Infrastructure requirements and current status of cervical brachytherapy in Africa

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I have no disclosures

Introduction

There can be no debate that brachytherapy is essential for cure in cervix carcinoma

Doses of >80Gy – not achievable with EBRT safely

Multiple infrastructure needs and limitations of delivery

Access in Africa remains a challenge

Evidence

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Image guided brachytherapy in cervical cancer

Image guided brachytherapy in locally advanced cervical cancer: Improved pelvic control and survival in RetroEMBRACE, a multicenter cohort study

Alina Sturdza [a], Richard Pötter [a,*], Lars Ulrik Fokdal [b], Christine Haie-Meder [c], Li Tee Tan [d], Renaud Mazeron [c], Primoz Petric [e], Barbara Šegedin [e], Ina Maria Jurgenliemk-Schulz [f], Christel Nomden [f], Charles Gillham [g], Orla McArdle [g], Erik Van Limbergen [h], Hilde Janssen [h], Peter Hoskin [i], Gerry Lowe [i], Ekkasit Tharavichitkul [j], Elena Villafranca [k], Umesh Mahantshetty [l], Petra Georg [a], Kathrin Kirchheiner [a], Christian Kirisits [a], Kari Tanderup [b], Jacob Christian Lindegaard [b]

Methods/results

12 institutions Europe and India

Retrospective observational study of MRI-based 3D HDR brachytherapy

Jan 1998- August 2012

Primary endpoint- local control (cervix)

Secondary endpoints
- Pelvic control
- OS
- CSS
- Toxicity

- 731 patients
- 19.8% IIIb
- Mean D90 HRCTV 87Gy

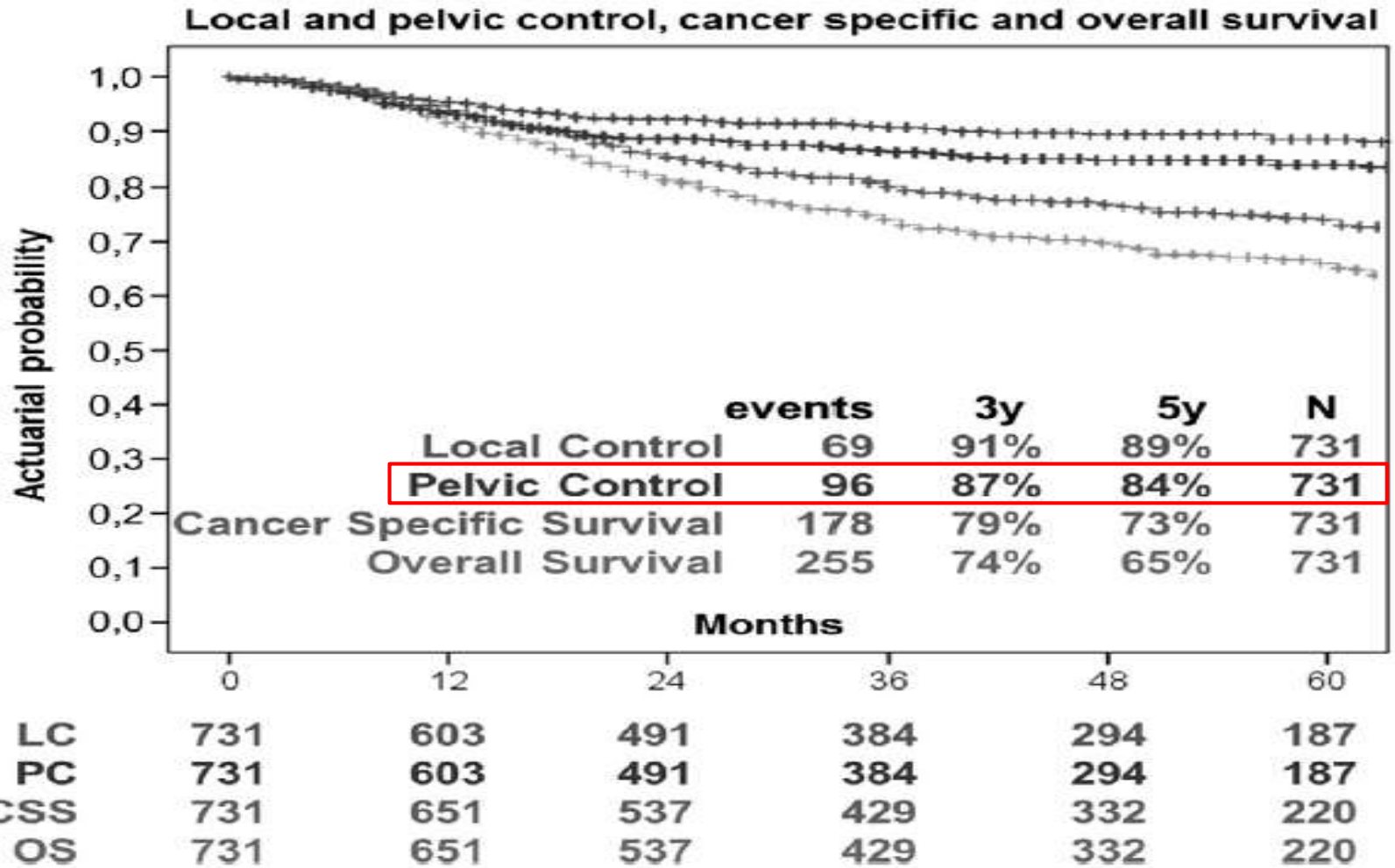


Fig. 1. Actuarial Kaplan–Meyer estimates for local control (LC), pelvic control (PC), cancer specific survival (CSS) and overall survival (OS) in 731 patients. Absolute number of events and actuarial estimates for outcome at 3 and 5 years are indicated.

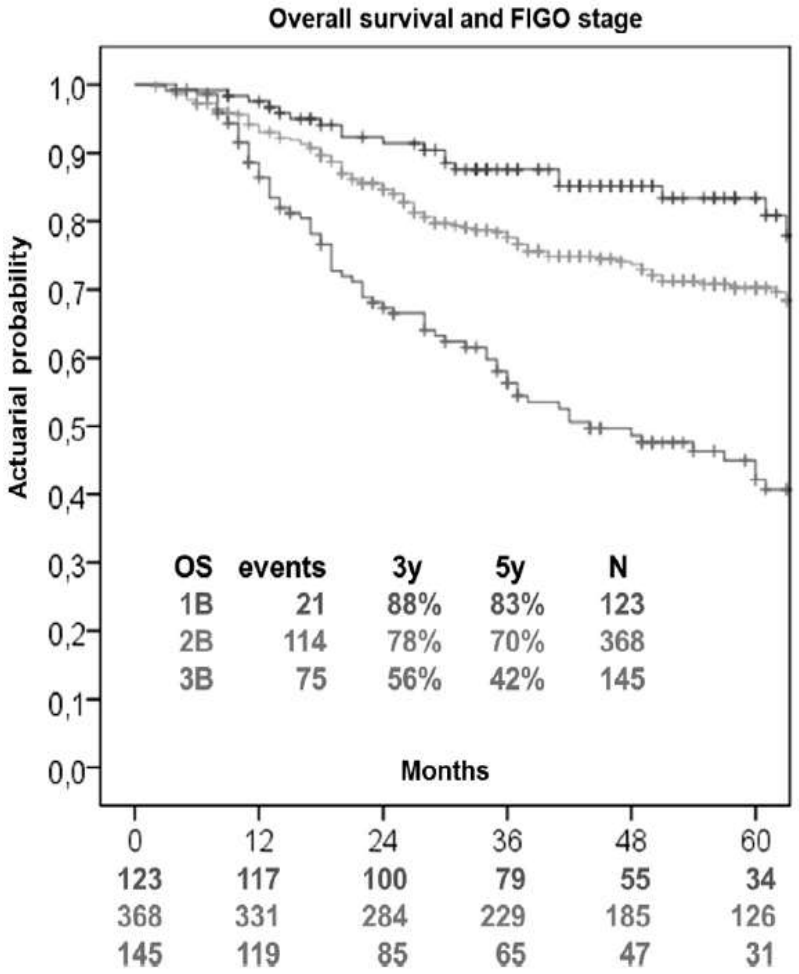


Fig. 4. Actuarial Kaplan–Meier estimates for stage related overall survival (OS) in patients with stage IB, IIB, IIIB disease ($n = 636$). Absolute number of events and actuarial estimates for outcome at 3 and 5 years are indicated.

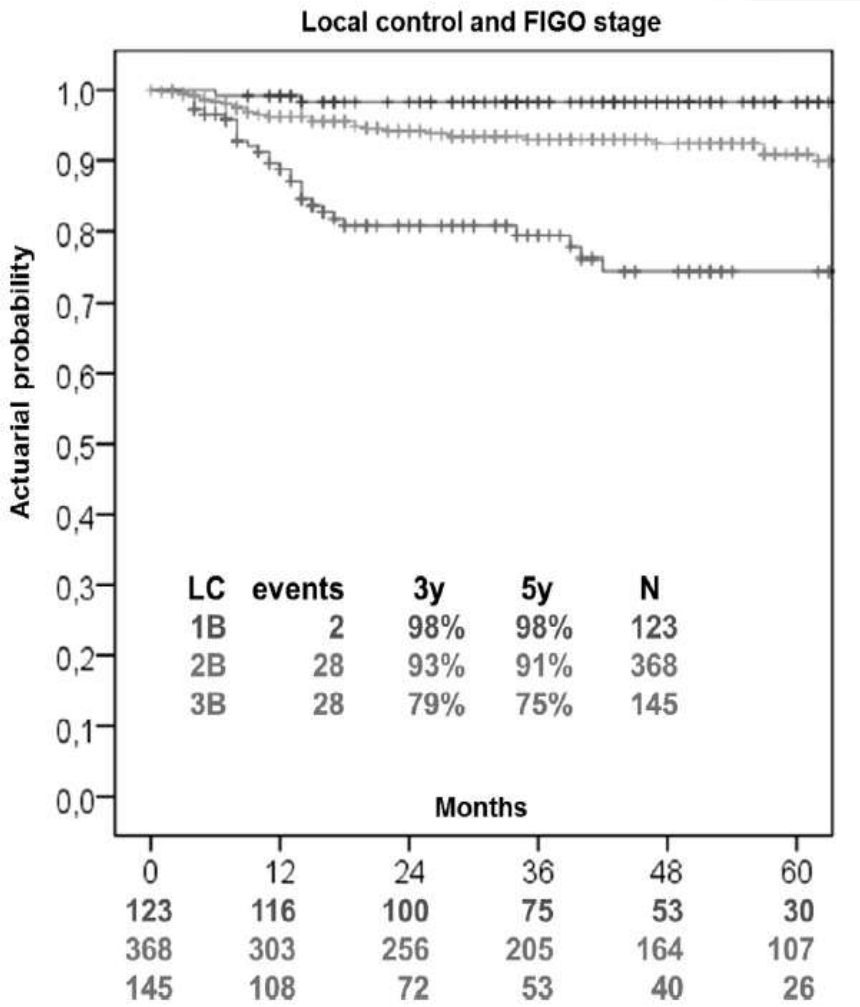


Fig. 2. Actuarial Kaplan–Meier estimates for stage related local control (LC) in patients with stage IB, IIB, IIIB disease ($n = 636$). Absolute number of events and actuarial estimates for outcome at 3 and 5 years are indicated.

Infrastructure

Source

Low dose rate

Cs137 (source change -30 years) – treat 12-14 hours

High dose rate

Co60 >1Mev (source change every few years)

Ir192 <1MeV (source change every few months)-treat 5-7 minutes

$6000 (RSA)

Core components

Room –adequate shielding

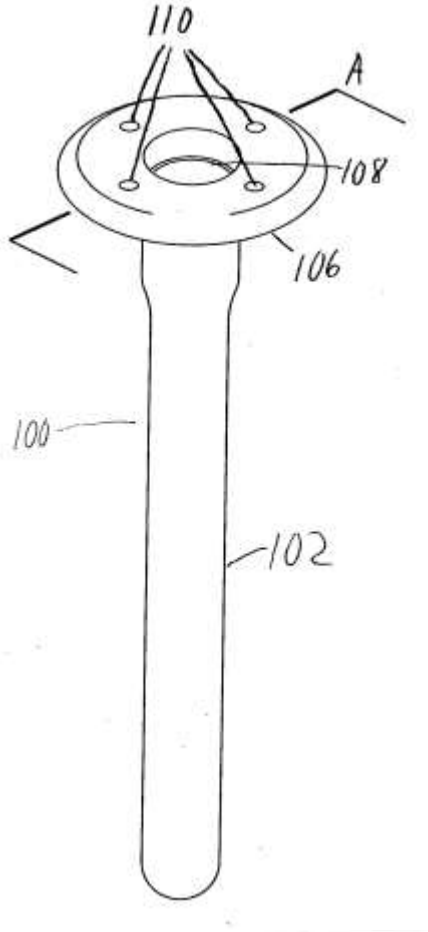
Afterloader $300 000

Applicators > $10 000

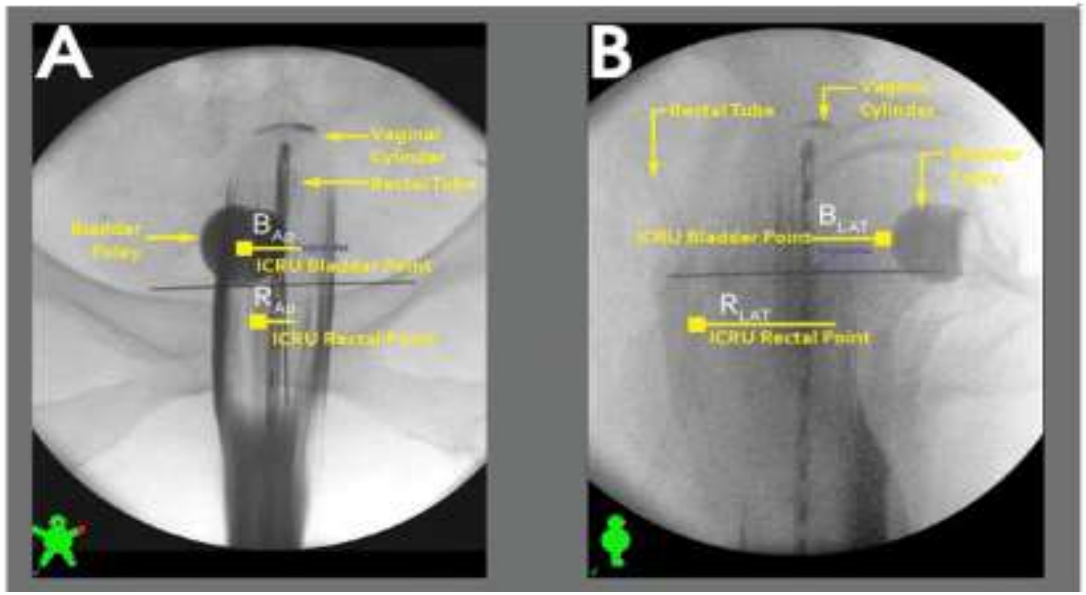
Imaging- C-arm $190 000

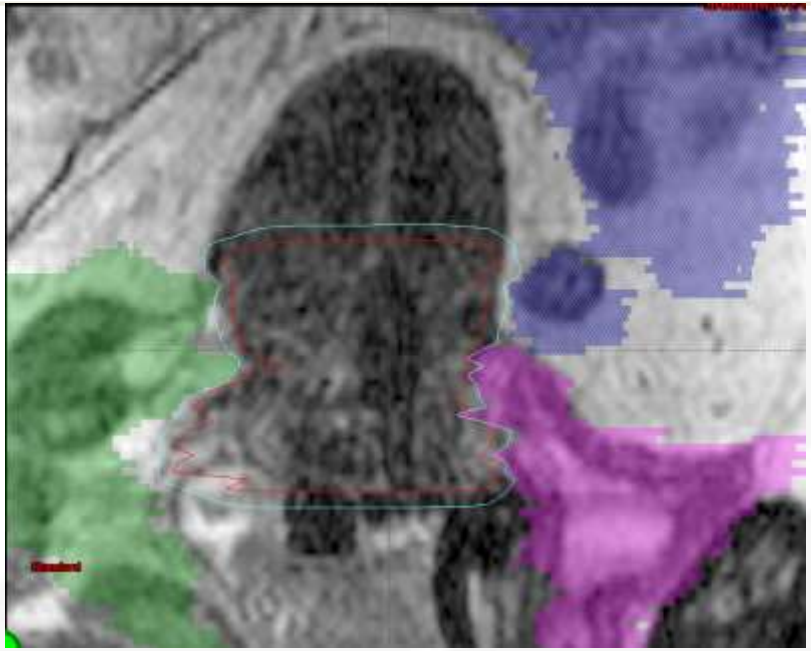
Quality Assurance equipment

Delivery -staff



Imaging access – impact on method/QA





- Lack of imaging – basic plans from library
- 2-D imaging – modification with information on rectal point
- 3-D imaging CT – individualize for the patient/tumour volume/OAR

Limitations of establishing a brachytherapy centre

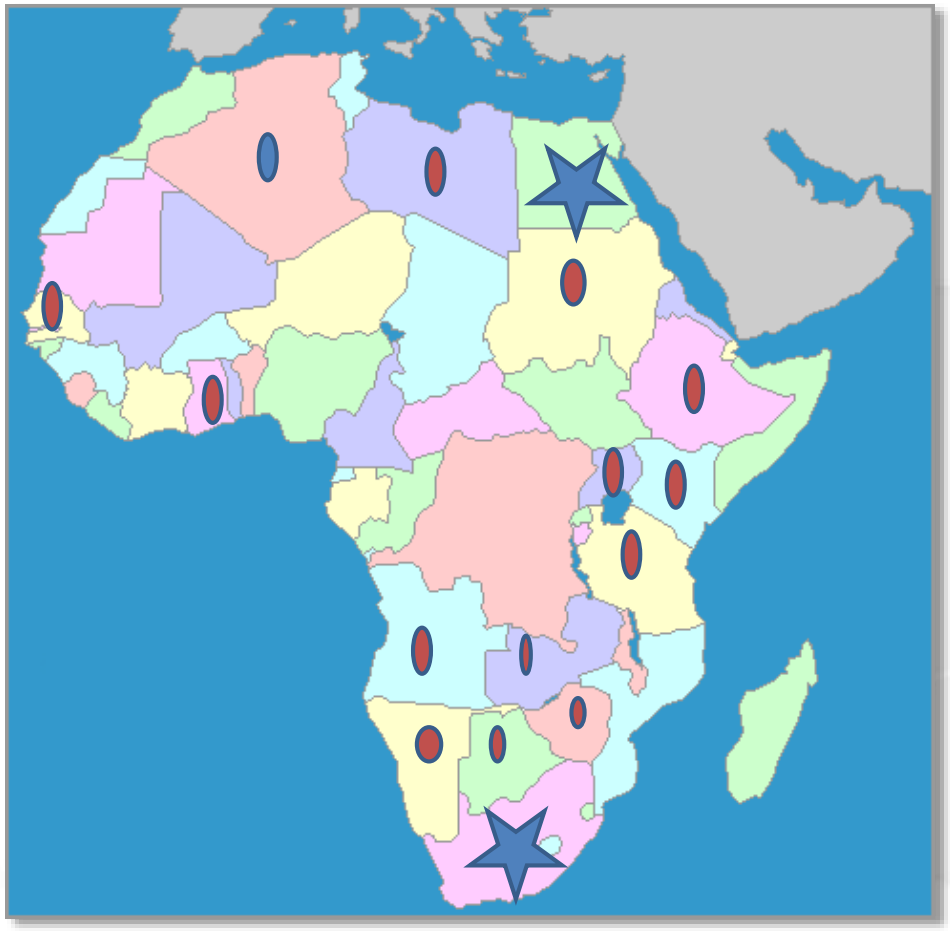
High cost of equipment (>$500 000 equipment alone)

Decay of the source
- Ir192 - 3 months
- Co-60 – many years

Regulation/export/import/ safety/storage

Staff and skills– medical physicists/RTTs/ clinician's time
- less complex planning ideal for smaller centres/ high through-put

Access in Africa



https://dirac.iaea.org/

DIRAC data

Region	Country	RT Centres	LDR Manual	LDR Remote	HDR Ir-192	HDR Co-60	Total
North Africa	5	113	1	8	13	12	34
Middle Africa	15	26	0	3	7	9	19
Southern Africa	4	50	2	0	14	8	22
Africa	24		3	11	34	29	**77 sources in Africa**

https://dirac.iaea.org/

Conclusion

More than 80 000 women are diagnosed with cervical cancer annually in Africa

If we presume a minimum of 50 000 are suitable for curable radiotherapy

Each source will need to treat a minimum of 650 patients annually

Reality is that the majority of cases occur in countries with access to one source – more than 1000 patients will need to be treated annually.

Upscaling of brachytherapy resources and training for all staff is vital if we are to meet the need on the continent.

Basic brachytherapy with adequate QA is the minimum requirement.