BRACHYTHERAPY FOR PROSTATE CANCER

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PROSTATE BRACHYTHERAPY

- Why brachytherapy?
- How do we do it?
- What are the results?
- Questions?

WHY BRACHYTHERAPY?

- Radioactive source inserted into tumour
- Can safely deliver higher radiation dose to tumour
- Lower radiation dose to bowel and bladder
- Improves local control of tumour and reduces toxicity of treatment
- Fewer treatments than external beam radiotherapy
- Shorter treatment time

STAGING DETERMINES WHICH TREATMENT IS APPROPRIATE TNM

- T1-confined to prostate, clinically undetectable
- T2a <1/2 1 side
- T2b ½ 1 side
- T2c > both sides
- T3a extends beyond the prostate capsule
- T3b into seminal vesicles
- T4 into other organs
- N1-into lymph nodes
- M1-distant spread (bones)

RISK GROUPING

- D'Amico Criteria (USA)
- Low risk
- PSA <10, Gleason <7, Stage <T2b,c

- Intermediate Risk
- 1 risk factor
- PSA 10-15, Gleason ≥7, Stage > T2b,c

- High Risk
- > 2 risk factors and a
- ll PSA >15

- NCCN Criteria (British)
  Low Risk
- PSA <10, Gleason <7, Clinical Stage <T2b

- Intermediate Risk
- 1 factor
- PSA 10-20, Gleason ≥ 7, Stage >T2b,c

- High Risk
- >2 factors and all PSA > 20
-

DOSE ESCALATION

- High dose (dose escalated) EBRT-conformal/ IMRT
- EBRT with HDR brachytherapy boost
- Brachytherapy with intraprostatic boost

BRACHYTHERAPY ELIGIBILITY

- Is it a Practical Treatment?
- Consent
- Pubic arch acceptable
- Able to hyperflex hips
- Life expectancy > 10 yrs
- Hip replacements *(poor CT visualisation,req MR)*
- Obesity

- Is Patient at Increased Risk of Complications?
- Anticoagulation
- TURP *(size of TURP defect)*
- AUA < 12, Flow rate > 12 (catheter risk)
- Chronic prostatitis

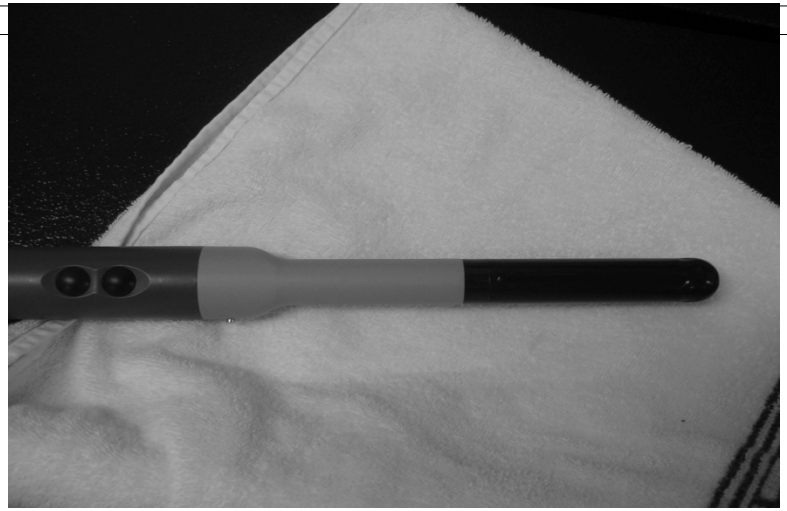
HOW DO WE DO IT?

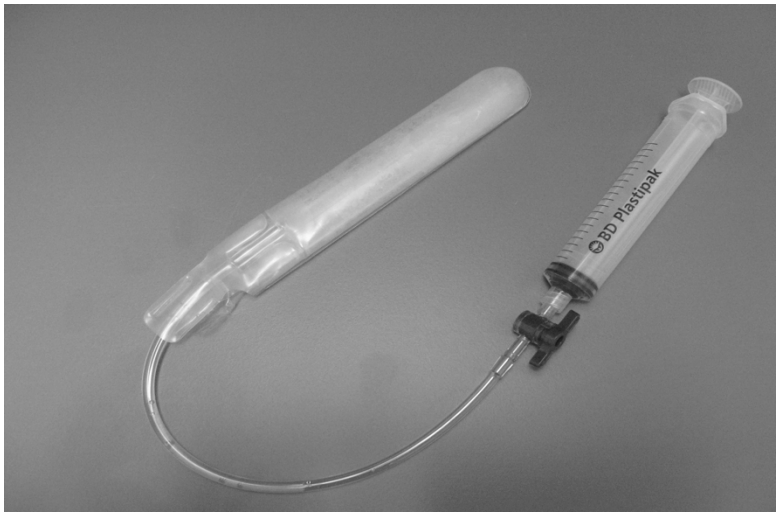
Delivery of brachytherapy using fine needles placed in the prostate

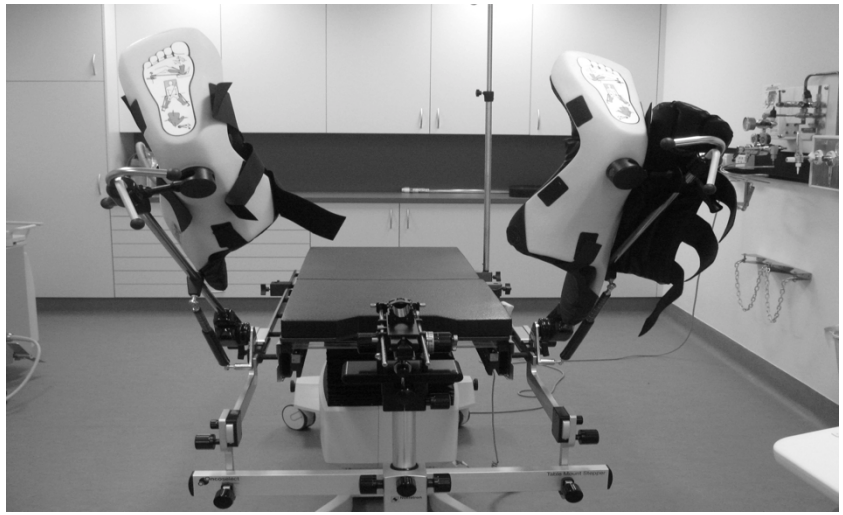
PRE-OP

- Volume study –awake patient, bowel prep
- prostate volume, (ellipsoid + calculated)
- correlation with CT and MR volume QA
- Pubic arch
- Anaesthetic assessment

VOLUME STUDY







VOLUME STUDY

- Images captured from base to apex at 5mm intervals
- Measurements taken and documented: width, height, length and volume
- Risk of pubic arch interference observed and documented
- Decision made as to suitability for treatment
- If suitable RFA consent and questionnaire filled out
- If not suitable, further discussion with patient. Possible extra 3 months of hormones and re-assess.

PRE-IMPLANT DIET AND BOWEL PREP

- Patient information sheet
- Low fibre diet commenced 3 days before implant
- Clear fluid diet commenced 1 day before implant
- Picolax bowel prep taken day before implant
- Fast from midnight day before implant

IMPLANT PROCEDURE

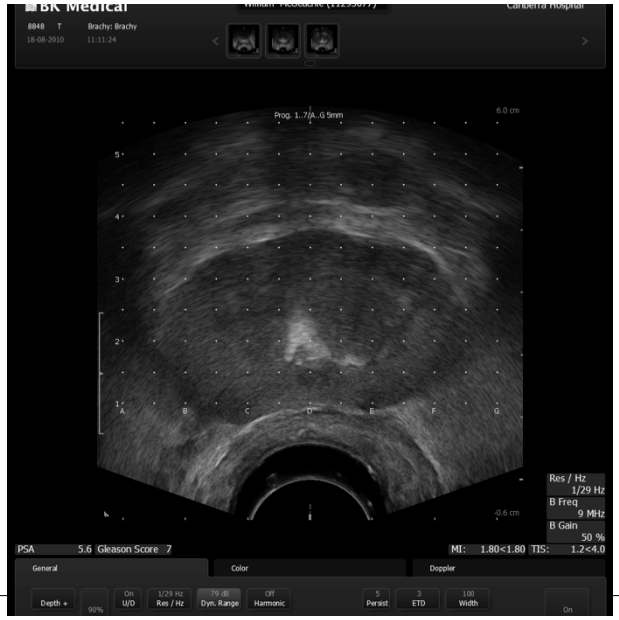
- Patient arrives at 7.00am for enema.
- Anaesthetics team arrives at 7.30am to set up their equipment and speak to patient.
- Procedure starts at 8.00am.
- Patient is anaesthetised (GA).
- Stirrups are attached to the couch and legs are positioned according to documentation recorded at the volume study.

IMPLANT PROCEDURE

- Skin prepped and sterile drapes placed.
- Catheter inserted into bladder and contrast injected into bladder.
- C-arm with sterile cover positioned over patient.
- Stepper mounted on couch.

IMPLANT PROCEDURE CONTINUED…

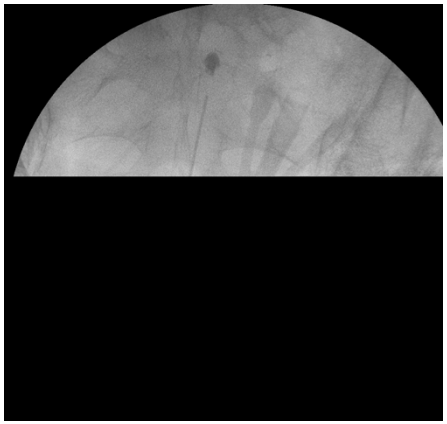
- U/S probe is inserted into rectum.
- Stepper position optimised.
- U/S used to identify prostate from base to apex.
- Measurements documented on theatre worksheet.

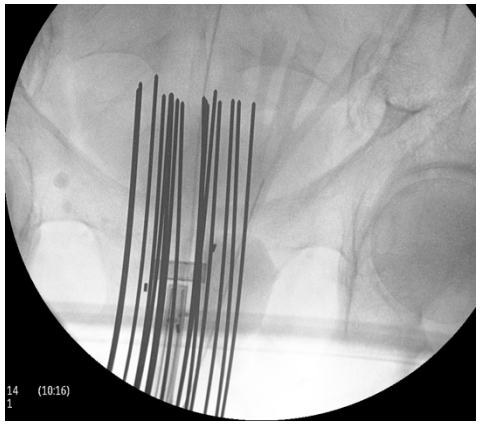


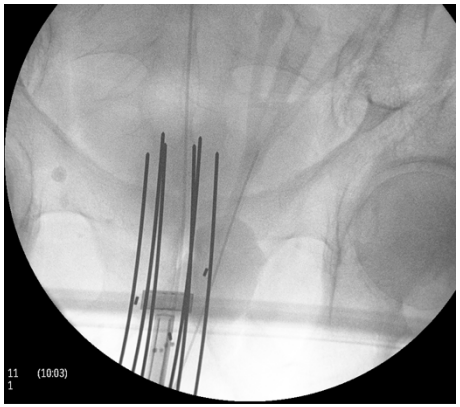
IMPLANT PROCEDURE

- Gold Seed Fiducial markers inserted. One at base of prostate, one at mid gland and one at apex.
- Needle placement commences with 2 central stabilising needles.
- C-arm used to verify placement of needles in relation to bladder.

IMPLANT PROCEDURE CONTINUED…







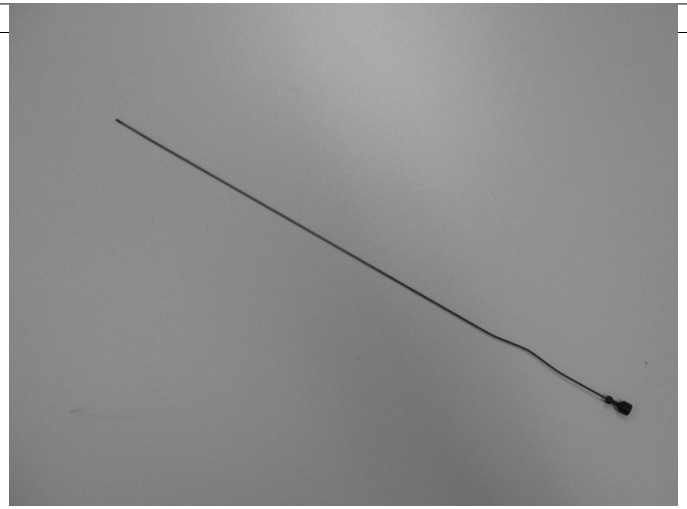
- Needle placement continues working from ant to post and the periphery of prostate before interior.

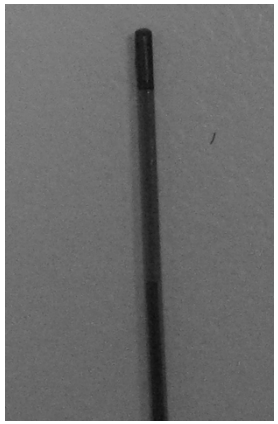
IMPLANT PROCEDURE

- Template sutured to perineum.
- End of bed replaced and legs taken out of stirrups.
- Charnley pillow placed between legs.
- Patient woken up from anaesthetic and taken to recovery where bladder irrigation is commenced.

CT SIM

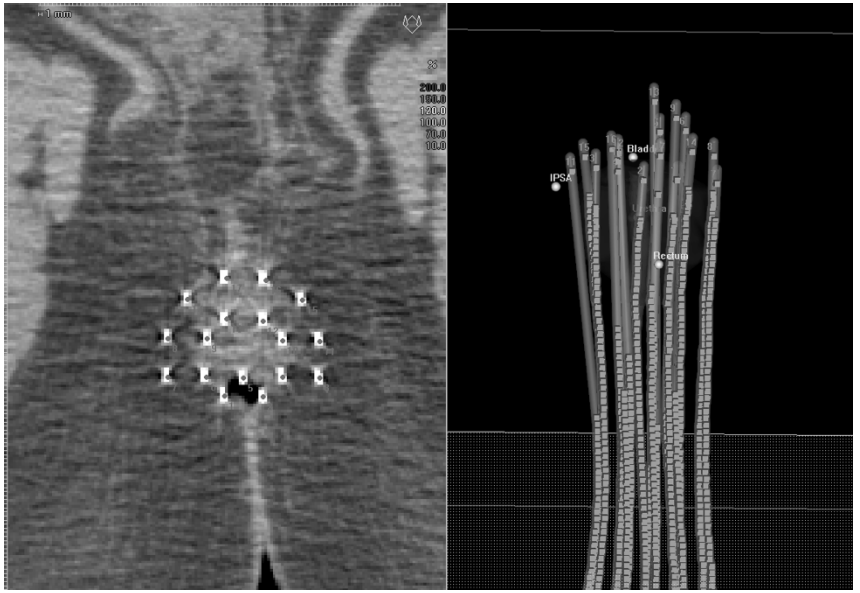
- CT markers inserted.
- Bladder filling: 90ml of water + 10ml contrast.
- CT protocol – 1mm reconstruction over tips of needles.





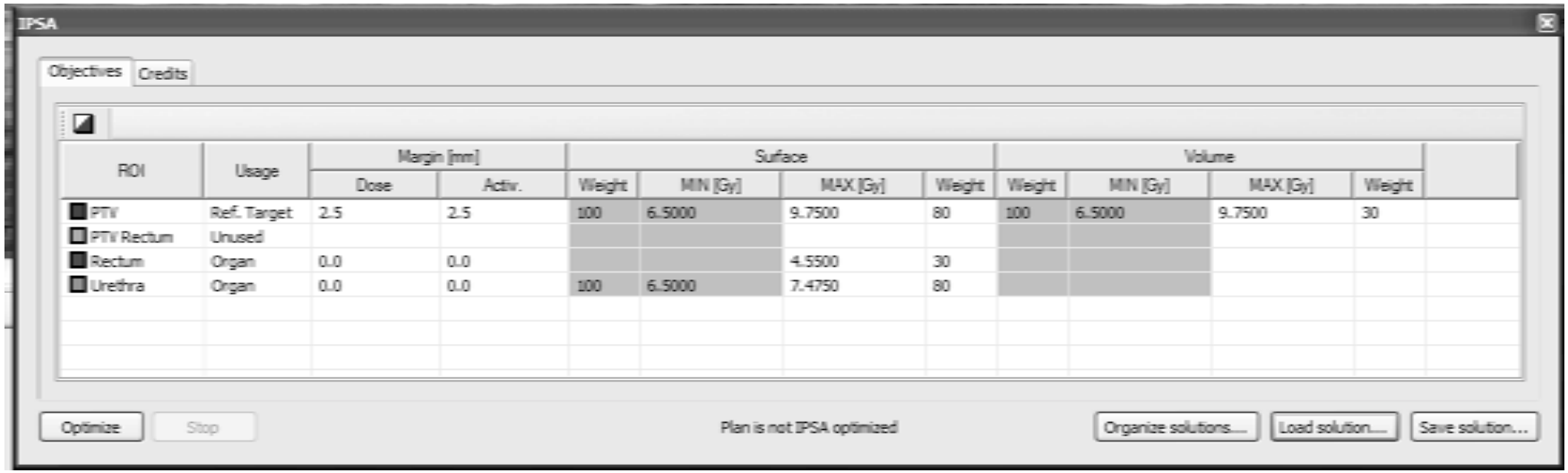
PLANNING

- Contouring: PTV, bladder wall, rectal wall, urethra
- Needle reconstruction



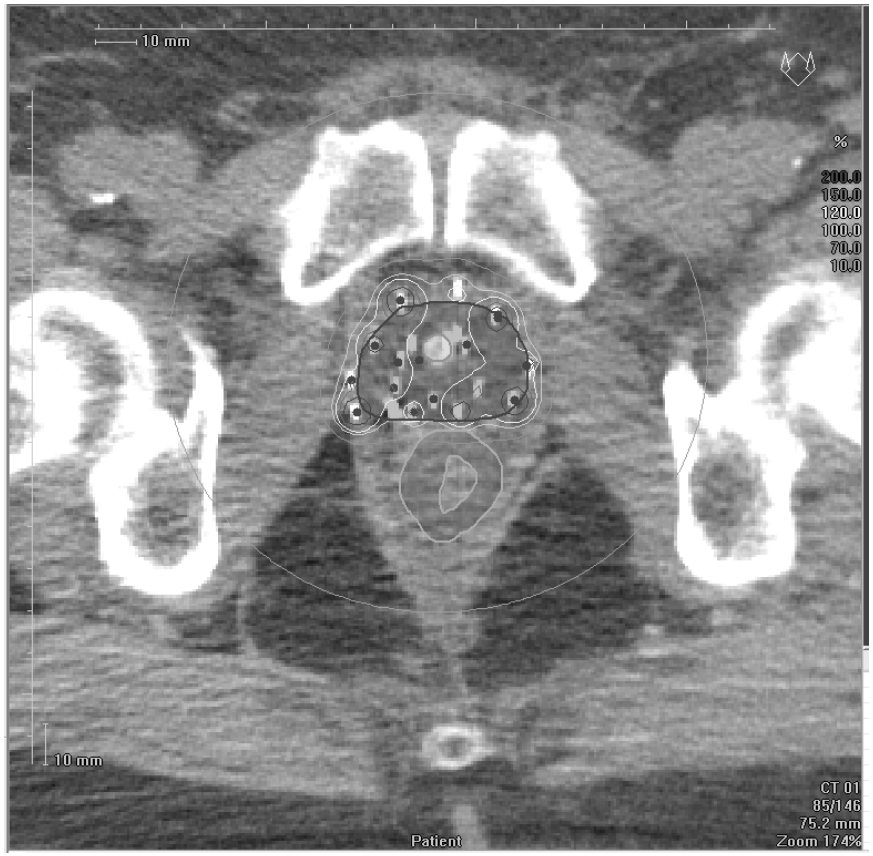
PLANNING CONTINUED

- Plan optimisation (IPSA)



PLANNING CONTINUED

- Plan evaluation



TREATMENTS

- 3 Treatments over 2 days
- Day 1
  - Implantation procedure
  - Planning
  - Treatment 1
- Day 2
  - CT scan and replan
  - Treatment 2
  - Treatment 3
  - Implant removed under sedation
  - Catheter remains until bleeding settled
- Day 3
  - Discharge when urine clear and able to urinate without a catheter and passed bowel motion

POST OP

- Patient is not radioactive
- Low fibre diet to avoid bowel motions
- Pain relief - endone
- Country patients – bladder obstruction risk
- Followed by 46Gy EBRT

POST IMPLANT CARE

- Flomaxtra 0.4mg 1 month
- NSAID for 5-10 days
- Simple analgesia prn
- Norfloxacin 5 days (10 if diabetic)
- Hormones-continue if high risk
- Ural for dysuria (NSAID)
- Cranberry juice/tomatoes/orange juice acidity can exacerbate dysuria
- EBRT 46Gy/23f within 2 weeks

HDR TREATMENT OUTCOMES

Study	*No.*	*Median PSA*	*Median Fup*	*bNED(5)*
Mate 1998 (Seattle)	104	12.9	45mo	iPSA<20:84% iPSA>20:50%
Ealau (Seattle)	104	12.9	6.3yr	OAS5 83% OAS 10 77%
Kestin	161	9.9	2.5yr	83%
Borghede 1997	50	NR	45mo	84% (18 mo)1
Galalae 2002	144	12.15 mean25.6	8yr	69%(10yr) 74% (5yr)

ACUTE TOXICITY HDR BRACHYTHERAPY

- Pain, bleeding, urinary retention(10%)
- EBRT component
- Proctitis rare, dysuria, frequency, urgency
- Acute post RT symptoms
- Rectal symptoms settle early
- Uruinary symptoms take 6-12 months to settle

HDR LATE TOXICITY

Study	*GI*	*GU*
Mate(1998)	2% G2	6.7% urethral stricture
Kestin (2000)	No G3	4% stricture
Galalae (2002)	4% G3 7% G2 10% G1	2% G3 cystitis 4%G2 12%G1
Borhegde (1997)	8% G2 proctitis No G3	12% G1-3 0 urethral strictures

LONG TERM

- Dysuria
- Bowels
- Perineal nerve function
- Impotence