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Functional parameters of blood circulation in patients with permanent pacemakers in the early postoperative period in different QRS complex duration classes

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Objective. To perform comparative evaluation of the blood circulation functional parameters in patients with permanent pacemakers in the early postoperative period in different QRS complex duration classes.

Materials and methods. The investigation involved 114 patients (56 women, 58 men) with implanted pacemakers. Among pacing modes (PM) there were 40 patients with VVI/VVIR, 26 patients with AV block and with DDD/DDDR, 14 patients with CRT. A separate group was made up of 34 patients with SSS in DDD/DDDR PM. The patients' average age was 69 ± 7 years. The levels of systolic and diastolic blood pressure (BP), spontaneous and induced rhythm heart rates, QRS complex duration as well as left ventricular ejection fraction (LVEF), end-diastolic volume (EDV) and end-systolic volume (ESV), the thicknesses of interventricular septum (IVS) and posterior wall (PW) of the left ventricle, the sizes of the left (LA) and right (RA) atrials and right ventricular (RV) were assessed before pacing therapy and in the early postoperative period (3—5 days after implantation). The stimulated QRS complex duration was measured in leads II, V5, V6 and with selecting the highest measured value. The obtained data were evaluated as changes of (increase in %) QRS complex duration after pacemaker implantation in different PM. QRS complex duration in patients with SSS was accompanied by DDD/DDDR in episodes of atrial and atrioventricular pacing separately. The patients were divided into 3 stimulated QRS complex duration classes: class 1 included patients with duration under 120 mc, duration of 120—150 mc was referred to class 2, and with duration of than 150 mc to class 3.

Results and discussion. It has been was established, that the blood circulation functional parameters in the early postoperative period after pacemaker implantation in all pacing modes were determined by the QRS complex duration class and these values were progressively changing with an increase in the latter.

Conclusions. QRS complex duration may be an effective control measure of permanent pacing which should be taken into account regardless of the mode.

Key words: permanent pacing, cardiac resynchronization therapy, electrocardiostimulation regimens.

One of the modern methods of treatment of life-threatening arrhythmias and medical refractory chronic heart failure (CHF) is permanent pacing [PP] [3].

Dynamic monitoring of the work of the ECS is based on the monitoring of the functional parameters of blood circulation, such as the QRS complex duration, left ventricular ejection fraction (LVEF), end-systolic (ESV)/end-diastolic (EDV) volumes, systolic (SBP)/diastolic (DBP) blood pressure [1, 2, 4, 5].

M. Haghjoo et al showed a reasonable allocation of the 3 groups of patients for QRS complex duration class respectively, tying the classes of extended and significantly extended QRS complex with more severe interventricular and intraventricular dyssynchrony [10].

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The purpose of this study is to conduct a comparative evaluation of the blood circulation functional values in patients with permanent pacemakers in the early postoperative period in different QRS complex duration classes.

Materials and methods

114 patients (56 — women, 58 — men) who underwent permanent pacemaker therapy were examined in the department of ultrasound, clinical and instrumental diagnosis and minimally invasive technologies Zaitsev V.T. Institute of General and Emergency Surgery of the NAMS of Ukraine. The average age was 69 ± 7 years. The indications for pacemaker implantation were: atrioventricular block of varying degrees (AV block) — 66 people (60 %), chronic heart failure (CHF) — 14 patients (10 %) who underwent cardiac resynchronization therapy (CRT), sick sinus syndrome (SSS) — 34 patients (30 %). In patients with AV block stimulation rate was 50 % or more, in CRT patients —

90 %. Atrial stimulation was prevailing in patients with SSS and ventricular stimulation was less than 50 %. The patients were treated with different pacing modes: mode VVI/VVIR (isolated ventricular pacing without or with frequency adaptation) — 40 patients, DDD/DDDR (double chamber pacing without or with frequency adaptation) — 26 patients, CRT — 14 patients.

ECG parameters were evaluated on prior to pacemaker implantation and in the early postoperative period (the third — the fifth day): spontaneous and stimulated heart rates (HR), QRS complex duration; systolic (SBP) and diastolic blood pressure (DBP), echocardiographic parameters: LVEF, EDV and ESV, the thicknesses of the interventricular septum (IVS), posterior wall (PW), left (LA) and right atrium (RA), right ventricular (RV) sizes. The obtained data were evaluated as changes of (increase in %) QRS complex duration after permanent pacemaker implantation in different pacing modes, and in patients with SSS stimulation modes DDD/DDDR on episodes of atrial and asynchronous ventricular pacing separately.

SBP and DBP were measured by Korotkov's method according to the recommendations of the Association of Cardiologists of Ukraine for the prevention and treatment of hypertension by tonometer Microlife BP AG1-20 in clinostaze after 5 minutes rest. The measurement accuracy was 2 mm Hg.

Electrocardiogram (ECG) was performed on a computer electrocardiograph Cardiolab +2000. The stimulated QRS complex duration was measured in leads II, V5, V6 (the average of three consecutive complexes) with a choice of maximum value. Measurement accuracy proved to be 1 mc.

Echocardiography study was conducted on the ultrasound machine Toshiba Applio 400. LF, RF, RV sizes and IVS, PW thickness was measured. To calculate the EDV and ESV used method of Simpson. LV ejection fraction was calculated using the formula EF = (EDV — ESV) / EDV × 100 %.

The patients were divided into 3 stimulated QRS complex duration classes: 1 — under 120 mc (normal), 2 — 120—150 mc (extended) and 3 — more than 150 mc (significantly extended) according to M. Haghjoo et al.

The patients' distribution was the following:

- class of normal QRS complex — seven patients in the modes of VVI /VVIR;
- class of extended QRS complex — 34 patients: VVI/VVIR — 19 (56 %), DDD/DDDR —11 (32 %), CRT — 4 (12 %);
- class of significantly extended QRS complex — 39 patients: VVI/VVIR — 14 (36 %), DDD/DDDR — 15 (38 %), CRT – 10 (26 %).

The data were brought into the Microsoft Excel base. For statistical evaluation of the results were used the parametric criteria (the mean — M, the average deviation — sd). The probability of differences between groups was determined using a nonparametric U-test Mann—Whitney. The likely result is determined by the levels of reliability $p < 0.01$ and $p < 0.05$.

Results and discussion

The increase in QRS complex duration after the pacemaker implantation in patients with complete AV block was the same in all classes in VVI/VVIR PM. The increase in QRS complex duration in DDD/DDDR PM progressively increased with the growth of its numbers. QRS complex duration in patients with SSS in the DDD/DDDR PM on episodes of atrial pacing did not change and on episodes of atrioventricular was behaved such way like in patients with complete AV block. Patients with CRT resulted in a significant shortening of the QRS complex duration, which was bigger in class 2 than in class 3 (Fig. 1).

Legend: in VVI PM — isolated ventricular pacing, DDD PM – atrioventricular pacing, CRT

I — no change in the initially normal QRS complex;

II — transition of initially normal QRS complex into the extended one;

III — the transition of initially normal QRS complex into significantly extended one;

IV — the transition of initially substantially elongated QRS complex into the extended one.

Table shows the comparative characteristics of the blood circulation functional values in patients with pacemakers in different QRS complex duration classes.

Pacemaker implantation in each of the QRS complex duration classes in all PM did not affect the values

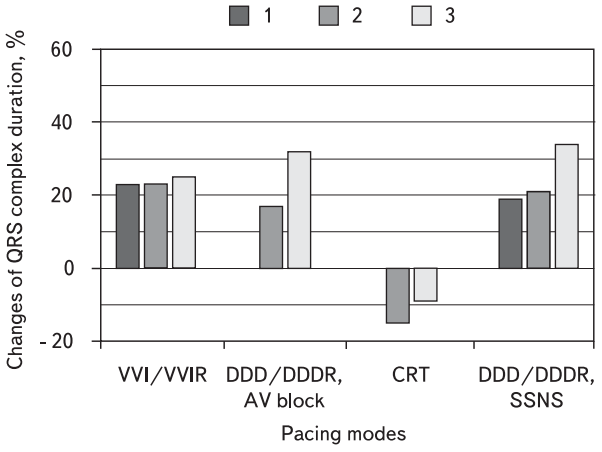
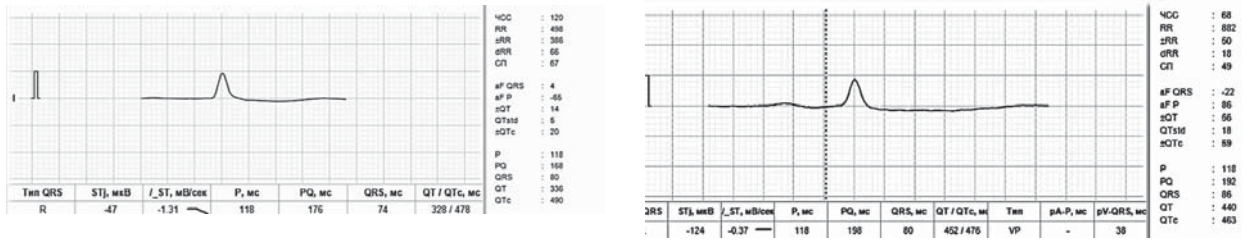
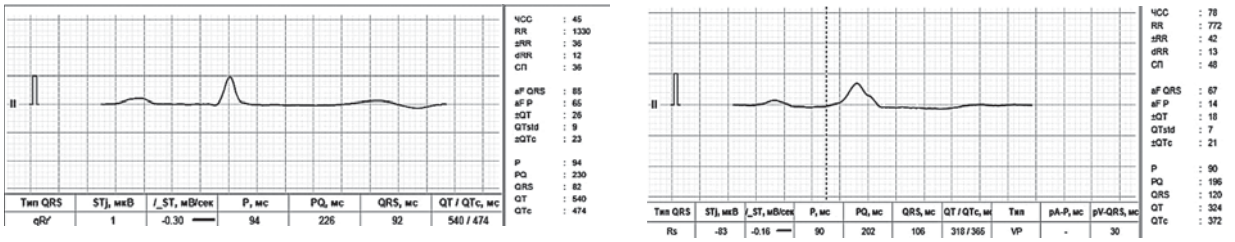


Fig. 1. **QRS complex duration changes after pacemaker implantation in different PM, where 1, 2, 3 are QRS complex duration classes**

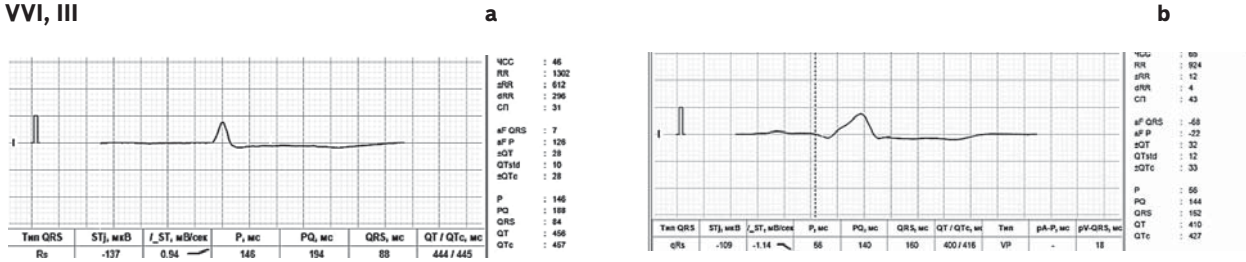
VVI, I **a** **b**



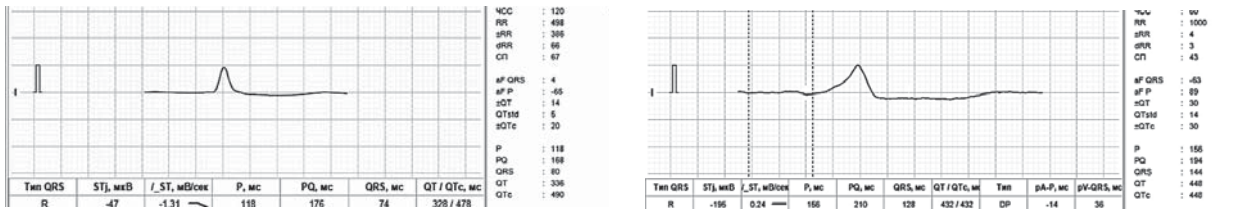
VVI, II **a** **b**



VVI, III **a** **b**



DDD AV block, II **a** **b**



DDD AV block, III **a** **b**

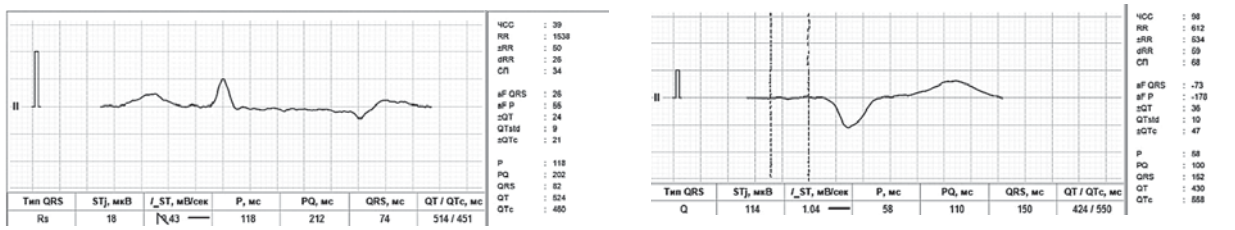
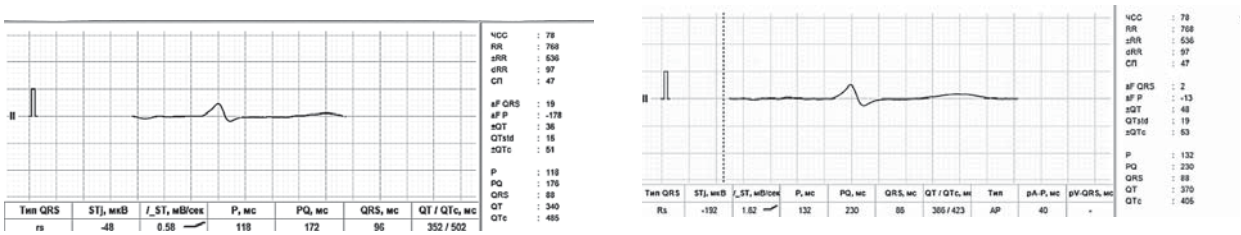


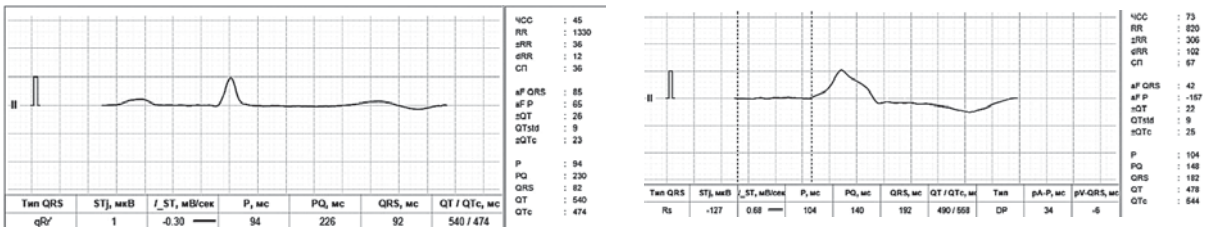
Fig. 2. **Options of changes in QRS complex duration in response to the pacemaker implantation:**
a — before pacemaker implantation, b — after pacemaker implantation.

Continuation Fig. 2

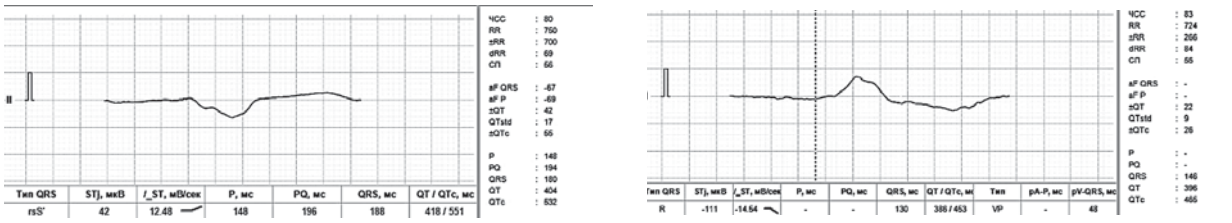
DDD, SSS, atrial stimulation, I **a** **b**



DDD, SSS, atrioventricular stimulation, II **a** **b**



CRT, IV **a** **b**



of systolic and diastolic blood pressure, and these values were the same as before it, with the exception of DBP in the VVI/VVIR PM, where it was significantly increased ($p < 0.05$).

Ventricular rate in patients in the VVI/VVIR and DDD/DDDR modes in all QRS complex duration classes was initially below the physiological norm. After the pacemaker implantation, ventricular rate reached the preset level ($p < 0.05$). In patients with a CRT, pacemaker implantation did not affect the heart rate, in accordance with its specifications.

The pacemaker implantation did not change EDV in all classes in the VVI/VVIR and DDD/DDDR PM. CRT significantly reduced EDV in both classes ($p < 0.05$).

The pacemaker implantation did not affect on the ESV, initially high in class 3 and normal — in classes 1 and 2 in the VVI/VVIR PM, as well as initially high — in class 3 DDD/DDDR PM. There was significant decrease in the initially normal ESV ($p < 0.05$) only in class 2 DDD/DDDR PM. CRT significantly affected the reduction of initially high ESV in both classes ($p < 0.05$).

Pacemaker implantation did not alter the initially normal EF in all classes of DDD/DDDR PM. The initially reduced EF was increased in class 1 with VVI/VVIR PM ($p < 0.05$). CRT affected the initially reduced EF and contributed to its increase in class 3 ($p < 0.05$), the trend towards increasing was seen in class 2.

Pacemaker implantation in each of the classes of QRS complex duration in all PM (VVI/VVIR, DDD/DDDR, CRT) did not affect the interventricular septum and PW LV thicknesses, which of were the same value as before the implantation.

The LA size was initially increased in all classes of VVI/VVVIR. No changes were found after pacemaker implantation, nor the initially normal LA size in class 2 of DDD/DDDR PM, and the initially increased LA size in class 3. CRT helped reduce the increased LA size ($p < 0.05$) in all classes.

Table

Functional parameters, depending on pacing modes

Functional value		Pacing modes	QRS complex duration class					
			Under 120 mc		120—149 mc		150 and more mc	
			Before	After	Before	After	Before	After
Heart rate (M ± sd, 1/min)		VVI/VVIR	52 ± 11	68 ± 6*	50 ± 9	70 ± 10*	44 ± 8	65 ± 6*
		DDD/DDDR	—	—	42 ± 6	71 ± 11*	47 ± 9	70 ± 8*
		CRT	—	—	72 ± 7	74 ± 19	69 ± 7	70 ± 7
Blood pressure (M ± sd, mm Hg)	SBP	VVI/VVIR	150 ± 15	154 ± 17	136 ± 15	139 ± 14	151 ± 17	153 ± 20
		DDD/DDDR	—	—	143 ± 15	139 ± 17	154 ± 19	148 ± 18
		CRT	—	—	137 ± 11	133 ± 18	148 ± 18	129 ± 8
	DBP	VVI/VVIR	82 ± 6	89 ± 9*	76 ± 7	85 ± 9*	78 ± 4	88 ± 9*
		DDD/DDDR	—	—	85 ± 10	80 ± 11	80 ± 9	85 ± 8
		CRT	—	—	83 ± 4	80 ± 7	81 ± 4	81 ± 2
Ultrasound values	EF (M ± sd, %)	VVI/VVIR	48 ± 10	57 ± 11*	51 ± 8	56 ± 6	43 ± 6	48 ± 8
		DDD/DDDR	—	—	52 ± 8	57 ± 9	50 ± 6	50 ± 7
		CRT	—	—	26 ± 7	29 ± 9	23 ± 4	29 ± 5*
	ESV (M ± sd, ml)	VVI/VVIR	63 ± 28	59 ± 26	65 ± 28	63 ± 21	83 ± 32	78 ± 31
		DDD/DDDR	—	—	74 ± 34	52 ± 23*	82 ± 39	84 ± 41
		CRT	—	—	356 ± 96*	272 ± 63	397 ± 89	272 ± 129*
	EDV (M ± sd, ml)	VVI/VVIR	135 ± 44	127 ± 29	139 ± 28	125 ± 25	165 ± 27	141 ± 28
		DDD/DDDR	—	—	126 ± 29	118 ± 23	166 ± 43	164 ± 61
		CRT	—	—	405 ± 94	340 ± 14*	497 ± 78	370 ± 80*
	IVS, (M ± sd, sm)	VVI/VVIR	1.2 ± 0.1	1.2 ± 0.1	1.2 ± 0.1	1.2 ± 0.1	1.2 ± 0.1	1.2 ± 0.1
		DDD/DDDR	—	—	1.2 ± 0.1	1.2 ± 0.1	1.2 ± 0.1	1.2 ± 0.1
		CRT	—	—	1.4 ± 0.1	1.4 ± 0.1	1.4 ± 0.1	1.4 ± 0.1
	PW LV, (M ± sd, sm)	VVI/VVIR	0.9 ± 0.1	0.9 ± 0.1	0.9 ± 0.1	0.8 ± 0.1	1.0 ± 0.1	1.0 ± 0.1
		DDD/DDDR	—	—	1.1 ± 0.2	1.1 ± 0.2	1.2 ± 0.2	1.2 ± 0.2
		CRT	—	—	1.3 ± 0.2	1.2 ± 0.2	1.3 ± 0.2	1.3 ± 0.2
	LA (M ± sd, sm)	VVI/VVIR	4.9 ± 0.6	4.8 ± 0.6	4.5 ± 0.5	4.5 ± 0.5	4.5 ± 0.5	4.5 ± 0.5
		DDD/DDDR	—	—	4.0 ± 0.5	4.0 ± 0.5	4.5 ± 0.4	4.5 ± 0.5
		CRT	—	—	5.4 ± 1.0	5.2 ± 1.0*	5.4 ± 1.0	5.2 ± 1.0*
	RA (M ± sd, sm)	VVI/VVIR	4.8 ± 1.0	4.8 ± 1.0	4.3 ± 0.4	4.4 ± 0.4	4.2 ± 0.4	4.3 ± 0.4
		DDD/DDDR	—	—	4.5 ± 0.6	4.3 ± 0.6	4.5 ± 0.6	4.3 ± 0.6
		CRT	—	—	6.0 ± 0.1	6.0 ± 0.1	6.0 ± 0.1	6.0 ± 0.1
	RV (M ± sd, sm)	VVI/VVIR	3.0 ± 0.4	3.0 ± 0.4	3.2 ± 0.5	3.2 ± 0.5	3.2 ± 0.5	3.2 ± 0.5
		DDD/DDDR	—	—	3.2 ± 07	3.2 ± 07	3.2 ± 07	3.1 ± 07
		CRT	—	—	3.5 ± 0.7	3.4 ± 0.7	3.6 ± 0.7	3.4 ± 0.7

Comment. * $p < 0.05$ — the level of significance of differences, M — mean value, sd — standard deviation.

Pacemaker implantation did not affect the RA and RV sizes in all classes and PM, regardless of whether they were initially increased or were in the physiological range.

Y. Su et al. [16] and C. Tang et al. [18] revealed a positive correlation between the stimulated QRS complex duration and ESV, EDV in studies of the patients in DDD/DDDR PM, which was found in our study.

The primary treatment of clinically significant bradyarrhythmias is the pacemaker implantation in VVI/VVIR and DDD/DDDR PM [11]. However, there is evidence that VVI/VVIR PM have a negative impact on the reduction of ventricular synchrony with an adverse effect on chronic heart failure manifestation in the case of non-optimal electrode implantation site [7—9, 17]. The increasing of DBP can be considered as an adverse effect of isolated ventricular stimulation, it was founded in all QRS complex duration classes with VVI/VVIR PM.

Our data also indicate that QRS complex duration in patient with SSS changes as well as in patients with AV block in DDD/DDDR PM. There is a assumption that the increase in QRS complex duration is independent of the atrial pacing, and may occur only in case of sinus ta-

chycardia episodes, premature ventricular excitation and the development of complete bundle-branch block [13].

The proof of benefits of CRT in patients with QRS complex duration more than 120 mc was illustrated in large multicenter randomized trials [8, 12, 14]. EDV and ESV, the LA size decreased equally in both classes in patients with CRT, and EF — significantly in class 3. Our data are consistent with the meta-analysis [15], when the results of five multicenter studies that included 6.501 patients with CRT (4.437 with QRS complex duration ≥ 150 mc, and 2.064 with QRS < 150 mc). It was concluded that the severity of CRT beneficial effects was significantly better for patients with QRS ≥ 150 mc vs. patients with QRS < 150.

A direct comparison of DDD/DDDR and CRT is not possible because of various contingents of patients and indications, but the results provide a basis to support a point of view [6] that in a great number of cases there is a need to supplementing the atrioventricular ventricular resynchronization.

Conclusions

Blood circulation functional values in the early postoperative period after pacemaker implantation in all pacing modes are determined by the QRS complex duration class and these values progressively change with an increase in the latter.

QRS complex duration may be an effective control measure of permanent pacing and should taken into account regardless of the mode.

Future studies

It seems promising to investigate the blood circulation functional values in patients with pacemakers in the remote period after implantation, taking into account QRS complex duration classes.

Referenses

1. Волков Д.Е. Расположение правожелудочкового электрода при электрокардиостимуляции. Возможности эхокардиографической верификации // Серце і судини. — 2012. — № 3. — С. 81—86.
2. Карпенко Ю.И., Волков Д.Е. Рекомендации по имплантации электрокардиостимуляторов, ресинхронизирующих устройств и кардиовертеров-дефибрилляторов [Электронный ресурс]. — Режим доступа: http://serdcekharkov.appspot.com/doctors/recommendations_pacing
3. Клинические рекомендации по проведению электрофизиологических исследований, катетерной абляции и применению имплантируемых антиаритмических устройств, ВНОК и ВНОА // Новая редакция. — 2011. — С. 17—19.
4. Неаполитанская Т.Э., Давидович И.М. Динамика показателей суточного мониторирования артериального давления у больных гипертонической болезнью после имплантации искусственного водителя ритма // Дальневосточный медицинский журн. — 2012. — № 2. — С. 6—9.
5. Сыволап В.В. Особенности внутрисердечной гемодинамики и диастолической функции у пациентов с ишемической болезнью сердца с полной атриовентрикулярной блокадой до и после электростимуляции в режиме VVI // Украинский медицинский часопис. — 2003. — № (33) I — II. — С. 75—78.
6. Anne B. Curtis, Seth J. Worley et al. Biventricular Pacing for Atrioventricular Block and Systolic Dysfunction // The New England Journal of Medicine. — 2013. — Vol. 368, 17. — P. 1585—1593.
7. Behar N., Martins R.P., Daubert J.C. et al. Does paced QRS duration predict the risk of heart failure events during permanent right ventricular pacing? // European journal of heart failure. — 2013. — Vol. 15 (3). — P. 241—243.
8. Chen S., Yin Y., Lan X. et al. Paced QRS duration as a predictor for clinical heart failure events during right ventricular apical pacing in patients with idiopathic complete atrioventricular block: results from an observational cohort study (PREDICT-HF) // European Journal of Heart Failure. — 2013. — Vol. 15 (3). — P. 352—359.
9. Dong Y.X., Guo M., Yang Y.Z. et al. Effects of ventricular demand and dual-chamber pacing models on the long-term clinical outcome and cardiac remodeling in patients with symptomatic bradycardia // Zhonghua Yi Xue Za Zhi. — 2011. — Vol. 91 (30). — P. 2103—2107.
10. Haghjoo M., Bagherzadeh A.F. et al. Prevalence of mechanical dyssynchrony in heart failure patients with different QRS durations // Pacing Clin Electrophysiology. — 2007. — Vol. 30 (5). — P. 616—622.
11. Kimmel M.W., Skadsberg N.D., Byrd C.L. et al. Single-site ventricular and biventricular pacing: investigation of latest depolarization strategy // Europace. — 2007. — Vol. 9 (12). — P. 1163—1170.
12. Linde C., Gold R. Michael, Abraham T. William et al. REVERSE study: CRT produces long-term improvements in disease progression in mildly symptomatic heart failure patients. Five-year results from the REsynchronization reVErses Remodeling in Systolic left vEntricular dysfunction study // Access mode: http://www.escardio.org/congresses/esc-2012/congress-reports/Pages/710-2-REVERSE-study.aspx.
13. Morady F. Widening of the QRS Complex During Atrial Pacing: What is the Mechanism? // Journal of cardiovascular electrophysiology. — 2002. — Vol. 13 (6). — P. 627—628.
14. Noyes K., Veazie P., Hall W.J. et al. Cost-Effectiveness of Cardiac Resynchronization Therapy in the MADITCRT // Journal of Cardiovascular Electrophysiology. — 2013. — Vol. 24. — P. 66—74.
15. Stavrakis S., Lazzara R., Thadani U. et al. The Benefit of Cardiac Resynchronization Therapy and QRS Duration: A Meta-Analysis // Journal of Cardiovascular Electrophysiology. — 2012. — Vol. 23. — P. 163—168.
16. Su Y., Pan W., Gong X. et al. Relationships between paced QRS duration and left cardiac structures and function // Acta Cardiologica. — 2009. — Vol. 64. — P. 231—238.

17. Sweeney M.O., Hellkamp A.S. et al. Heart Failure During Cardiac Pacing // Circulation. — 2006. — Vol. 107, N 23. — P. 2082—2088.
18. Tang C.C., Xiang L., Hu M. et al. Association between Paced QRS Duration and Cardiac Function in Patients with Right Ventricular Septum Pacing // Access mode: http://en.cnki.com.cn/Article_en/CJFDTOTAL-SWCX201202020.htm

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Функціональні показники кровообігу в пацієнтів із встановленими електрокардіостимуляторами в ранньому післяопераційному періоді в різних класах тривалості QRS-комплексу

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Мета дослідження — проведення порівняльної оцінки кровообігу функціонального значення в пацієнтів із постійними кардіостимуляторами в ранньому післяопераційному періоді в різних класах тривалості QRS-комплексу.

Матеріали та методи. Обстежено 114 пацієнтів (56 жінок, 58 чоловіків) віком (69 ± 7) року зі встановленими електрокардіостимуляторами (ЕКС) в режимах стимуляції VVI/VVIR (40 пацієнтів), DDD/DDDR (26 пацієнтів) з АВ-блокадою та окремо із синдромом слабкості синусового вузла (СССВ) (34 пацієнти), із кардіоресинхронізувальною терапією (14 пацієнтів). До встановлення ЕКС і в ранньому післяопераційному періоді (3—5-й день після встановлення) оцінювали рівні систолічного й діастолічного артеріального тиску; частоту серцевих скорочень спонтанного та стимульованого ритму; тривалість QRS-комплексу; фракцію викиду лівого шлуночка, кінцево-діастолічний об'єм і кінцево-систолічний об'єм, товщину міжшлуночкової перетинки і задньої стінки лівого шлуночка, розміри лівого і правого передсердь, а також правого шлуночка. Тривалість стимульованого QRS комплексу вимірювали у відведеннях II, V5, V6 з подальшим вибором максимального виміряного. За отриманими даними оцінювали також зміну (приріст у відсотках) тривалості QRS-комплексу після імплантації ЕКС в різних режимах стимуляції, у пацієнтів із СССВ у режимах стимуляції DDD/DDDR окремо на епізодах передсердної стимуляції і передсердно-шлуночкової стимуляції. Пацієнти були розподілені на 3 класи тривалості стимульованого QRS-комплексу: клас 1 — до 120 мс, клас 2 — 120—150 мс, клас 3 — більше 150 мс.

Результати та обговорення. Встановлено, що функціональні показники кровообігу в ранньому післяопераційному періоді після імплантації ЕКС у всіх режимах стимуляції визначаються класом тривалості QRS-комплексу і прогресивно змінюються при збільшенні останнього.

Висновки. Тривалість QRS-комплексу може бути ефективною мірою контролю постійної електрокардіостимуляції і враховуватися незалежно від режиму.

Ключові слова: постійна електрокардіостимуляція, кардіоресинхронізувальна терапія, режими електрокардіостимуляції.

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Функциональные показатели кровообращения у пациентов с установленными электрокардиостимуляторами в раннем послеоперационном периоде в разных классах продолжительности QRS-комплекса

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Цель исследования — проведение сравнительной оценки кровообращения функционального значения у пациентов с постоянными кардиостимуляторами в раннем послеоперационном периоде в разных классах продолжительности QRS-комплекса.

Материалы и методы. Обследовано 114 пациентов (56 женщин, 58 мужчин) в возрасте (69 ± 7) года с установленными электрокардиостимуляторами (ЭКС) в режимах стимуляции VVI/VVIR (40 пациентов), DDD/ DDR (26 пациентов) с АВ-блокадой и отдельно с синдромом слабости синусового узла (СССУ) (34 пациента), с кардиоресинхронизирующей терапией (14 пациентов). До установки ЭКС и в раннем послеоперационном периоде (3—5-й день после имплантации) оценивали уровни систолического и диастолического артериального давления; частоту сердечных сокращений спонтанного и стимулированного ритма; продолжительность QRS-комплекса; фракцию выброса левого желудочка, конечно-диастолический объем и конечно-систолический объем, толщину межжелудочковой перегородки и задней стенки левого желудочка, размеры левого и правого предсердий, а также правого желудочка. Продолжительность стимулированного QRS-комплекса измерялась в отведениях II, V5, V6 с последующим выбором максимального измеренного. По полученным данным оценивали также изменение (прирост в процентах) продолжительности QRS-комплекса после установки ЭКС в разных режимах стимуляции,

причем у пациентов с СССУ в режимах стимуляции DDD/DDDR отдельно на эпизодах предсердной стимуляции и предсердно-желудочковой стимуляции. Пациенты были распределены на 3 класса продолжительности стимулированного QRS-комплекса: класс 1 — до 120 мс, класс 2 — 120—150 мс, класс 3 — более 150 мс.

Результаты и обсуждение. Установлено, что функциональные показатели кровообращения в раннем послеоперационном периоде после имплантации ЭКС во всех режимах стимуляции определяются классом продолжительности QRS комплекса и прогрессивно изменяются при увеличении последнего.

Выводы. Продолжительность QRS-комплекса может быть эффективной мерой контроля постоянной электрокардиостимуляции и учитываться вне зависимости от режима.

Ключевые слова: постоянная электрокардиостимуляция, кардиоресинхронизирующая терапия, режимы электрокардиостимуляции.