

LONG-TERM ADVERSE EFFECTS ON BLADDER FILLING PHASE IN MALES SUBMITTED TO THE PELVIC RADIOTHERAPY

Hypothesis / aims of study

Radiotherapy by damaging cellular DNA content, causes healthy tissue damage, which in the case of urinary tract leads to acute adverse effects from the third month of treatment mainly by gross hematuria associated to cystitis. Acute adverse effects have been significantly reduced due to technological advances as "three- dimensional conformal RT" (3D-CRT) or the "intensity modulated RT" (IMRT). Poner significado

In women several studies have shown that EBRT alone or adjuvant to the pelvic radical surgery causes significant long-term dysfunction of the bladder filling phase. However, there are no published studies on the long-term effects of EBRT in male lower urinary tract function.

Similarly to the women, we hypothesis that the male external radiation causes long-term alterations of the bladder filling phase. Therefore our objective is to qualify and quantify the risk to develop long-term lower urinary tract dysfunctions, during the filling stage in men, associated to EBRT and identifying the radical pelvic surgery morbidity

Study design, materials and methods

We performed a retrospective comparative study on a cohort of 99 men undergoing EBRT 4.7 years ago by clinically localized prostate, rectum or colon neoplasia, and another formed by 97 men over 50 years who did not undergo radiotherapy.

To calculate the required sample size, based on data published by Choo et al¹ was considered significant percentage of at least 10 % of patients with impaired compliance in the radiotherapy group, versus none in the control group. It was considered 91 patients in each group to obtain a significance level of 5% and a bilateral 80% statistical power

The urodynamic study was conducted with a polygraph Uro model 2000 (MMS, Enschede, The Netherlands), according to the specifications of the ICS and the protocols of the Good Urodynamic Practice. The patients were placed in standing and proceeded to bladder filling through a number 8- French catheter two-way transurethrally inserted, with saline solution at room temperature with a rate of 50 ml / s. Abdominal pressure was recorded by a transrectal balloon catheter and the pressures were measured with reference to the atmospheric pressure. The filling phase stopped when the patient reported a strong desire to void or there was a terminal involuntary detrusor contraction

Results

Cystometric bladder capacity in the EBRT group was 175 ± 105.4 ml and in control group was 236 ± 128.0 ml; the differences were statistically significant (p = 0.000). Bladder capacity at first desire to void of radiotherapy group was 106 ± 60.7 ml and in the control group was 146 ± 140.0 ml; the differences were statistically significant (p = 0.010)

Table 1 shows the relationship between the variables that were significantly associated with the presence of functional disturbances of the filling phase. Table 2 shows the results of multivariate analysis in relation to the presence of reduced bladder compliance. Table 3 shows results of multivariate analysis in regard to the presence of stress urinary incontinence.

Table 1. - Predictors of dysfunction of the filling phase

	Diminished compliance		p
	Yes	No	
Age (years)	71±8.3	69 ± 8.6	0.252
Radiotherapy (%)	21,1†	7,1†	0.006*
Time from radiotherapy (years)	5.3 ± 5.79	4.5 ± 3.65	0,433
Radical surgery (%)	28.6†	11.2†	0,032*
	Detrusor overactivity		p
	Present	Absent	
Age (years)	71 ± 7.7	67 ± 9.0	0.001*
Radiotherapy (%)	59,8†	49.5†	0.191
Time from radiotherapy (years)	4.5 ± 3.12	5.4 ± 5.29	0.248
Radical surgery (%)	58.6†	53,7†	0.689
			p
	Present	Absent	
Age (years)	67 ± 10.6	70 ± 8.3	0.300
Radiotherapy (%)	16,1†	2.0†	0.001*
Time from radiotherapy (years)	4.7 ± 5.12	4.7 ± 4.00	0.964
Radical surgery (%)	35.7†	3.8†	0.000*

* Significant. †Among those belonging to this group

Table 2.- Results of multivariate analysis of predictive variables of decreased compliance

	Radiotherapy	Radical surgery
Univariate analysis		

p	0.007*	0.018*
Odds Ratio	3.517	3.178
95% confidence interval	1.400-8.8392	1.223-8.252
Multivariate analysis		
p	0.043*	0.248
Odds Ratio	2.835	1.855
95% confidence interval	1.035-7.763	0.651-5.284

* Significant

Table 3.-Results of multivariate analysis of predictive variables of stress urinary incontinence

	Radiotherapy	Radical surgery
Univariate analysis		
p	0.004*	0.000*
Odds Ratio	9.301	14.074
95% confidence interval	2.048-42.229	4.576-43.253
Multivariate analysis		
p	0.153	0.002*
Odds Ratio	3.527	7.639
95% confidence interval	0.626-19.880	2.262-25.794

* Significant

Interpretation of results

Cystometric bladder capacity and bladder capacity at first desire to voiding were significantly lower in the radiotherapy group. Univariate analysis showed that the radiotherapy group evinced a risk to present a diminished compliance of 3.5 times more and 9.3 times more to find stress urinary incontinence, but we did not found increased risk for detrusor overactivity. In multivariate analysis the history of radical surgery acted as a confounding factor in the risk of stress urinary incontinence, but not to suffer diminished bladder compliance.

Concluding message

The main long-term adverse effect of pelvic radiotherapy on male bladder function during filling is the increased risk of low bladder compliance.

References

1. Choo R , Do V , Herschorn S , DeBoer G , Danjoux C , Morton G , Cheng CH , Barak I , Preiner J. Urodynamic changes at 18 months post -therapy in patients Treated with external beam radiotherapy for prostate carcinoma . Int J Radiat Oncol Biol Phys 2002; 53 (2):290-6.

Disclosures

Funding: None **Clinical Trial:** No **Subjects:** HUMAN **Ethics not Req'd:** Is a retrospective case control study **Helsinki:** Yes **Informed Consent:** Yes