheter in place, the needles with stranded seeds preloaded, are inserted into the prostate gland through the perineum, the skin between the scrotum and the anus under trans rectal U/S guidance. As the needles pass through the prostate, they are imaged with the ultrasound and x-ray and can be guided to their final position. The needles are withdrawn, leaving the seeds accurately placed in the prostate. About 30 needles and up to 120 seeds are used depending on prostate size. The seeds produce radiation in a small area around them and very little radiation reaches the adjacent normal organs. Following the implant many men are not even aware anything has been done and it is certainly not a painful procedure. At Calvary North Adelaide Hospital, patients are discharged when voiding and have a CT scan at Adelaide Radiotherapy Tennyson Centre at Kurralta Park later that day. At the Royal Adelaide Hospital, discharge is the same day if first on the list or the next day if second on the list and the post implant CT is performed before discharge.



Rapidstrand Rx pre-loaded needles



Completed Seed implantation



Seed implantation

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Immediately after the prostate seed implant

An icepack is placed between the legs to help minimise perineal swelling. Antibiotics are given during the implant and may be given after the implant to prevent infection. After removal of the catheter there will probably be a mild burning sensation when passing urine perhaps with some blood for a while. Drinking plenty of water helps prevent blood clots by flushing the bladder. The smooth muscle relaxant flomaxtra or prazosin relaxes the smooth muscle of the bladder neck and the prostate and helps voiding in the face of prostate swelling after the implant. This will have been started just before the implant and should be continued as long as necessary to help voiding, usually 2 -- 3 months. Driving is not restricted beyond 24 hours after the anaesthetic. A normal diet and activities can be resumed apart from avoiding heavy lifting or strenuous physical activity for the first 2 days.

Side-effects after the seed implant

Some mild soreness and bruising in the perineal area between the legs is common and temporary. Sitting is occasionally uncomfortable and riding a bike should be avoided until this has settled. Soon after the implant, the trauma of the implantation and the radiation reaction from the seeds causes variable urinary frequency (day and night), urgency, dysuria (painful voiding) and slowing of the stream. About 2% of patients go into urinary retention and cannot pass urine sometime in the first few weeks after the procedure and require a catheter to be inserted. If unable to pass urine and in discomfort, advice should be sought from the implanting Urologist or Radiation Oncologist immediately. If a catheter is necessary, it may need to stay in for a few weeks before voiding is possible again. Rarely, it may need to stay in longer, intermittent self catheterisation tried or a suprapubic catheter inserted. Some urinary symptoms may persist for 6 -- 12 months. A reduction in or even complete loss of semen on ejaculation may be noticed as the prostate and the adjacent seminal vesicles are responsible for the production of seminal fluid. Ejaculation can be blood stained and painful and very rarely a seed or two can be lost in the ejaculate early on. Erectile dysfunction occurs in 30 -- 40 % of patients with time but will usually respond to medical treatment. Occasionally the bowel can be affected with constipation, more frequent loose bowel actions or rarely bleeding seen. Headache, dizziness or rash from the medication provided is occasionally seen.

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Radiation safety

Patients are radioactive on leaving hospital but their urine is not. However nearly all of the radiation from the seeds is absorbed within the prostate and surrounding tissues and every 60 days the radiation dose is reduced by 50%. There are no restrictions on travel or physical contact with other adults, even sleeping or intercourse. However, precautions should be taken to avoid prolonged very close contact with small children and pregnant women within the first 2 months after treatment. Women who are, or may be pregnant may share a lounge but should not sit very close on the same lounge for any period but otherwise there are no restrictions. Children should not be nursed or sit very close for long periods of time but may be cuddled or held briefly each day and they may stay the other end of a couch without restriction. The seeds are permanently embedded in the prostate gland but there is a very remote chance of a single seed being passed during sexual activity. Patients are therefore advised to use a condom during intercourse for the first two weeks after the implant. During this time, the semen may be discoloured dark brown. This is normal and is a result of bleeding that may have occurred during the operation and has now been released into the ejaculate. Sometimes ejaculation can also be painful but this tends to settle in time. Should a seed be caught in a condom it should be disposed of by double wrapping and placing in the rubbish bin.

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Follow up schedule

After the seed implantation, regular follow-up is arranged. The post implant CT is used to assess actual dosimetry to see if the prostate has been satisfactorily treated with an adequate radiation dose. If this is thought to be significantly deficient, occasionally a second top-up seed implant or external beam radiotherapy could be recommended. The first follow-up is usually with the Urologist in about 4 weeks and the next with the Radiation Oncologist at 3 months after treatment at Calvary North Adelaide Hospital. PSA levels are checked at 3 months, at 6 months and 6 monthly for 2 years and then yearly. Following the implant the PSA should gradually fall, possibly taking a couple of years to fall to the lowest level, which should be <1.0 . It is not uncommon for there to be a slight PSA rise or bounce at about 12 -- 18 months and this should not cause concern. Should there be a sustained PSA rise after treatment, indicating either local failure or unrecognised occult metastatic disease, delayed hormone treatment would be the likely recommendation.



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