



Prostate cancer: Simultaneous integrated boost with Radixact® System, about a series of 74 patients.

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Introduction

- Prostate cancer(PCa) the second most diagnosed cancer in men[1].
- The incidence :age-standardised rates $94,9/10^5$.
- The fifth leading cause to death in men (Globocan 2018) .
- Overall survival : 73% (1999-2001) 83% (2005-2007).

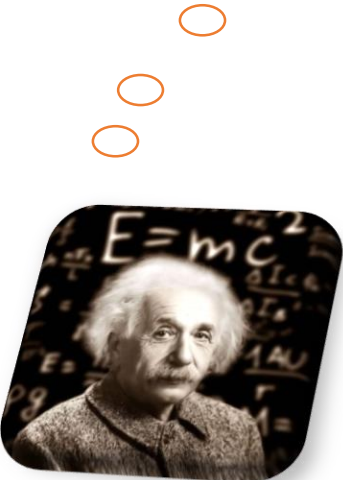


Traitement modalities

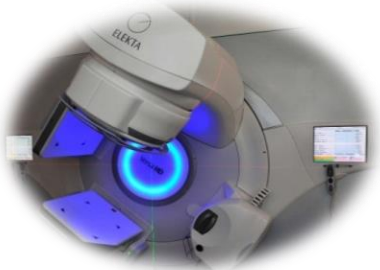
Hormonal therapy



Active surveillance



Radiotherapy



Radical prostatectomy



Main objective:

Assess the impact of intensity modulated radiotherapy (IMRT) with helical Radixact® (HR) on frequency and severity of acute gastrointestinal (GI) and genitourinary (GU) toxicity in PCa.



METHODS AND MATERIALS:

-Retrospective study, between May 13th,2019 and May 25th,2020

-**74** patients who were diagnosed with Pca were the first to be treated with (**IMRT-HR**) radiotherapy in our department. We treated these patients with Simultaneous integrated boost (**SIB**).

-All patients were classified according to the national comprehensive cancer network classification (**NCCN**): Version 4.2018 — August 15, 2018

02 patients (2,7%) low risk

14 patients (19%) intermediate risk,

50 patients (**67,6%**) either high or very high risk

08 patients (10.8%) as regional risk.

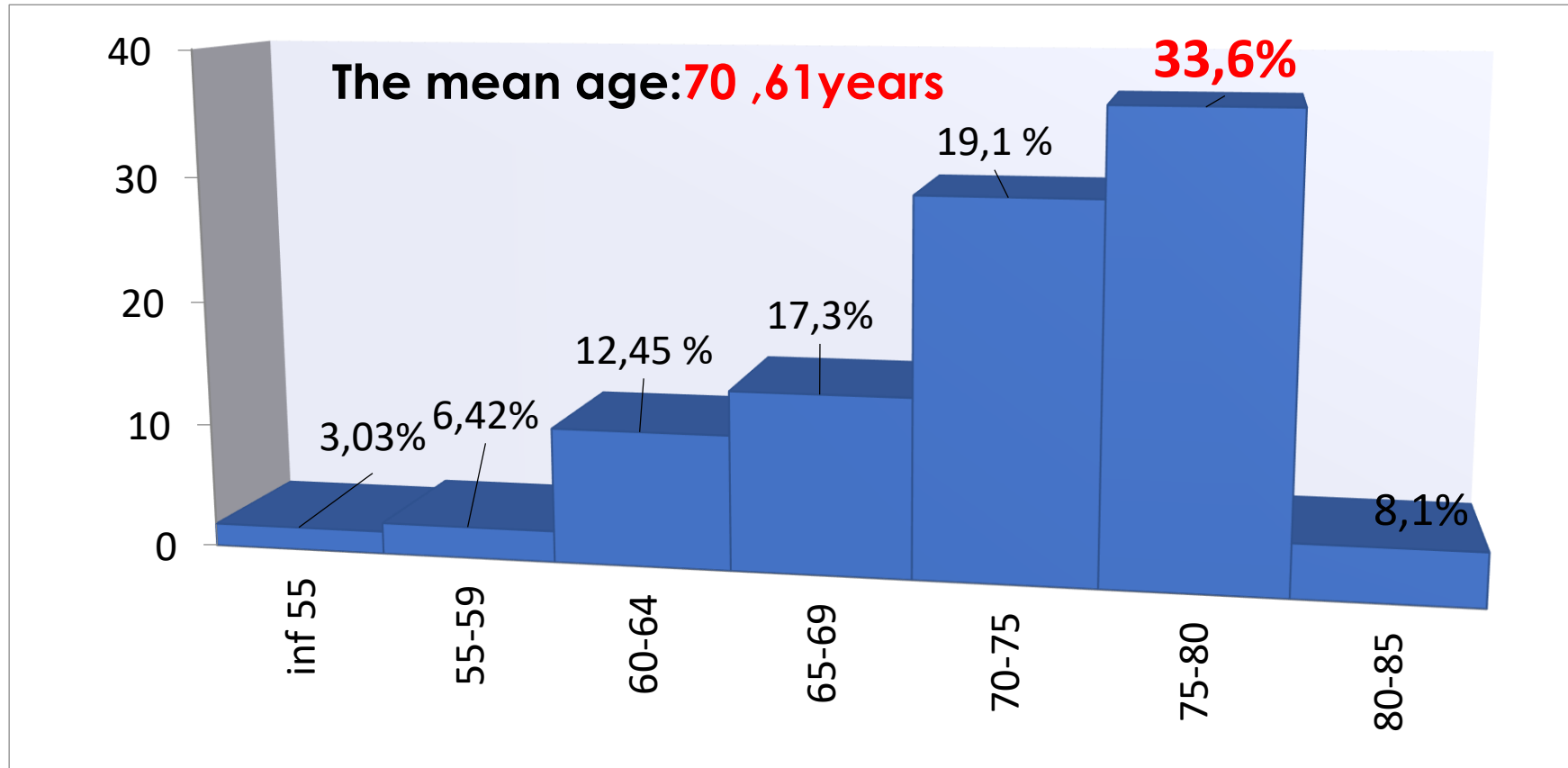
METHODS AND MATERIALS:

- The therapeutic dose : -Pelvic lymph node (**LN 52.7 Gy**) (in four fractions of 1.7 Gy per day) when the risk of positive LN was greater than 10% according the Roach formula[2]
- Seminal vesicles (**SV 62 Gy**) (in four fractions of 2 Gy per day)
- Prostate (**71.3 Gy**) (in four fractions of 2,3 Gy per day).

-The dose constraints :Table1

OAR	Dose Constraint (2 GY per fraction)	Max Vol (% or cc)
Rectum	V30	80%
	V40	70-65%
	V50	50%
	V60	35%
	V70	15%
	V74	5%
Bladder	V45	39%
	V50	50%
	V60	25%
	V74	5%
Femoral Heads	V43	50%
Bowel	V30	200
	V35	150
	V45	20cc
	V50	1-10cc
Penile bulb	V50	50%
	V60	10%

Results:



The majority of our patients are over 75 years old (**41.7%**), they require a systematic evaluation of health status using the G8 (Geriatric 8) screening tool

Results:

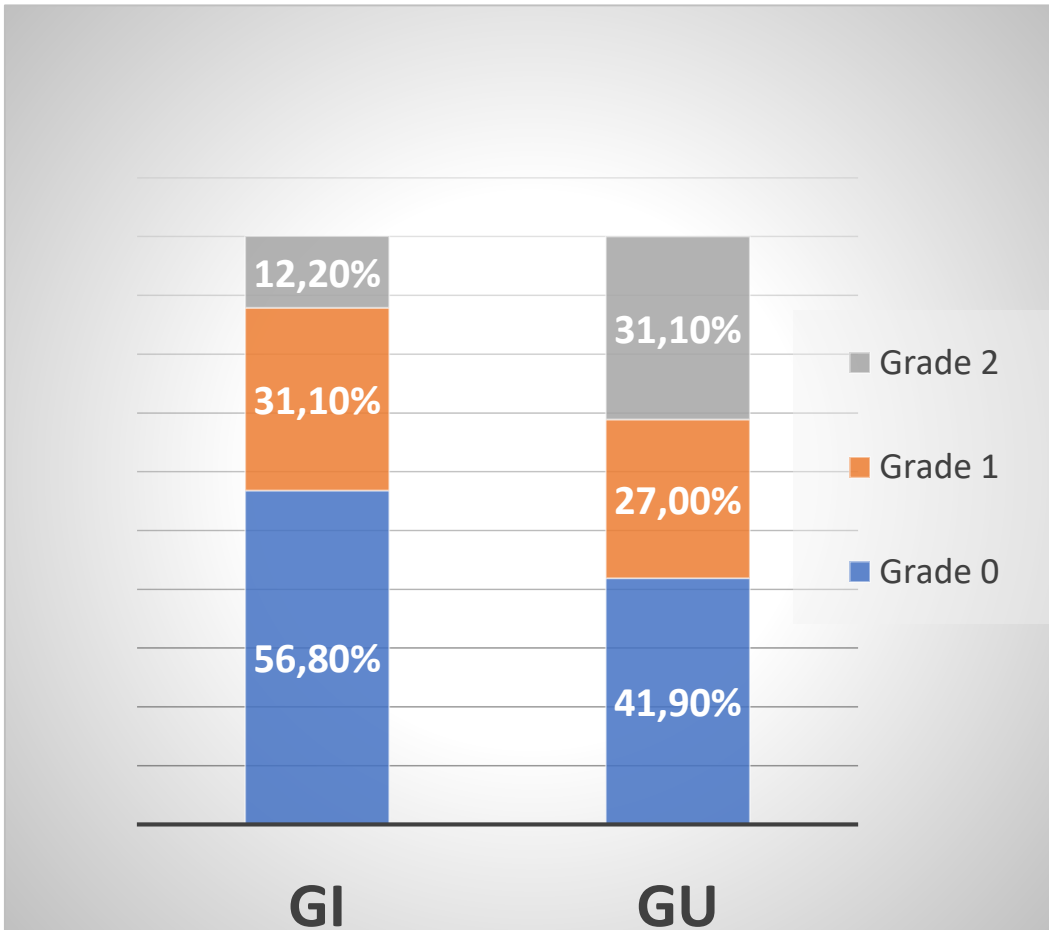


Figure 1: Acute toxicity using the (CTCAE) V 4.03

No side effects were noticed for grade 3 or higher.

Study	Method	Acute toxicity GU by grade (%)			Acute toxicity GI by grade (%)		
		2	3	4	2	3	4
Present study(n=74)	Radixact® System 71.3Gy (EQD2 77.41)	31.10	00	00	12.12	00	00
Lips et al. (3) (n = 331)	IMRT fiducials 76 Gy	47	3	00	30	00	00
Soete et al. (4) (n = 238)	IG Arc therapy	37	16	00	19	6	00
Ghadjar et al. (5) (n = 39)	IMRT fiducials 80 Gy	56	8	00	3	00	00
Cheng et al. (6) (n = 76)	Tomotherapy 78.9 Gy	38	00	00	25	00	00
Martin et al. (7) (n = 259)	87% conformal RT fiducials 79.8 Gy	33	00	00	10	00	00

Table 2. Comparison to results from other studies using IGRT-IMRT for prostate cancer

Conclusion:

the present study depicts much lower occurrence of side effects comparatively to the previous studies in other areas of the world. That is mainly due to **Image guided radiation therapy that was performed daily** (before every session). Other reasons for the dropped numbers are: strict **dose constraints**, dietary and water instructions given by our department.

1: Global Cancer Statistics 2018: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries

2: [M Roach 3rd](#), [C Marquez](#), [H S Yuo](#), [P Narayan](#), [L Coleman](#), [U O Nseyo](#), [Z Navvab](#), [P R Carroll](#): Predicting the risk of lymph node involvement using the pre-treatment prostate specific antigen and Gleason score in men with clinically localized prostate cancer. *Int J Radiat Oncol Biol Phys* 1994 Jan 1;28(1):33-7. doi: 10.1016/0360-3016(94)90138-4.

3. Lips IM, Dehnad H, Van Gils CH, Kruger B, Arto E, Van Der Heide UA, Van Vulpen M: High-dose intensity-modulated radiotherapy for prostate cancer using daily fiducial marker-based position verification: acute and late toxicity in 331 patients. *Radiat Oncol* 2008, 3:15.

4. Soete G, Verellen D, Michielsen D, Rappe B, Keuppen F, Storme G: Imageguided conformation arc therapy for prostate cancer: Early side effects. *Int J Radiat Oncol Biol Phys* 2006, 66:S141-S144.

5. Ghadjar P, Vock J, Vetterli D, Manser P, Bigler R, Tille J, Madlung A, Behrensmeier F, Mini R, Aebbersold DM: Acute and late toxicity in prostate cancer patients treated by dose escalated intensity modulated radiation therapy and organ tracking. *Radiat Oncol* 2008, 3:35.

6. Cheng JC, Schultheiss TE, Nguyen KH, Wong JY: Acute toxicity in definitive versus postprostatectomy image-guided radiotherapy for prostate cancer. *Int J Radiat Oncol Biol Phys* 2008, 71:351-357.

7. Martin JM, Bayley A, Bristow R, Chung P, Gospodarowicz M, Menard C, Milosevic M, Rosewall T, Warde PR, Catton CN: Image guided dose escalated prostate radiotherapy: still room to improve. *Radiat Oncol* 2009,4:50