The Eindhoven Intra Operative Radiotherapy Applicator System for breast carcinoma

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Introduction

Catharina Hospital Eindhoven:

- Electron Beam IORT as pioneered by Veronesi et al.*
- Target volume: surgical cavity + surrounding 1 cm of tissue
- Dose: 21 Gy at 90%

- Favourable patient group
- Fixed linac at OR

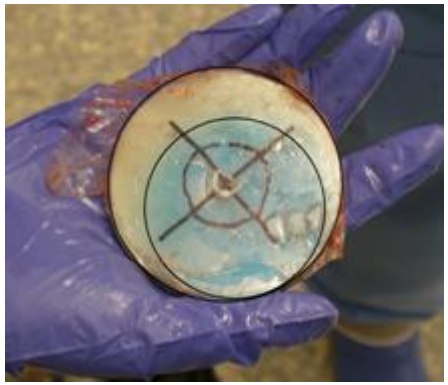
* Veronesi U, Gatti G, Luini A et al. Breast J. 2003 Mar-Apr;9(2):106-12

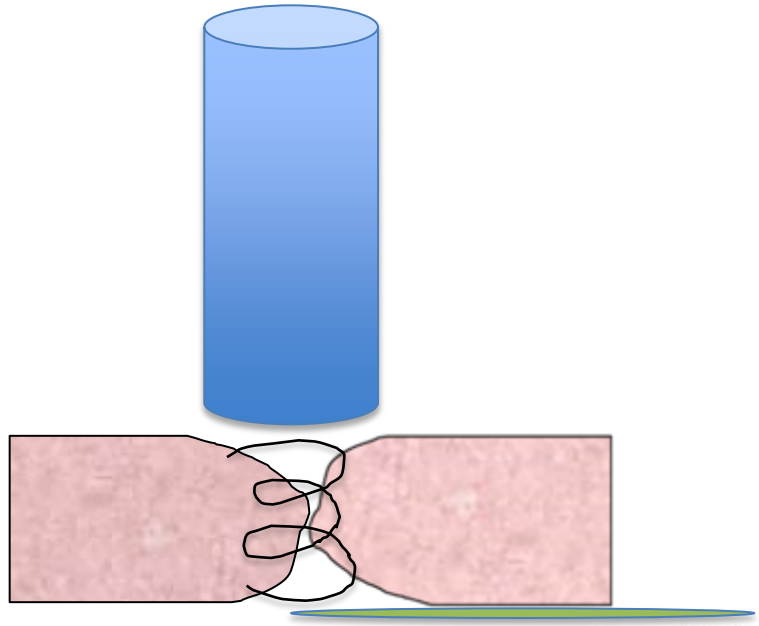
Electron Beam Intra Operative Radiotherapy

- Stainless steel applicator
- 5 mm water equivalent bolus at the applicator tip
- Absorber disc to reduce dose to underlying tissue (thoracic wall)

Practical problems

- Target volume not centered in the electron beam
- Misalignment of absorber disc
- Large skin incision necessary to position absorber disc





Requirements

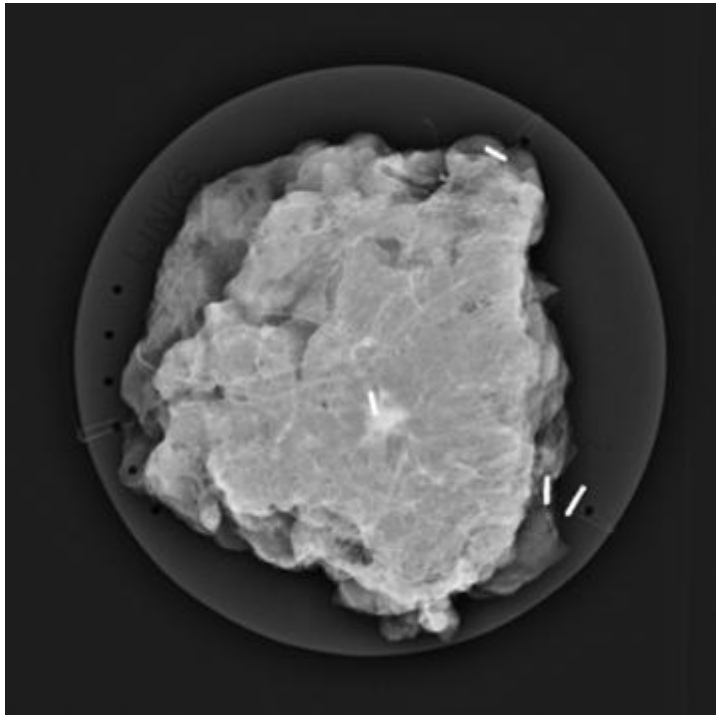
- Autoclave sterilisable
- 5 mm water bolus included
- Simple setup
- Suitable for 5 and 6 cm IORT applicators
- Mechanical safety
- Video verification

Design: parts

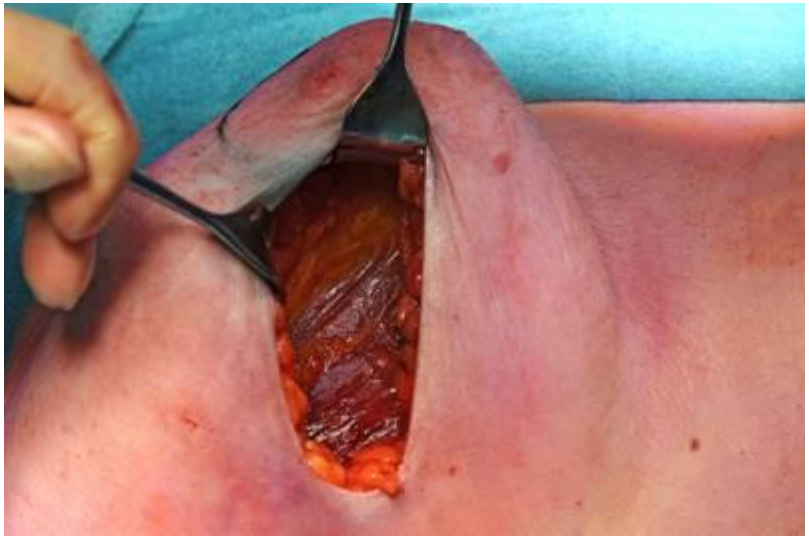
- Cup
- Absorber disc
- Spacer

Procedure: lumpectomy

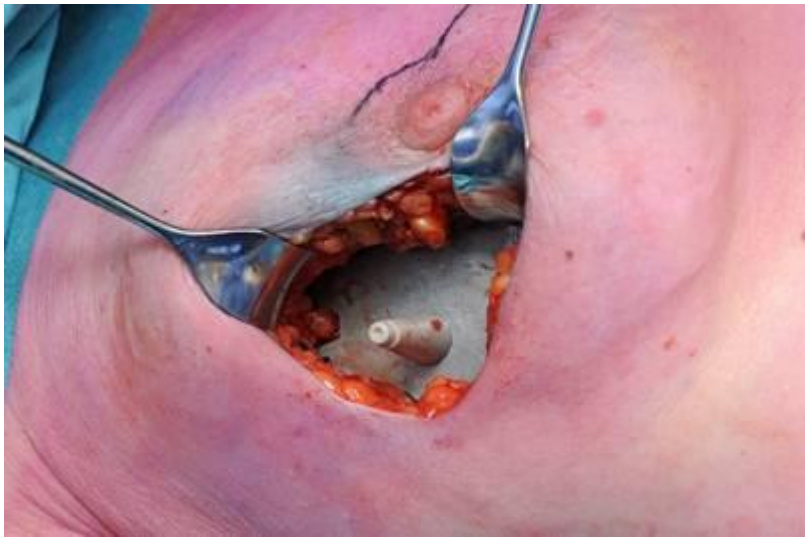
Procedure: double check

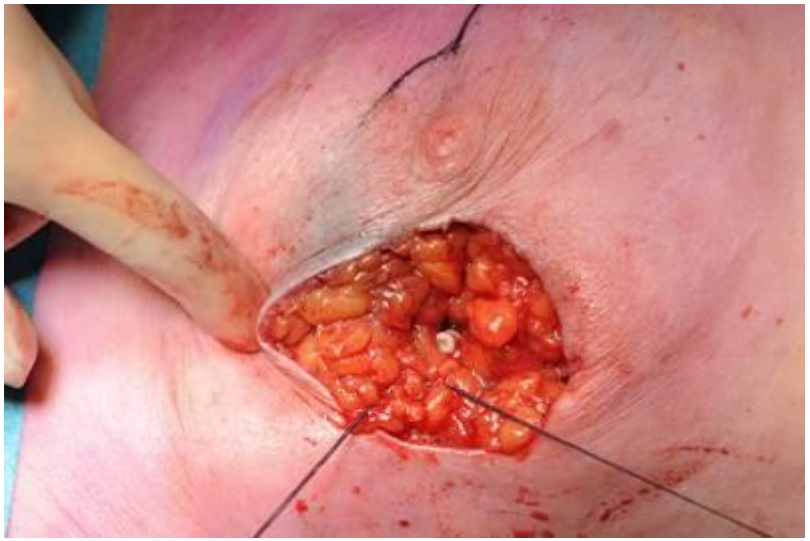


Procedure: inserting absorber disc



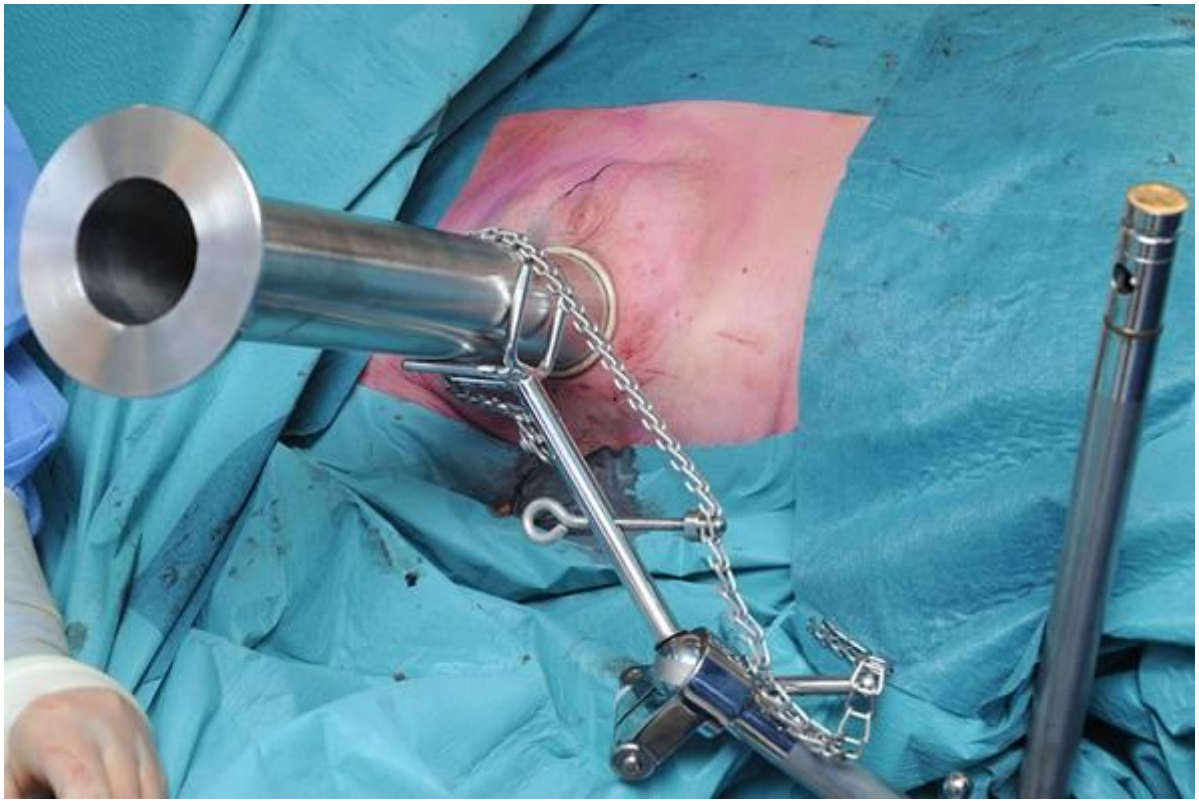
Procedure: placing spacer



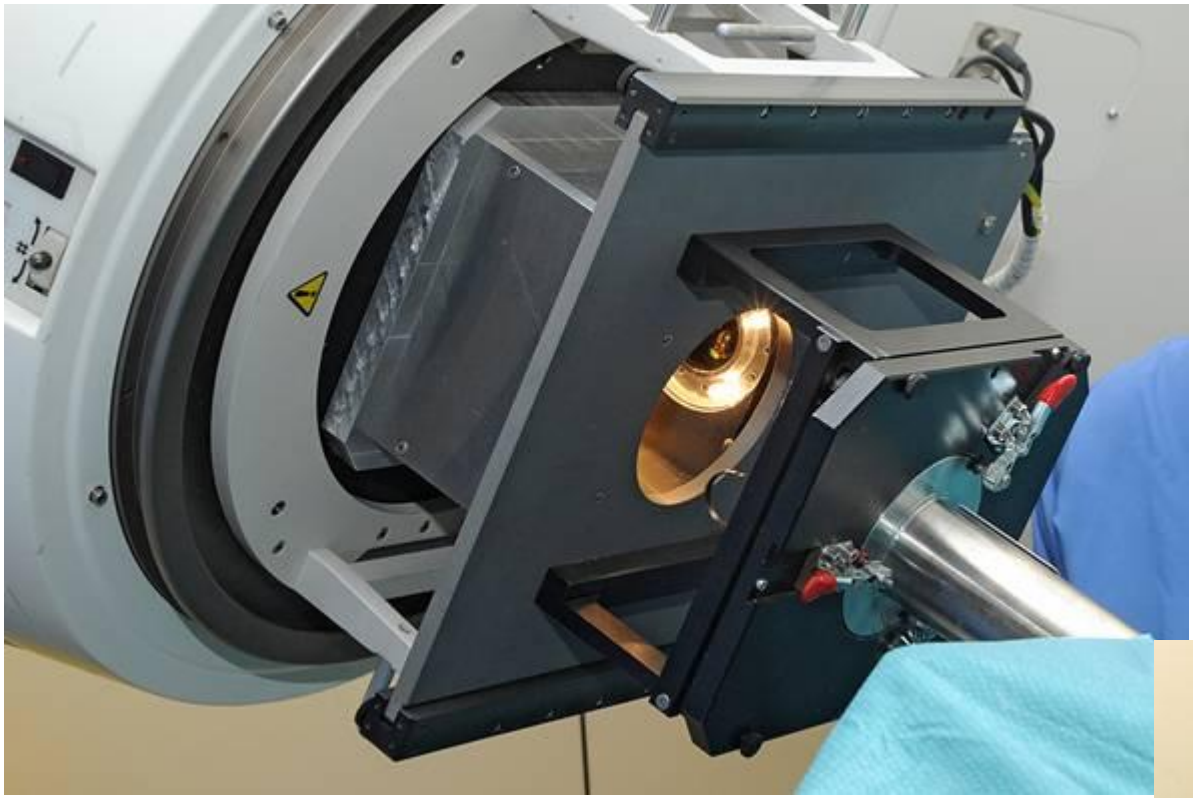


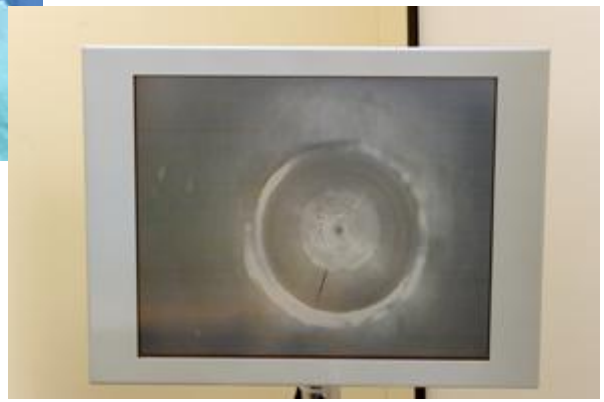
Procedure: placing cup

Procedure: placing applicator

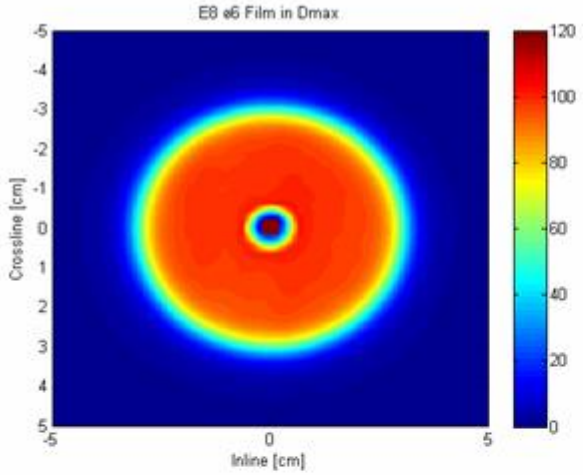


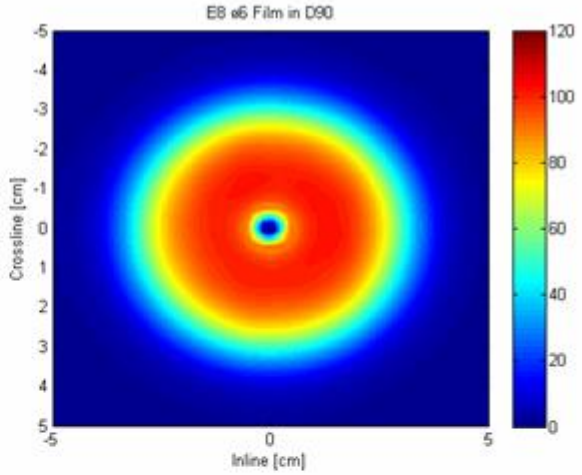
Procedure: fixed docking at linac

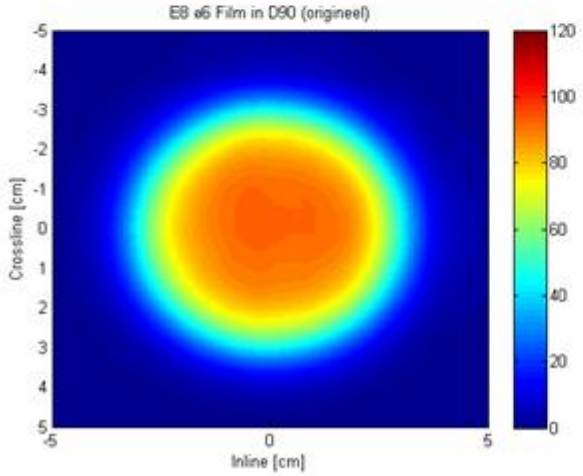


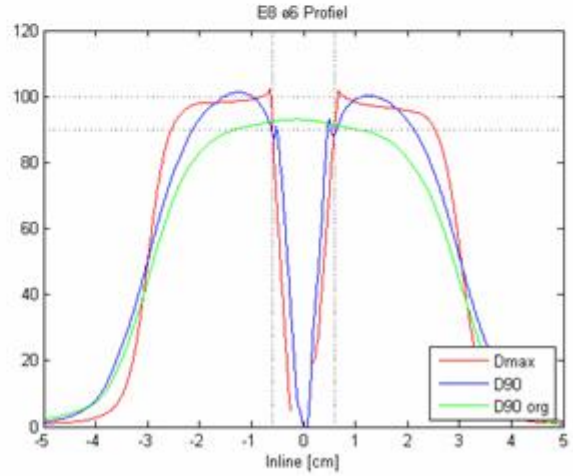


Breast IORT measurements in H2O

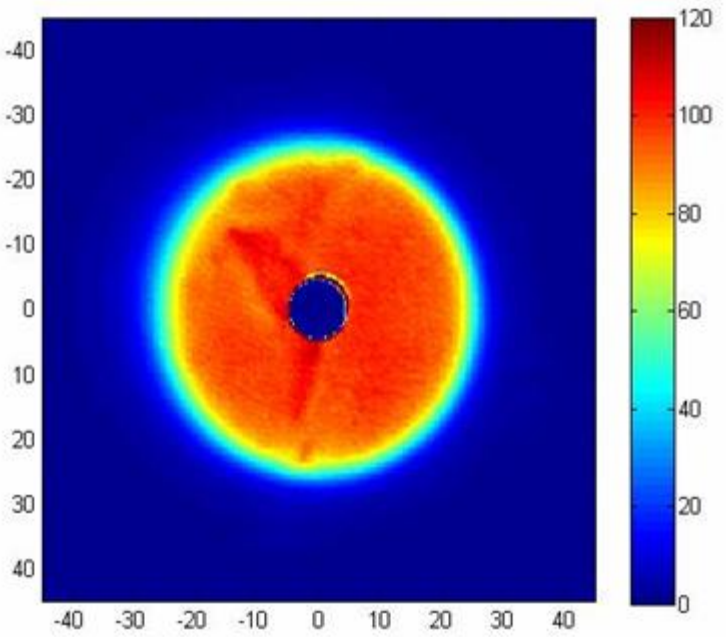








Breast IORT measurements in tissue



- Bovine breast tissue (‘udder’) as surrogate for human breast tissue.
- Illustrative for effects of
  - Lower density
  - Air gaps/non homogeneous packing of tissue

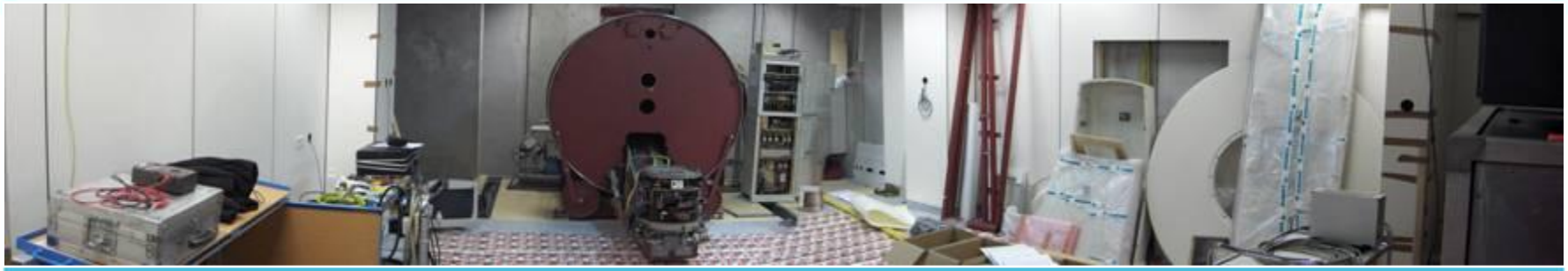
Current status

- 73 patients treated
- No errors in positioning of the system occurred
- Clinical outcome: presentation F. Smits

Conclusion

The Eindhoven Intra Operative Radiotherapy Applicator System for breast cancer limits errors in dose delivery and can be used safely and efficiently in clinical practice.

Disc backscatter, tissue density and air gaps influence dose uniformity



IORT

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