Partial volume analysis in LDR-brachytherapy for prostate cancer-

Comparision of intraoperative ultrasound planning and postimplant CT dosimetry

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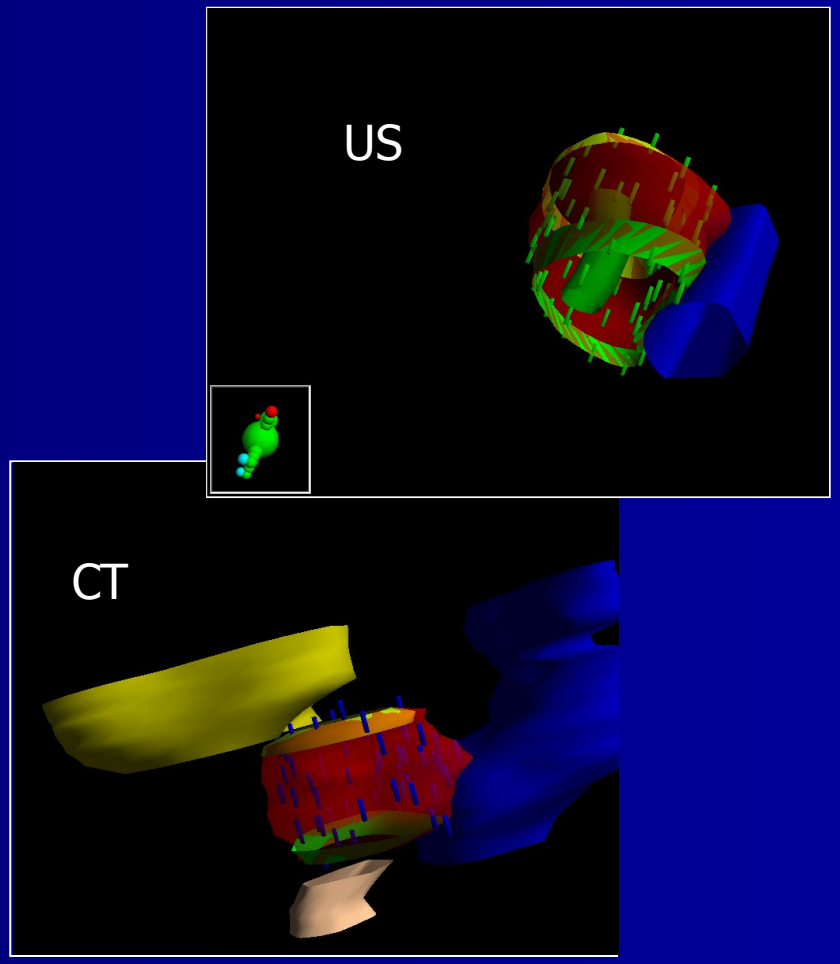
Materials and Methods

- 450 patients - implantation with I-125 radioactive seeds
- Patients:
  - Age: 66 years (50-81 years)
  - T1/T2-
  - Gleason Score ≤ 7
  - PSA ≤ 10
  - $V_{prostate}$ ≤ 60 cc

Following the recommendations of the ABS and ESTRO/EORTC

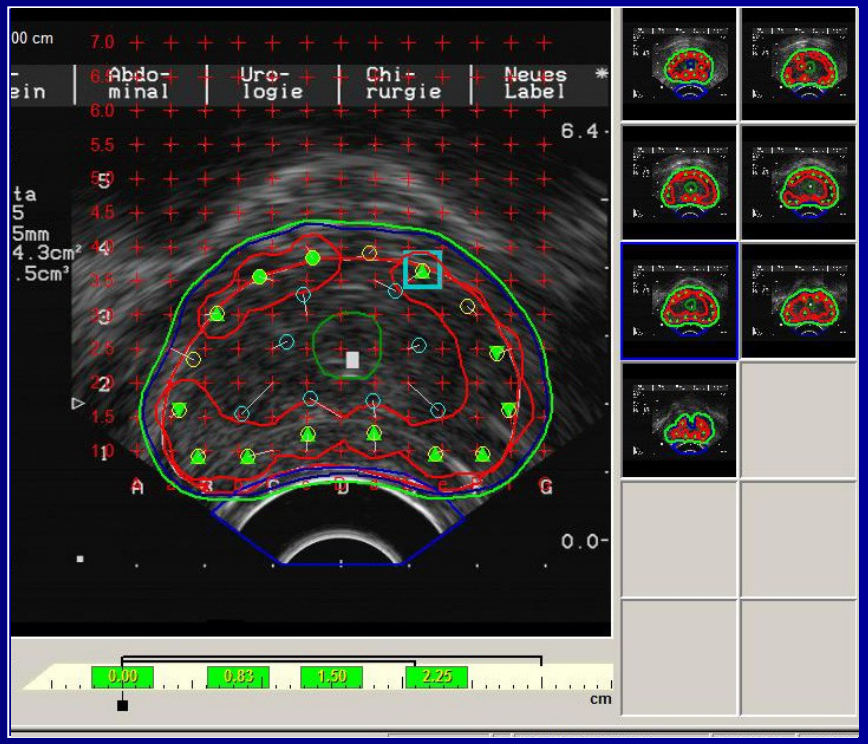
Materials and Methods

- Number of implanted seeds: 64 (29-108)
- Activity: 0.466 mCi (0.364-0.618)
- Number of needles: 22 (13-33)



Method

- From 2000 to 2005
- 370/450 patients: interaktive dynamic planning (VariSeed 7.0/7.1)
- 6 weeks after implantation – postimplant CT planning for all patients



Method

Analyzed Parameters

	Intraoperative ultrasound planning	Postimplant CT-planning
Prostate	$V_{Prostate}$, D90	$V_{Prostate}$, D90
Urethra	D30	
Rektum	V100	V100
Apex	V_{Apex}, D90, V100	V_{Apex}, D90, V100
Base	V_{Basis}, D90, V100	V_{Basis}, D90, V100
Bulbus		D90, D50, V100

Results

Prostate

	Intraoperative ultrasound planning	Postimplant CT-planning	
$V_{Prostate}$	37.58 ± 14.2 cm3	35.67 ± 13.6 cm3	p=0.06
D90	182 ± 4.2 Gy	173.3 ± 14.2 Gy	p=0.03

Prescription dose 160 Gy

Results

Apex and Base of the Prostate

	Intraoperative ultrasound planning	Postimplant CT-planning	
Apex			
D90	180 Gy ± 8 Gy	155 Gy ± 20 Gy	p=0.001
V100	2.68 ± 1.3 cc	2.87 ± 0.84 cc	p=0.9
Base			
D90	175 ± 8.1 Gy	150 ± 26 Gy	p=0.0005
V100	4.45 ± 1.47 cc	3.72 ± 1.35 cc	p=0.37

Results

Rektum

	Intraoperative ultrasound planning	Postimplant CT-planning	
V100 (Median)	0.29 cc	0.91 cc	p=0.004

V100 < 1.3cm^3

Taussky D, Yeung I, Williams T, Pearson S, McLean M, Pond G, Crook J.
Rectal-wall dose dependence on postplan timing after permanent-seed prostate brachytherapy.
Int J Radiat Oncol Biol Phys. 2006 Jun 1;65(2):358-63.

Results

Penile Bulbus

	Intraoperative ultrasound planning	Postimplant CT-planning	
D90	-	55 Gy ± 14 Gy	
D50	-	80 Gy ± 22 Gy	
V100	-	<0.1 cc	

Macdonald AG, Keyes M, Kruk A, Duncan G, Moravan V, Morris WJ. Predictive factors for erectile dysfunction in men with prostate cancer after brachytherapy: is dose to the penile bulb important?
Int J Radiat Oncol Biol Phys. 2005 Sep 1;63(1):155-63.

Results

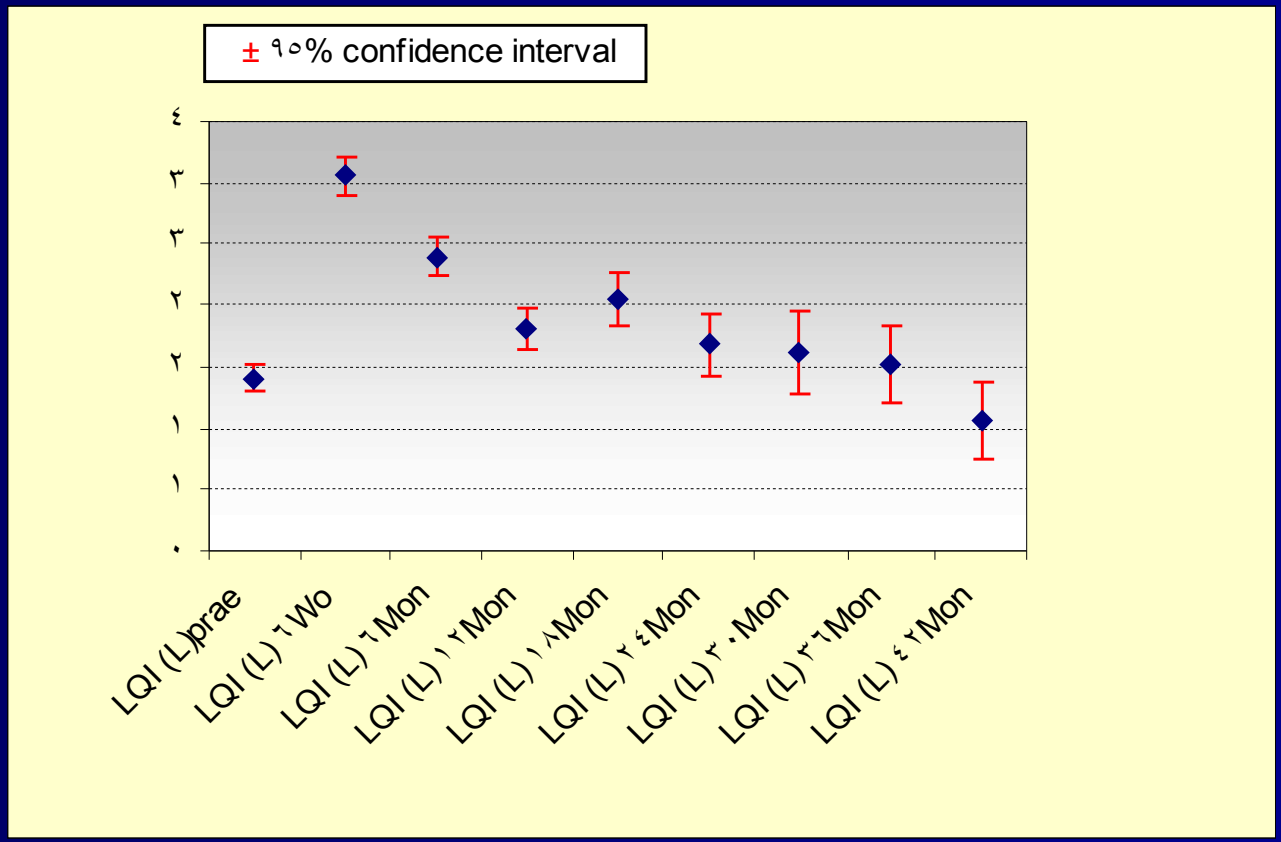
- PSA relaps: 2 patients

- High Quality of life, low side effects
- rectal IV toxicity: 1 patient

Van Gellekom MP, Moerland MA, Van Vulpen M, Wijrdeman HK, Battermann JJ. Quality of life of patients after permanent prostate brachytherapy in relation to dosimetry.
Int J Radiat Oncol Biol Phys. 2005 Nov 1;63(3):772-80.

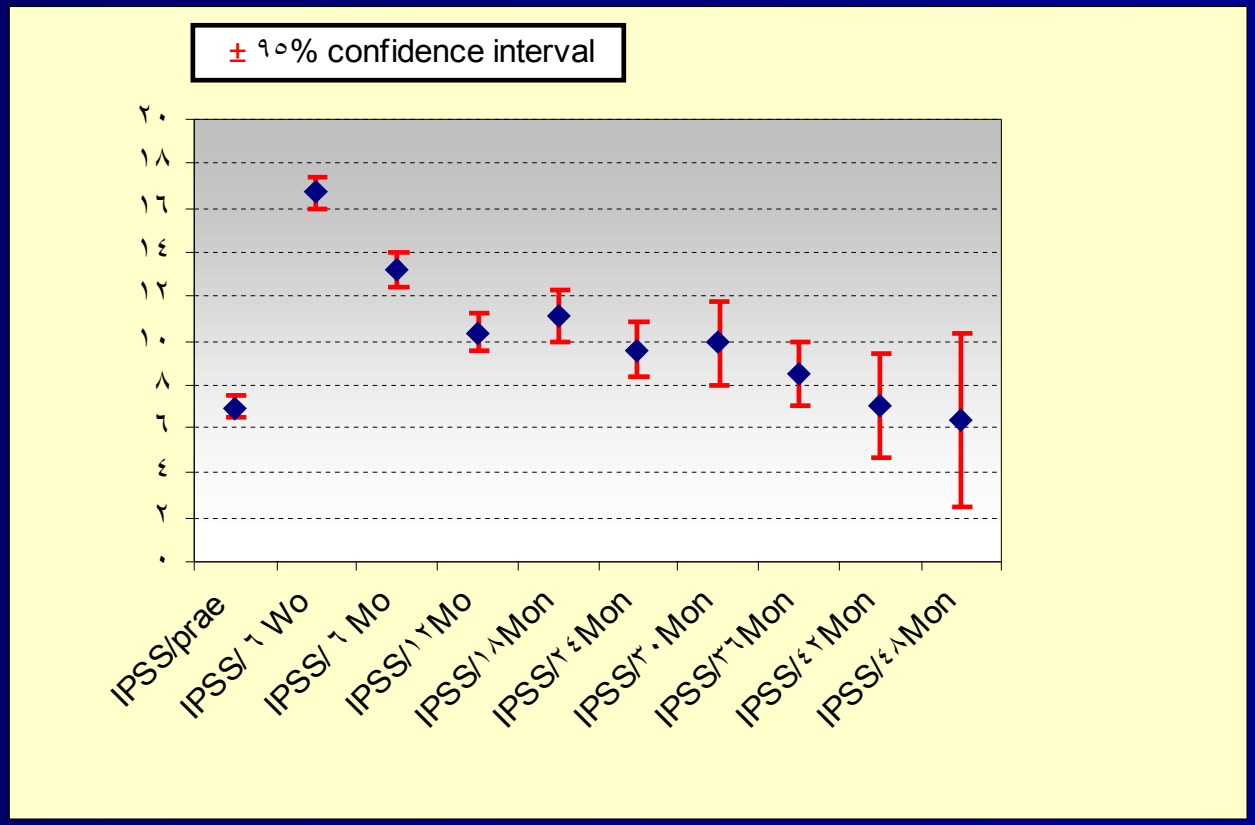
Results

Quality of life score



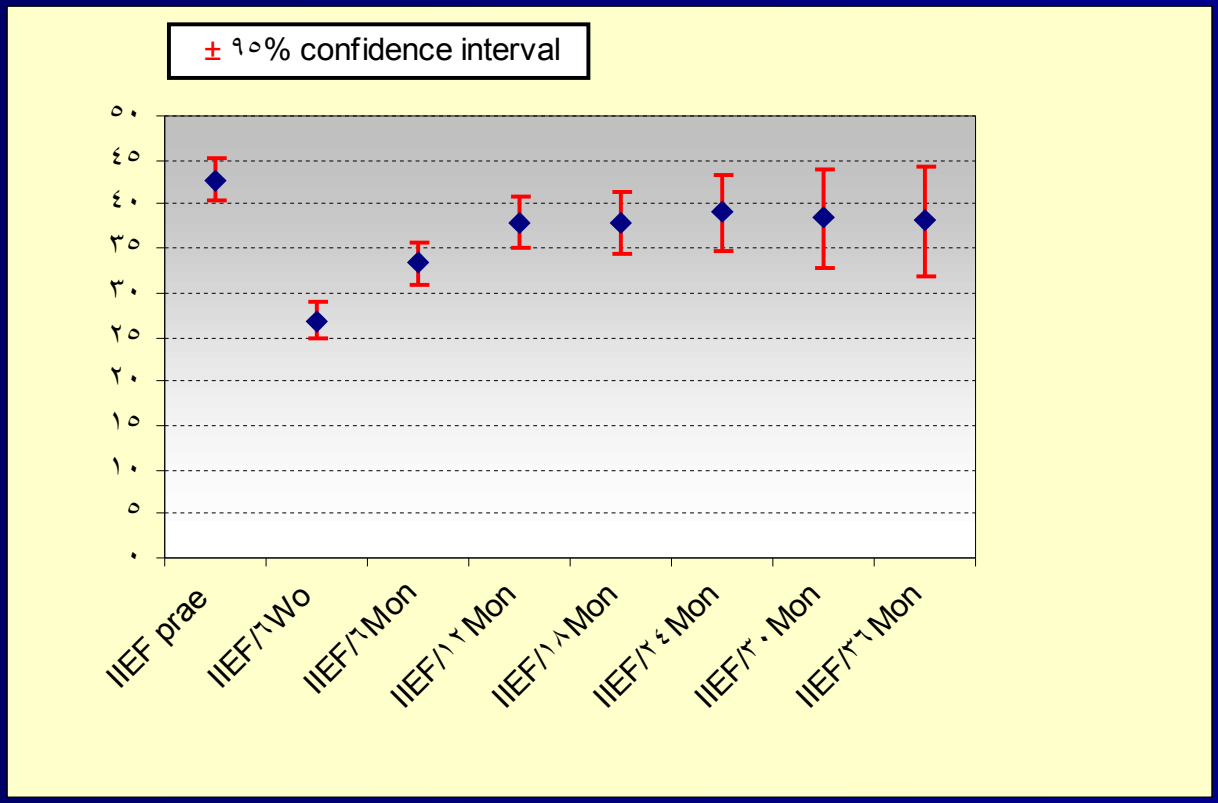
Results

IPSS



Results

IIEF



Conclusions

- Partial volume dosimetry may offer the possibility of lower side effects
- Rectale dose is significant higher in the 6 weeks postimplant CT plan
- Optimization of planning and dose distribution in partial volumes may result in better quality of life