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Regulatory-Adaptive Capabilities of the Organism after Radical Prostatectomy with Prostate Cancer of the I-II Degree

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ABSTRACT

Purpose: to reveal the dynamics of regulatory and adaptive status in men after laparoscopic radical prostatectomy with a nerve-sparing result and when nerve-sparing did not result

Material and methods. Observations have been performed on 50 patients with I-II degree prostate cancer with the prostatic gland volume of more than 40 cm^3 before and after radical prostatectomy. In all patients observed by the method of V.M. Pokrovsky the functional test of cardio-respiratory synchronism on the «VNS-Micro» apparatus was carried out according to the computer program "System for determining cardio-respiratory synchronism in humans". The minimum and maximum frequency limits of the gating range, the gating range, and the duration of gating development at the minimum limit of the range were determined. According to the parameters of cardio-respiratory synchronism the index of regulatory adaptive status was calculated, and regulatory adaptive capabilities were found from it. Statistical analysis of the study results was carried out using the programs: «STATISTICA 10».

Results. According to the index of regulatory adaptive status, after prostatectomy, patients were divided into individuals with good, satisfactory and low regulatory adaptive capabilities

The index of regulatory adaptive status after radical prostatectomy did not change significantly in patients with good and satisfactory regulatory adaptive capabilities. In these 33 out of 50 patients, nerve-sparing was noted as a result of radical prostatectomy performed by laparoscopic access. In patients with low regulatory adaptive capabilities, the index of regulatory adaptive status decreased by 15.3% after radical prostatectomy. This was due to an increase in the duration of the development of gating at the minimum limit of the range by 65.4%, despite the increase in the range by 40.0%. In these 17 patients, as a result of radical prostatectomy with laparoscopic access, nerve-sparing did not occur.

Conclusion. The parameters of cardio-respiratory synchronism, the index of regulatory adaptive status and regulatory adaptive capabilities reflect integratively the consequences of radical prostatectomy performed laparoscopically with a nerve-sparing result and when nerve-sparing does not result.

Keywords: regulatory and adaptive capabilities, nerve-sparing radical prostatectomy

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INTRODUCTION

Nerve-saving prostatectomy has led to significant functional improvements in the treatment of prostate cancer [1]. On the other hand, due to the development of screening programs and the introduction of cancer-specific markers into everyday practice, tumors began to be diagnosed in the early stages of development. Such tumors are characterized by compact localization, lack of spread to surrounding tissues, lymph nodes, and do not have distant metastases. This was the first prerequisite for the emergence of organ-preserving techniques, where the effect is carried out only on the abnormal focus.

Earlier, the assessment of the functional state in patients after removal of prostate cancer was carried out according to the quality of life [2], assessment of the psychological status [3], erectile function [4, 5], and urofluometry parameters [6].

Regulatory and adaptive status as an integrative qualitative indicator of the functional state of the organism after removal of the prostate gland was not evaluated.

The purpose of the work: to reveal the dynamics of regulatory and adaptive status in men after laparoscopic radical prostatectomy with a nerve-sparing result and when nerve-sparing does not occur.

MATERIAL AND METHODS OF RESEARCH

The observations were performed on 50 patients with I-II degree prostate cancer with a gland volume of more than 40 cm3 before and after radical prostatectomy in the urology department No. 2 of the Territorial Clinical Hospital No. 2 in the city of Krasnodar.

In all patients observed by the method of V.M. Pokrovsky the functional test of cardio-respiratory synchronism on the «VNS-Micro» apparatus was carried out according to the computer program "System for determining cardio-respiratory synchronism in humans". The minimum and maximum frequency limits of the gating range, the gating range, and the duration of gating development at the minimum limit of the range were determined. According to the parameters of cardio-respiratory synchronism, the index of regulatory adaptive status (IRAS) was calculated, and regulatory adaptive capabilities (RAC) were found from it [7].

Statistical analysis of the results of the study was carried out using programs: «STATISTICA 10». After establishing the normality of the distribution of variations, the parametric processing method was used - significant differences were determined in comparing the average values in paired comparisons the Student t-test at p <0.05 was taken.

RESULTS

In patients with of the I-II degree prostate cancer with the prostate gland volume of more than 40 cm^3, cardio-respiratory synchronism was observed during the test. The parameters of cardio-respiratory synchronism are given in table 4.1.

According to the index of regulatory and adaptive status, regulatory and adaptive capabilities were determined which allowed to divide the patients into three groups with good, satisfactory and low regulatory and adaptive capabilities.

In patients with satisfactory regulatory adaptive capabilities the index of regulatory adaptive status was less than in the ones with good capabilities by 47.7% due to a shorter gating range of 10.5% and a longer duration of development of gating at the minimum limit of the range of 71.2 %

In patients with low regulatory adaptive capabilities, the index of regulatory adaptive status was less than in individuals with good capabilities by 74.0% due to a shorter gating range by 54.0% and a longer duration of development of gating at a minimum

The parameters of cardio-respiratory synchronism after radical prostatectomy performed laparoscopically are presented in table 4.2.

Table 4.1: CRS, IRAS, RAC parameters in the patients with prostate cancer of the I-II degree before radical prostatectomy

Parameters	Statistical factors	Regulatory adaptive capabilities		
		1	2	3
		Good	Satisfactory	Low
Minimum gating range limit in cardio-respiratory cycles per minute	n M±m δ	23 77,6±0,5 2,5	21 75,8±0,5 2.3 P_1<0,05	6 74,0±2,0 3.4 P_2>0,05 P_3>0,05
Maximum gating range limit in cardio-respiratory cycles per minute	n M±m δ	23 85,2±0,5 2.5	21 82,6±0,6 2.8 P_1<0,001	6 77,3±2,0 3.4 P_2<0,001 P_3<0,001
Gating range in cardio-respiratory cycles per minute	n M±m δ	23 7,6±0,2 1.0	21 6,8±0,1 0.1 P_1<0,001	6 3,5±0,2 0.3 P_2<0,001 P_3<0,001
Duration of gating development at minimum limit of range in cardiac cycles	n M±m δ	23 10,8±0,2 1.0	21 18,5±0,3 0.3 P_1<0,001	6 19,1±0,4 0.7 P_2<0,001 P_3>0,05
IRAS	n M±m δ	23 70,3±0,6 3.0	21 36,8±0,3 1.4 P_1<0,001	6 18,3±0,3 0.5 P_2<0,001 P_3<0,001

Note. . P_1 between columns 1 и 2; P_2 – 1 и 3; P_3 – 2 и 3.

After radical prostatectomy, regulatory-adaptive capabilities remained satisfactory, although the index of regulatory-adaptive status decreased by 25.6% compared to that before surgery due to an increase in the duration of gating development at the minimum range limit by 28.5% with a significantly unchanged gating range

Table 4.2: The dynamics of CRS, IRAS, RAC parameters in the patients with prostate cancer of the I-II degree before and after radical prostatectomy

Parameters	Statistical factors	Before treatment	After treatment
Minimum gating range limit in cardio-respiratory cycles per minute	n M±m δ P	50 76,4±0,2 0.2	50 80,3±0,2 1.4 <0,001
Maximum gating range limit in cardio-respiratory cycles per minute	n M±m δ P	50 83,2±0,2 1.4	50 86,8±0,2 1.4 <0,001
Gating range in cardio-respiratory cycles per minute	n M±m δ P	50 6,8±0,1 0.7	50 6,5±0,1 0.7 >0,05
Duration of gating development at minimum limit of range in cardiac cycles	n M±m δ P	50 15,1±0,1 0.7	50 19,4±0,2 1.4 <0,001
Index of regulatory adaptive status (IRAS)	n M±m δ P	50 45,0±0,1 0.7	50 33,5±0,5 3.5 <0,001
Regulatory adaptive capabilities of organism		Satisfactory	Satisfactory

According to the index of regulatory adaptive status, after prostatectomy, patients were divided into individuals with good, satisfactory and low regulatory adaptive capabilities (table 4.3).

In patients with good regulatory adaptive capabilities, the index of regulatory adaptive status did not change significantly after radical prostatectomy.

In patients with satisfactory regulatory adaptive capabilities, the index of regulatory adaptive status did not change significantly after radical prostatectomy.

In these 33 out of 50 patients, nerve-sparing was noted as a result of radical prostatectomy performed by laparoscopic access.

Table 4.3: The dynamics of CRS, IRAS parameters in the patients with prostate cancer of the I-II degree before and after radical prostatectomy

Parameters	Statistical factors	RAC					
		Good		Satisfactory		Low	
		Before	After treatment	Before	After treatment	Before	After treatment
Minimum gating range limit in cardio-respiratory cycles per minute	n M ±m δ P	23 77.6 ±0,5 2.5	17 77.0 ±0,5 2.2 >0,05	21 75.8 ±0,5 2.3	16 86.4 ±0,4 1.6 >0,05	6 74.0 ±2,0 3.4	17 72.5 ±0,8 3.2 >0,05
Maximum gating range limit in cardio-respiratory cycles per minute	n M ±m δ P	23 85.2 ±0,5 2.5	17 85.0 ±0,5 2.2 <0,001	21 82.6 ±0,6 2.8	16 93.0 ±0,9 3.6 <0,001	6 77.3 ±2,0 3.4	17 83.1 ±0,9 3.6 <0,001
Gating range in cardio-respiratory cycles per minute	n M ±m δ P	23 7.6 ±0,2 1.0	17 8.0 ±0,1 0.4 <0,001	21 6.8 ±0,1 0.1	16 6.6 ±0,1 0.4 >0,05	6 3.5 ±0,2 0.3	17 4.9 ±0,1 0.4 <0,001
Duration of gating development at minimum limit of range in cardiac cycles	n M ±m δ P	23 10.8 ±0,2 1.0	17 11.2 ±0,2 0.9 >0,05	21 18.5 ±0,3 0.3	16 19.2 ±0,4 1.6 >0,05	6 19.1 ±0,4 0.7	17 31.6 ±0,3 1.2 <0,001
Index of regulatory adaptive status (IRAS)	n M ±m δ P	23 70.3 ±0,6 3.0	17 71.4 ±0,5 3.3 >0,05	21 36.8 ±0,3 1.4	16 34.4 ±0,4 1.6 >0,05	6 18.3 ±0,3 0.5	17 15.5 ±0,3 1.2 <0,001

In patients with low regulatory adaptive capabilities, the index of regulatory adaptive status decreased by 15.3% after radical prostatectomy. This was due to an increase in the duration of the development of gating at the minimum limit of the range by 65.4%, despite the increase in the range by 40.0%. In these 17 patients, as a result of radical prostatectomy with laparoscopic access, nerve-sparing did not occur.

CONCLUSION

The parameters of cardio-respiratory synchronism, the index of regulatory adaptive status and regulatory adaptive capabilities reflect integratively the consequences of radical prostatectomy performed laparoscopically with a nerve-sparing result and when nerve-sparing does not result.

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