

## Clinical researches

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### ANALYZE OF DEATH IN PATIENTS WITH CARDIAC PACING

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This study included 30 cases of death among patients at the age of 47 to 83 years who underwent permanent pacing. The estimated factors considered patients' sex (male, female), age, cause of death, clinical diagnosis, indications, type, the frequency and duration of pacing. Depending on the length of pacing, these deaths were divided into I) acute (from 1 to 7 days), II) sharp (7 to 30 days), III) postimplantation (30 days to 5 years) and IV) remote postimplantation (more than 5 years) periods. The obtained results reveal the fact that more than 2/3 of the deaths occurred in acute and postimplantation periods. The number of deaths pertaining these periods was approximately equal. The rest of the lethal cases, which includes 1/3 of the deaths, falls on the acute and remote postimplantation periods. The number of deaths happened in the acute period was two times less than in the remote postimplantation period. In 2/3 cases the death was caused by the acute heart failure, happening in the acute and sharp periods, correspondently. 1/3 of deaths can be qualified as caused by comorbid pathology, happened in postimplantation and remote postimplantation periods. Patients, who had heart failure in their life-time, have the least favorable prognosis for recovery.

**KEY WORDS:** pacemaker, mortality, heart failure

### АНАЛІЗ ЛЕТАЛЬНИХ ВИПАДКІВ У ПАЦІЄНТІВ З ІМПЛАНТОВАНИМ ЕЛЕКТРОКАРДІОСТИМУЛЯТОРОМ

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Проведено аналіз летальних випадків 30 померлих у віці від 47 до 83 років, які при житті піддалися постійній електрокардіостимуляції (ЕКС). Оцінювали: вік, стать, причину смерті, клінічний діагноз, показання, тип, частоту та тривалість стимуляції ЕКС. Летальні випадки, в залежності від тривалості ЕКС, були розділені на: I) найгостріший (від 1 до 7 днів), II) гострий (від 7 до 30 днів), III) постімплантанційний (від 30 днів до 5 років) та IV) віддалений постімплантанційний (більше 5 років) періоди. З отриманих результатів маємо: більше 2/3 летальних випадків були в найгострішому та постімплантаційному періодах, де по частоті вони були приблизно однакові, з залишившою 1/3, їх частота в гострому періоді була майже в 2 рази менше, ніж у віддаленому постімплантаційному періоді. У 2/3 випадках причиною смерті була гостра серцева недостатність (СН), переважно, в найгострішому та гострому, та у 1/3 – коморбідна патологія, переважно, у постімплантаційному та віддаленому постімплантаційному періодах. Пацієнти, які в анамнезі життя мали СН, мають більш несприятливий прогноз для одужання.

**КЛЮЧОВІ СЛОВА:** електрокардіостимулятор, смертність, серцева недостатність

### АНАЛИЗ ЛЕТАЛЬНЫХ ИСХОДОВ У ПАЦИЕНТОВ С ИМПЛАНТИРОВАННЫМ ЭЛЕКТРОКАРДИОСТИМУЛЯТОРОМ

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Проведен анализ летальных исходов 30 умерших в возрасте от 47 до 83 лет с имплантированным при жизни постоянным электрокардиостимулятором (ЭКС). Учитывались возраст; пол, причина

смерти, клинический диагноз, показания, тип, частота и продолжительность ЭКС. Летальные исходы в зависимости от продолжительности ЭКС были разделены на I – острейший (от 1 до 7 дней), II – острый (от 7 до 30 дней), III – постимплантационный (от 30 дней до 5 лет) и IV) отдаленный постимплантационный (более 5 лет) периоды. Результаты показали, что более 2/3 летальных исходов приходилось на острейший и постимплантационный периоды, где по частоте они были примерно одинаковы, из оставшейся 1/3 их частота в остром периоде была почти в два раза меньше, чем в отдаленном постимплантационном. В 2/3 случаях причиной смерти являлась острая сердечная недостаточность (СН), преимущественно, в острейшем и в остром, и в 1/3 - коморбидная патология, преимущественно, в постимплантационном и отдаленном постимплантационном периодах. Пациенты, имеющие СН в анамнезе, имеют более неблагоприятный прогноз для выздоровления.

**КЛЮЧЕВЫЕ СЛОВА:** электрокардиостимулятор, смертность, сердечная недостаточность

## INTRODUCTION

The implantation of a permanent pacemaker (ECS) is the leading treatment of bradysystolic arrhythmia and chronic heart failure (CHF) resistant to medical treatment. [1-4]. Pacing prevents syncope recurrence and improves patients' life expectancy [5]. Despite the wide range of indications for pacemaker implantation and positive results, part of patients died not only in the long term, but in the first days after surgery, and to improve its results requires an analyze of mortality. [5-6]. There are publications related to mortality in patients only with single-chamber ventricular pacing.

## OBJECTIVE

The aim of this work is to analyze mortality in patients with permanent pacemakers.

## MATERIALS AND METHODS

On the basis of the mortuary of SI «Zaytsev V.T. Institute of General and Urgent Surgery NAMS of Ukraine» and Regional Hospital of Kharkiv, there were examined protocols of autopsy of 30 dead patients (15 men and 15 women) at the age of 47 to 83 (average  $70,9 \pm 8,3$ ) There were estimated sex (male, female), age, duration of stimulation and cause of death.

From the available archival histories of disease of 19 dead patients were additionally estimated the clinical diagnosis, indications for stimulation, type and frequency of stimulation of pacemaker. We managed to determine the type of pacemaker stimulation in patients with identified history of illness: in 5 % - DDD and in 95 % cases VVI.

There were 4 periods isolated: I) acute (from 1 to 7 days), II) a sharp (7 to 30 days), III) post-implantation (30 days to 5 years) and IV) remote postimplantation (more than 5 years) periods.

In all patients and dedicated periods ECS for the age, the frequency and duration of stimulation, there were found the arithmetic mean and standard deviation.

The frequency of causes of death and indications for pacing were evaluated in percentage.

The results obtained were processed after forming the database. Statistical evaluation was performed using Microsoft Excel 2007.

## RESULTS AND DISCUSSION

More than 2/3 cases of deaths occurred in I and III periods, where the frequency was about the same, the remaining 1/3 cases of their frequency in the II period was almost two times less than in the IV period (Fig. 1).

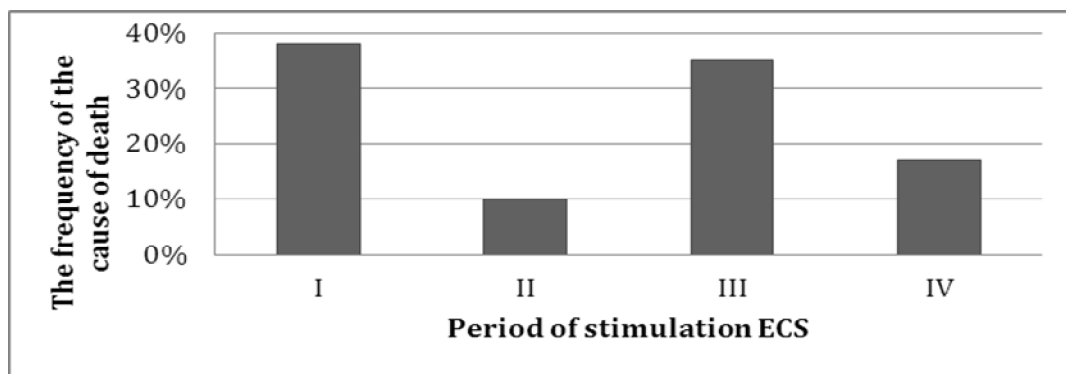


Fig. 1 The frequency of deaths in periods ECS (in %)

In 2/3 cases the cause of death was caused by comorbid pathology (tab. 1) heart failure, and in the remaining 1/3 -

Table 1

The frequency of the cause of death among patients with implanted pacemaker in the periods of ECS (in %)

	AHF	PE	Stroke	Cancer intoxication	Acute bleeding
I	75	16	8	-----	-----
II	100	-----	-----	-----	-----
III	56	-----	33	-----	11
IV	60	-----	20	20	-----

Abbreviations: AHF - acute heart failure, PE- pulmonary embolism, stroke - acute cerebrovascular accident.

Causes of death in the I period were the following: AHF, pulmonary embolism, stroke, in the II period - AHF, in the III and IV periods - AHF, stroke, tumor diseases and acute

bleeding.

The frequency of clinical entities and clinical syndromes before the death of patients with implanted ECS are shown in the fig 2.

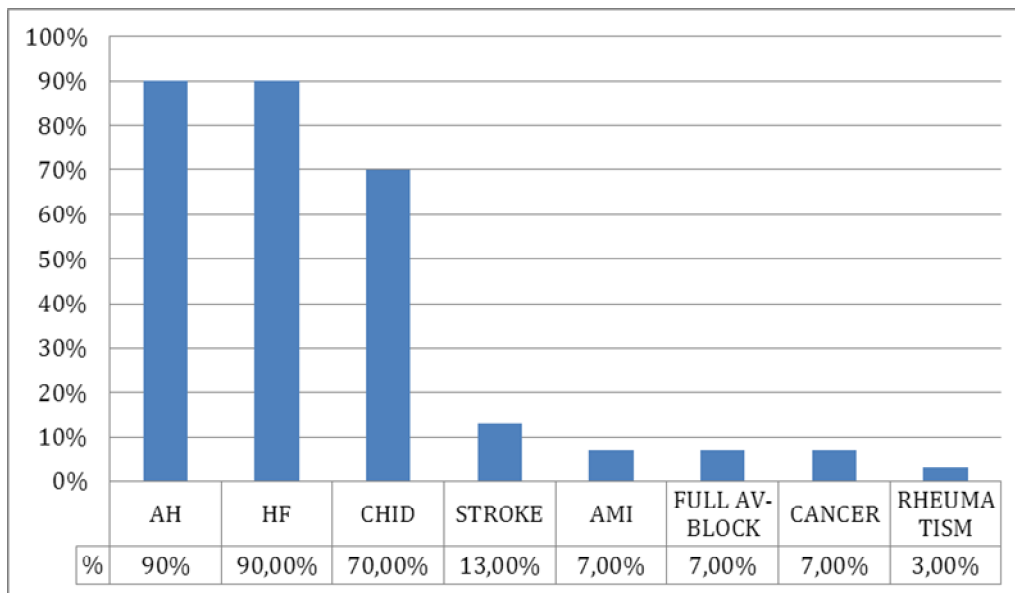


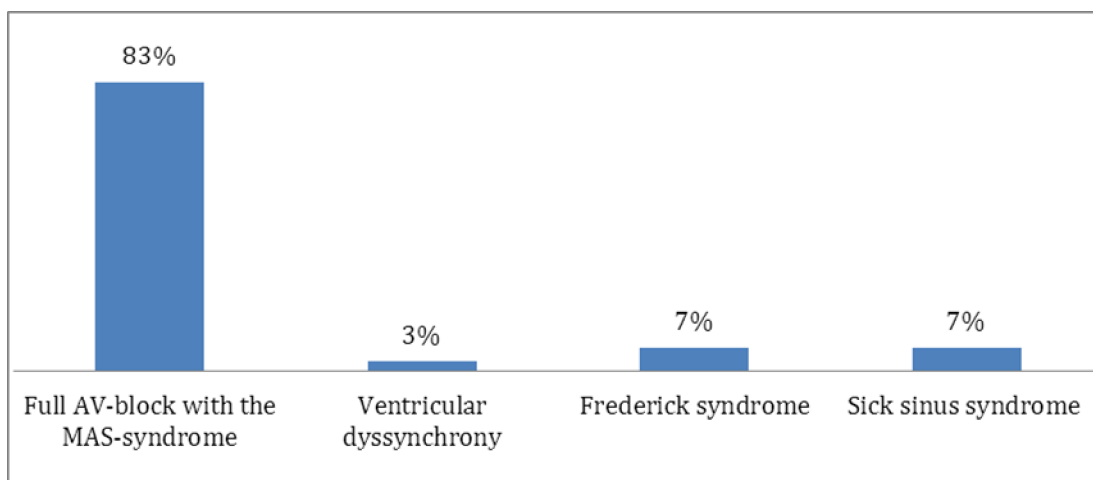
Fig.2 The frequency of clinical entities and clinical syndromes before the death of patients with implanted ECS in decreasing order (in %)

Abbreviations: AH – atrial hypertension, HF - heart failure, AMI - acute myocardial infarction, CIHD - chronic ischemic heart disease.

The majority of patients had the combination of AH, CHID, seldom - stroke and AMI, and more seldom - other states.

The predominant indication for pacemaker implantation was AV block, which in two

cases was combined with a permanent form of atrial fibrillation, among other indications - ventricular dyssynchrony and Sick sinus syndrome (SSS) (Fig. 3).



**Fig. 3 Frequency of indications for pacemaker implantation in the studied group (in %)**

In the studied group the rate of frequency of pacemaker stimulation during the life-time ranged from 60 to 80 beats / min ( $67 \pm 6,78$  beats / min at VVI pacing and 70 beats / min during DDD pacing)

AHF as most frequent cause of death in patients with implanted pacemaker was confirmed [6-7]. Publications with a detailed analyze of deaths especially that concerns the periods of ECS, weren't found in the literature and are the new ones.

## CONCLUSIONS

1. More than 2/3 of the deaths were in the

acute and postimplantation periods, where their frequency was about the same, the remaining 1/3 of their frequency falling on the acute period was almost two times less, than in the remote postimplantation period.

2. In 2/3 cases the death was caused by the acute heart failure, happening in the acute and sharp periods, correspondently. 1/3 of deaths can be qualified as caused by comorbid pathology, happened in postimplantation and remote postimplantation periods

3. Patients, who had heart failure in their life-time, have the least favorable prognosis for recovery.

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