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COMPARISON OF THE FUNCTIONAL STATE OF HEALTHY MEN AND PATIENTS WITH PROSTATE CANCER AFTER A RADICAL LAPAROTOMIC PROSTATECTOMY BY INTEGRATIVE INDICES

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Abstract

Research objective: evaluate the functional state of men after a radical laparotomic prostatectomy by integrative indices

Materials and methods. 100 men were under observation (50 for prostate cancer and 50 for the comparison group). Before and after treatment in urological department No.2 of Regional Clinical Hospital No.2, doctors used integral objective physiological methods (variability of heart rhythm and sample of cardio-respiratory synchronism), only with the consent of patients. According to the parameters of cardio-respiratory synchronism: synchronization range, duration of synchronization development at the minimum boundary of the range was determined by the index of regulatory and adaptive status, and by this index the regulatory and adaptive capacity was determined. According to the questionnaires, the international erectile function index was subjectively evaluated) Statistical analysis of the study results was carried out using parametric statistical methods after the normal distribution of the variant using programs was established: "STATISTICA 10".

Results. A week after hospital discharge, patients with radical prostatectomy, compared to healthy subjects, the synchronization range was 46.4% less, the duration of synchronization development at the minimum range boundary was 24.4% more, the regulatory and adaptive status index was 57.0% less, the regulatory and adaptive capacity was "satisfactory", while in control subjects it was "good". In terms of variability of heart rhythm in healthy persons there was optimal activity of regulation systems. Functionality was high, reactions to various influences were well expressed, and loads were easily transferred. Availability of significant reserves was determined. Reflex effects prevailed over humoral-metabolic ones. A week after hospital discharge, patients with radical prostatectomy the state of overvoltage was observed by parameters of heart rhythm variability. Insufficiency of protective and adaptive mechanisms of the organism on influence of external environment factors. Functional capabilities were reduced.

Conclusion. Parameters of cardiac respiration synchronism, index of regulatory and adaptive status and regulatory capabilities, along with the results of cardiac rhythm variability, along with the data of urofluometry and evaluation of erectile function reflect the consequences of radical prostatectomy performed by laparotomy access with nerve saving result and when nerve saving does not occur.

Keywords: cardiac respiration synchronicity, heart rhythm variability, radical prostatectomy.

INTRODUCTION

Prostate cancer is a common disease all over the world, including Russia [7]. One of the treatment methods is an open radical prostatectomy.

Radical prostatectomy affects the functional state of the whole organism. The literature describes the estimation of only local disturbances, which can be caused by radical prostatectomy [8]. From integrative estimations the definition

of quality of life is used. However, the latter contains many subjective criteria [3]. To objectify the integrative evaluation, we suggest using the definition of regulatory and adaptive capabilities [6, 9] and the total evaluation of regulatory systems by the variability of heart rate [2, 5].

A.V. Babintseva [1] cites the following factors of sexual activity preservation after a radical prostatectomy: preservation of the vascular-nervous bundles); the patient's interest in sexual activity preservation; the patient's interest in sexual activity preservation; the patient's interest in sexual activity preservation; the patient's interest in sexual activity preservation; and the patient's interest in sexual activity preservation. Sual function; no concomitant diseases; age under 65 years; international erectile function index over 20. However, even in case of nerve-saving radical prostatectomy, erectile dysfunction of this or that severity is observed in 65-75% of patients.

Restoration of erectile function after surgery may take place within 6 months. Therefore, it is necessary to search for an indicator to predict recovery of erectile function or continuation of erectile dysfunction in a man [1, 4].

RESEARCH OBJECTIVE

Evaluate the functional state of men after a radical laparotomic prostatectomy by integrative indices.

MATERIALS AND METHODS

100 men were under observation (50 for prostate cancer and 50 for the comparison group). Before and after treatment in urological department No.2 of Regional Clinical Hospital No.2, doctors used integral objective physiological methods (variability of heart rhythm and sample of cardio-

respiratory synchronism), only with the consent of patients. According to the parameters of cardio-respiratory synchronism: synchronization range, duration of synchronization development at the minimum boundary of the range was determined by the index of regulatory and adaptive status, and by this index the regulatory and adaptive capacity was determined. According to the questionnaires, the international erectile function index was subjectively evaluated) Statistical analysis of the study results was carried out using parametric statistical methods after the normal distribution of the variant using programs was established: "STATISTICA 10".

RESEARCH RESULTS

Parameters of the cardio-respiratory synchronism sample, index of regulatory and adaptive status, regulatory and adaptive abilities of patients with prostate cancer of I - II degree, volume more than 40 cubic centimeters, according to the scale of digital histological definitions of tissues in prostate cancer by Gleason 6 - 8 points before radical prostatectomy, after prostatectomy by laparoscopic access are given in comparison with parameters of healthy men (Table 1).

A week after hospital discharge, patients with radical prostatectomy, compared to healthy subjects, the synchronization range was 46.4% less, the duration of synchronization development at the minimum range boundary was 24.4% more, the regulatory and adaptive status index was 57.0% less, the regulatory and adaptive capacity was "satisfactory", while in control subjects it was "good".

In terms of variability of heart rhythm in healthy persons there was optimal activity of regulation systems. Functionality was high, reactions to various influences were well expressed, and loads were easily transferred. Availability of significant reserves was determined. Reflex effects prevailed over humoral-metabolic ones.

A week after hospital discharge, patients with radical prostatectomy the state of overvoltage was observed by parameters of heart rhythm variability. Insufficiency of protective and adaptive mechanisms of the organism on influence of external environment factors. Functional capabilities were reduced.

Table 1. Parameters of cardio-respiratory synchronism, index of regulatory and adaptive status, regulatory and adaptive capacity in patients one week after radical prostatectomy with laparotomy access and in control group subjects.

Parameters	Statistical indicators	Healthy	After prostatectomy
Initial heart rate per minute	N M±m δ P	24 83,6±0,5 2,5	50 76,8±0,6 4,2 <0,001
Initial breathing rate per minute	N M±m δ	24 20,0±0,2 1,0	50 18,7±0,3 2,1 >0,05
Minimum boundary of synchronization range in cardiorespiratory cycles per minute	N M±m δ	24 84,4±0,5 2,5	50 77,6±0,3 2,1 <0,001
Maximum boundary of synchronization range in cardiorespiratory cycles per minute	N M±m δ	24 95,4±0,6 2,9	50 83,5±0,8 5,6 <0,001
Cardiorespiratory cycle synchronization range per minute	N M±m δ	24 11,0±0,2 1,0	50 5,9±0,2 1,4 <0,001
Duration of synchronization development at the minimum range limit in cardiocycles	N M±m δ	24 17,6±0,3 1,5	50 21,9±1,0 7,0 <0,001
Regulatory Adaptive Status Index	N M±m δ	24 62,5±0,2 1,0	50 26,9±0,3 2,1 <0,001
Regulatory and adaptive capacity		Good	Satisfactory

Patients had erectile dysfunction and decreased urofluometry. After 6 months in 30 patients after radical prostatectomy with preservation of the neurovascular beam the parameters of cardio-respiratory synchronism, index of regulatory and adaptive status and regulatory and adaptive capacity began to recover (Tables 1 and 2). The range of synchronization increased by 27.1%, duration of synchronization development decreased by 36.0%, the regulatory and adaptive status index increased by 72.1%. At the same time, these parameters were lower than in the control group. The range of synchronization was 31.8% lower, the regulatory and adaptive status index was 36.0% lower.

Erectile function and urofluometry parameters were restored in the patients.

No nerve saving occurred in 20 patients 6 months after the prostatectomy. They had erectile dysfunction. The parameters

of urofluometry were reduced (Table 3).

The range of synchronization decreased by 42.4%, compared to the healthy ones by 69.1%. The regulation-adaptive status index decreased by 41.6%, with 74.9% decrease in relation to the healthy ones.

The overall assessment of regulatory systems by the

variability of heart rhythm indicated the state of exhaustion, while the extreme variant of vegetative regulation disruption - sharply stabilized rhythm - "rigid rhythm". Functional capabilities were sharply reduced. Inadequate response of organism systems to the influence of external environment factors.

Table 2. Parameters of cardio-respiratory synchronism, index of regulatory and adaptive status and regulatory capacity in patients 6 months after radical postatectomy with and without nerve saving.

Parameters	Statistical indicators	With nerve-sparing	Without nerve-sparing
Initial heart rate per minute	N M±m δ P	30 78,2±1,0 5,5	20 74,6±0,6 2,7 <0,001
Initial breathing rate per minute	N M±m δ P	30 17,2±0,1 0,6	20 20,4±0,2 0,9 <0,001
Minimum boundary of synchronization range in cardiorespiratory cycles per minute	N M±m δ P	30 78,8±0,3 1,7 <0,001	20 75,8±0,6 2,7 <0,001
Maximum boundary of synchronization range in cardiorespiratory cycles per minute	N M±m δ P	30 86,4±0,6 3,3	20 79,2±0,6 2,7 <0,001
Cardiorespiratory cycle synchronization range per minute	N M±m δ P	30 7,5±0,2 1,1	20 3,4±0,1 0,5 >0,05
Duration of synchronization development at the minimum range limit in cardiocycles	N M±m δ P	30 16,2±0,4 2,2	20 21,6±0,6 2,7 <0,001
Regulatory Adaptive Status Index	N M±m δ P	30 46,3±0,4 2,2	20 15,7±0,3 1,4 <0,001
Regulatory and adaptive capacity		Satisfactory	Low

Table 3. Dynamics of male condition indicators after radical laparotomically performed prostatectomy.

Indicators		Men after a radical prostatectomy.	
		Successful nerve-sparing surgery	Without nerve-sparing surgery
IIEF-5	N M±m SD	30 17,2±0,8 3,4 P_1<0,001	20 5,0±0,2 0,9 P_2<0,001 P_3<0,001
Level of erectile dysfunction		Mild degree dysfunction	Expressed erectile dissipation

The estimation of urofluometry 6 months after surgery is given in Table 4.

After a radical prostatectomy with nerve saving, the maximum and average urinary flow rate is higher than that without nerve saving.

The time to reach maximum speed and the time to urinate after radical prostatectomy is less than in the absence of nerve saving.

Table 4. Urofluometry parameters before and after laparotomically performed radical prostatectomy

Parameters	Statistical indicators	After a radical prostatectomy with nerve-sparing	After a radical prostatectomy without nerve-sparing
Urination volume, ml	N M±m P SD	30 158,2±0,4 2,2	20 188,4±0,8 <0,001 3,6
Maximum urine flow rate, ml/s	N M±m P SD	30 22,0±0,2 1,1	20 15,2±0,2 <0,001 0,9
Average urine flow rate, ml/s	N M±m P SD	30 9,4±0,1 0,6	20 7,0±0,1 <0,001 0,5
Time to reach maximum speed, sec	N M±m P SD	30 11,2±0,2 1,1	20 14,3±0,4 <0,001 1,8
Urination time, sec.	N M±m P SD	30 22,1±0,3 1,7	20 25,8±0,1 <0,001 0,5

CONCLUSION

Parameters of cardiac respiration synchronism, index of regulatory and adaptive status and regulatory capabilities, along with the results of cardiac rhythm variability, along with the data of urofluometry and evaluation of erectile function reflect the consequences of radical prostatectomy performed by laparotomy access with nerve saving result and when nerve saving does not occur.

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