Conference paper

The structure of cardiac surgery and interventions in heart failure management in the Kyrgyz Republic: A retrospective analysis

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Abstract
In this study, we retrospectively analyzed the cardiac surgical and interventional care of patients with chronic heart failure hospitalized in Scientific-Research Institute of Heart Surgery and Organs Transplantation (SRIHSOT) and Osh Interregional United Clinical Hospital (OIUCH).
Key words: heart failure, cardiac surgical care, intervention, extent of operation, follow-up

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Introduction

As known, heart failure (HF) is characterized by high morbidity, mortality, and exertion of substantial economic and social burden (1, 2).

Heart failure is defined by the European Society of Cardiology (ESC) as a clinical syndrome characterized by symptoms such as shortness of breath, persistent coughing or wheezing, ankle swelling and fatigue that may be accompanied by the following signs: jugular venous pressure, pulmonary crackles, increased heart rate and peripheral edema (3). 2016 Guidelines classified HF into HF with reduced, mid-range and preserved ejection fraction based on contractile function of left ventricle (3).

Practically, any cardiovascular disease or any non-cardiac conditions with heart involvement can be complicated by heart failure development. Hence, etiological causes of heart failure are versatile: coronary heart disease, arterial hypertension, myocardial damage, cardiomyopathies, valvular heart diseases, congenital heart disease, cardiac damage in diabetes, autoimmune disorders, adverse effects of cancer treatment etc. (4, 5).

Although heart failure is observed at any age and regardless of gender, race and ethnicity of patients, some age, gender and race predispositions coexist (6,7).

According to literature review, prevalence of heart failure is steadily increasing (8).

Despite the continuous development and updating of protocols and guidelines on optimal diagnostic workup and treatment, management of heart failure remains overwhelming and challenging, especially in developing countries (3, 9).

In the management of heart failure, along with medical therapy, surgical and interventional care also plays an important role according to indications (10, 11).

In this retrospective study, we aimed to analyze the structure of surgical and interventional management of heart failure in Kyrgyz Republic in three-year follow-up, between 2016 and 2018.

Methods

A total of 6825 patients hospitalized in Scientific-Research Institute of Heart Surgery and Organs Transplantation (SRIHSOT) and Osh Interregional United Clinical Hospital (OIUCH) healthcare institutions were enrolled into our study in periods of 2016-2018 follow-up. Age range varied from 12 days to 87 years. Mean age 64.36 years. Male gender slightly predominated by 52.7%. All operated patients presented clinically with II-III functional class heart failure according to New-York Heart Association (NYHA).

Data regarding surgery/intervention for underlying condition of heart failure were supplied by both hospitals.

Statistical analysis: We used descriptive statistics to represent data.

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Results

Total number of operations and interventions, treatment modalities, proportion of procedures in whole hospital cases is highlighted in tables and diagrams. Table 1 shows total number of hospitalization in two clinics for three-year period.

Table 1. Number of hospitalized cases				
Hospitals/years	2016	2017	2018	**All**
OIUCH	782	768	745	2295
SRIHSOT	1203	1580	1747	4430
All	1985	2348	2492	6825
OIUCH - Osh Interregional United Clinical Hospital, SRIHSOT - Scientific-Research Institute of Heart Surgery and Organs Transplantation				

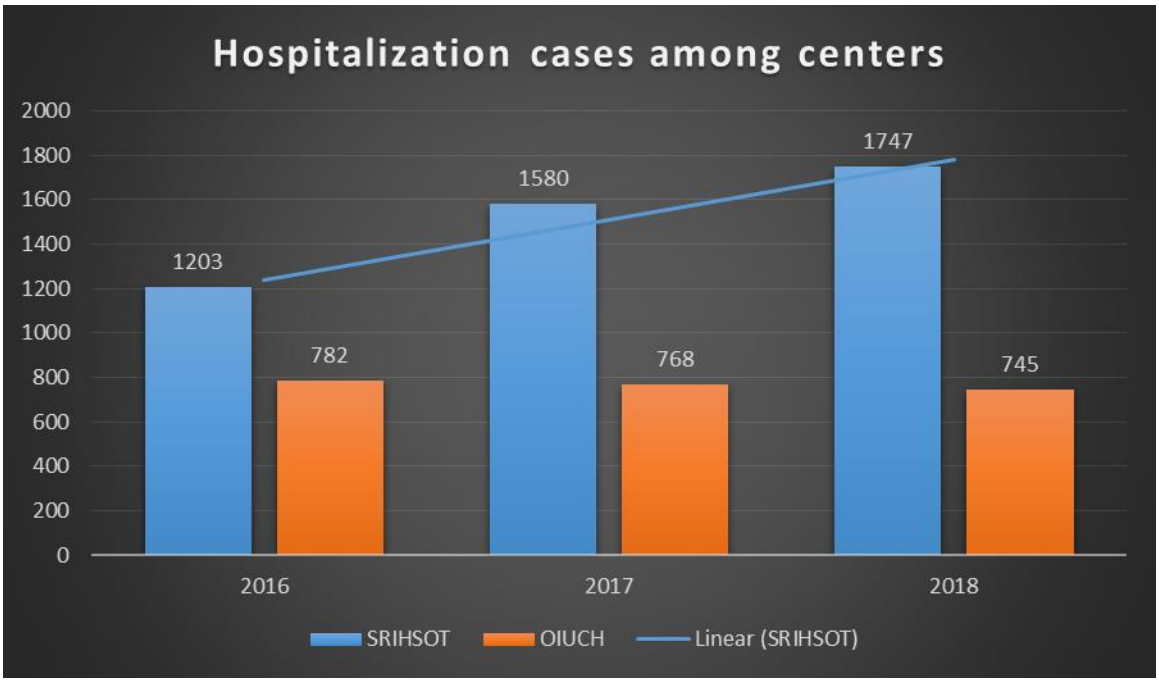

Figure 1. Hospitalization cases among centers
OIUCH - Osh Interregional United Clinical Hospital, SRIHSOT - Scientific-Research Institute of Heart Surgery and Organs Transplantation

As seen from Table 1 and Figure 1 hospitalization cases steadily increased in cardiac surgery center in contrast to interregional hospital where constant state is noticed. Improvement of surgical care and organizational facility of cardiac surgery center can be considered. In addition, due to responsibility of SRIHSOT for all cardiac surgery conditions, since it is a tertiary hospital, the hospital cases increased. On the other hand, interregional hospital accepts the versatile conditions, including vast majority of non-cardiac diseases, so limited bed number for admission of patients.

Table 2 and Figure 2 inform about extent of surgical and interventional procedures of cases.

Table 2. Amount of surgical and interventional procedures							
	2016		2017		2018		All
	Surgery	Intervention	Surgery	Intervention	Surgery	Intervention	
OIUCH	0	92	0	113	0	160	365
SRIHSOT	815	365	1167	368	1250	414	4513
All	815	457	1167	481	1250	574	4878
OIUCH - Osh Interregional United Clinical Hospital, SRIHSOT - Scientific-Research Institute of Heart Surgery and Organs Transplantation							

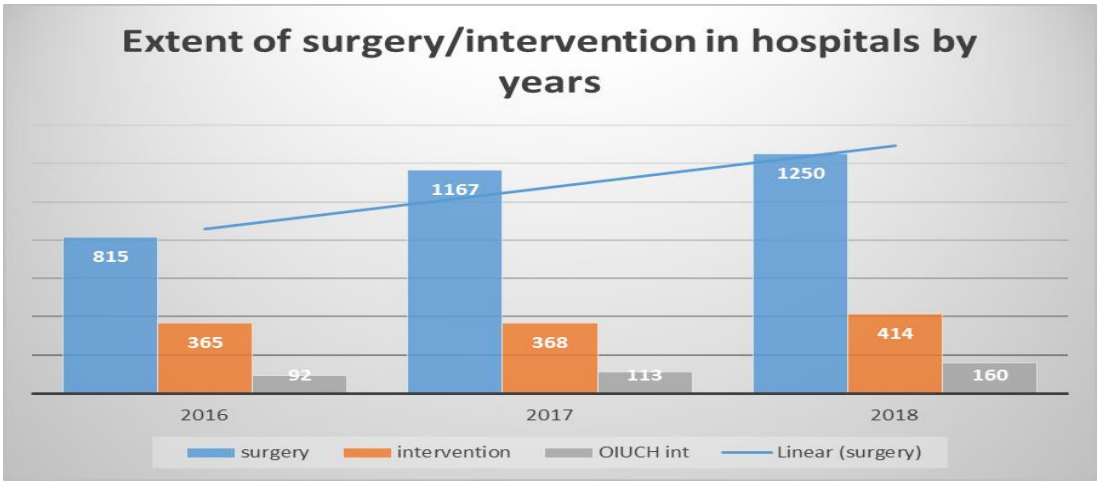

Figure 2. Extent of surgery/intervention in hospitals by year
OIUCH - Osh Interregional United Clinical Hospital, SRIHSOT - Scientific-Research Institute of Heart Surgery and Organs Transplantation

As seen from Table 2 and Figure 2 surgery cases proportionally to hospitalization increased by time, whereas intervention remained almost in plateau. Osh Interregional hospital represents a slight increase in interventions from 2016 to 2018. It may be associated with improvement in technical and personnel arrangements, optimization of financial costs, increasing of patient education in regions.

Table 3 and Table 4 depict structure of surgical and interventional care of aforementioned hospitals. Due to lack of surgical care in OIUCH, patient data presented separately and accompanied by diagrams for comparison.

Table 3. Hospitalization case structure of SRIHSOT

#	Hospitalization cases	2016			2017			2018			All
		T	S	I	T	S	I	T	S	I	
1	Coronary heart disease[1]	417	144	273	622	324	298	660	402	258	1699
2	Valvular heart disease[2]	217	217	0	380	380	0	315	315	0	912
3	Congenital heart disease[3]	454	454	0	466	463	3	562	532	30	1482
4	Bradyarrhythmias[4]	92	0	92	67	0	67	96	0	96	255
5	Tachyarrhythmias[5]	0	0	0	0	0	0	15	0	30	30
6	ICU cases[6]	0	0	0	12	0	0	0	0	0	12
7	Other disorders[7]	23	0	0	0	0	0	99	0	0	122
8	**Total surgery/intervention cases**	1180	815	365	1468	1167	301	1648	1234	414	4296
9	**Non-surgery and non-intervention cases**	23	0	0	12	0	0	99	0	0	134
10	**Total**	1203	815	365	1480	1167	301	1747	1234	414	**4430**

I-interventions, ICU – intensive care unit, S-surgeries, T- total patient numbers, OIUCH - Osh Interregional United Clinical Hospital, SRIHSOT - Scientific-Research Institute of Heart Surgery and Organs Transplantation

[1]Coronary heart disease included both chronic and acute coronary syndromes, surgery assumes coronary bypass surgery (CABG) and intervention by means of percutaneous coronary intervention

[2]Valvular heart diseases included only acquired valve defects, surgery stands for valve repair/replacement

[3]Various hemodynamic and anatomic correction of congenital heart disease was mentioned

[4]Pacemaker implantation was used to treat bradyarrhythmias

[5]EPS and RFA was handled in tachyarrhythmias

[6]ICU cases did not included neither surgery nor intervention. Some patients were hospitalized only for stabilization, some were lost before operation

[7]Other disorders included non-operable conditions or for investigations

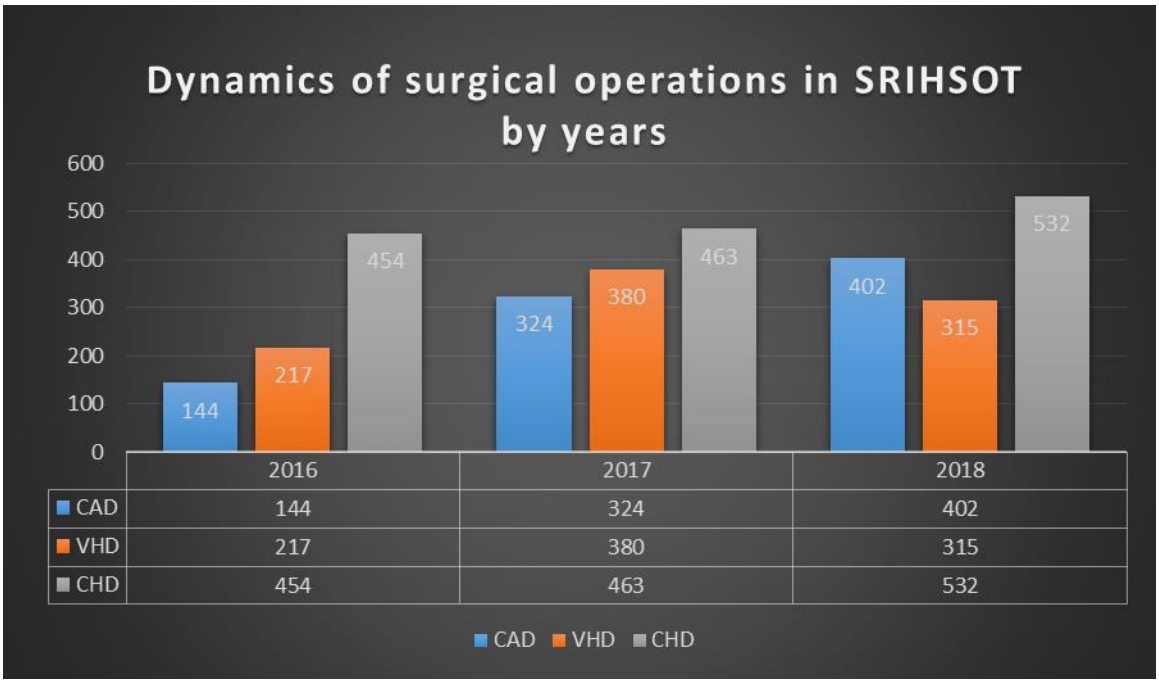

Figure 3. Dynamics of surgical operations in SRIHSOT by years
SRIHSOT - Scientific-Research Institute of Heart Surgery and Organs Transplantation

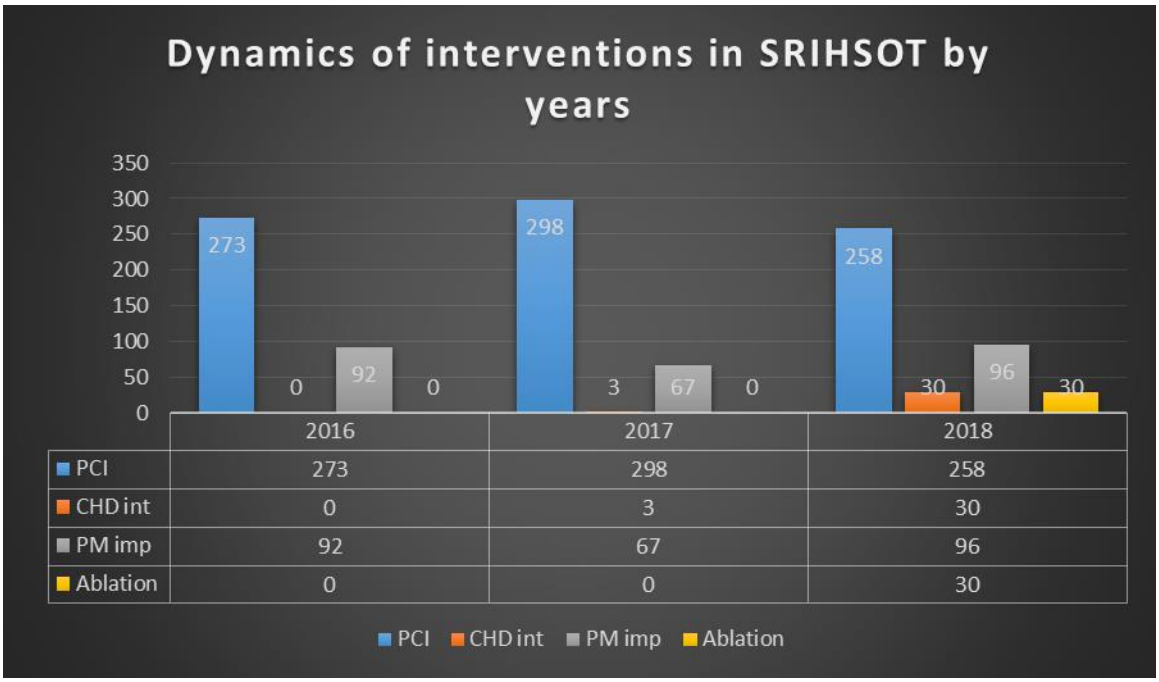

Figure 4. Dynamics of interventions in SRIHSOT by years
SRIHSOT - Scientific-Research Institute of Heart Surgery and Organs Transplantation

Table 4. Hospitalization case structure of OIUCH center

#	Hospitalization cases	2016		2017		2018		All
		T	**I**	**T**	**I**	**T**	**I**	
1	Coronary heart disease[1]	649	86	643	107	592	156	1884
2	Valvular heart disease[2]	29	0	33	0	28	0	90
3	Congenital heart disease[3]	7	5	8	4	8	3	23
4	Infectious myocarditis	9	0	3	0	9	0	21
5	Cardiomyopathies[4]	19	0	16	0	23	0	58
6	Essential hypertension	9	0	3	0	2	0	14
7	Other disorders[5]	8	1	9	2	7	1	24
8	**All hospitalizations due to CV disorders**	730		715		669		2114
9	Non-cardiac conditions with heart failure	52	0	53	0	76	0	181
10	**Total**	782	92	768	113	745	160	**2295**

T-total patient numbers, I-interventions
[1]Coronary heart disease included both chronic and acute coronary syndromes, PCI was performed in interventions
[2]Included only acquired heart defects, predominantly rheumatic etiology
[3]Included any forms of congenital heart diseases, both in pediatric and adult congenital heart disease
[4]All forms of cardiomyopathies including peripartum cardiomyopathy
[5]Other interventional cardiology procedures
OIUCH - Osh Interregional United Clinical Hospital

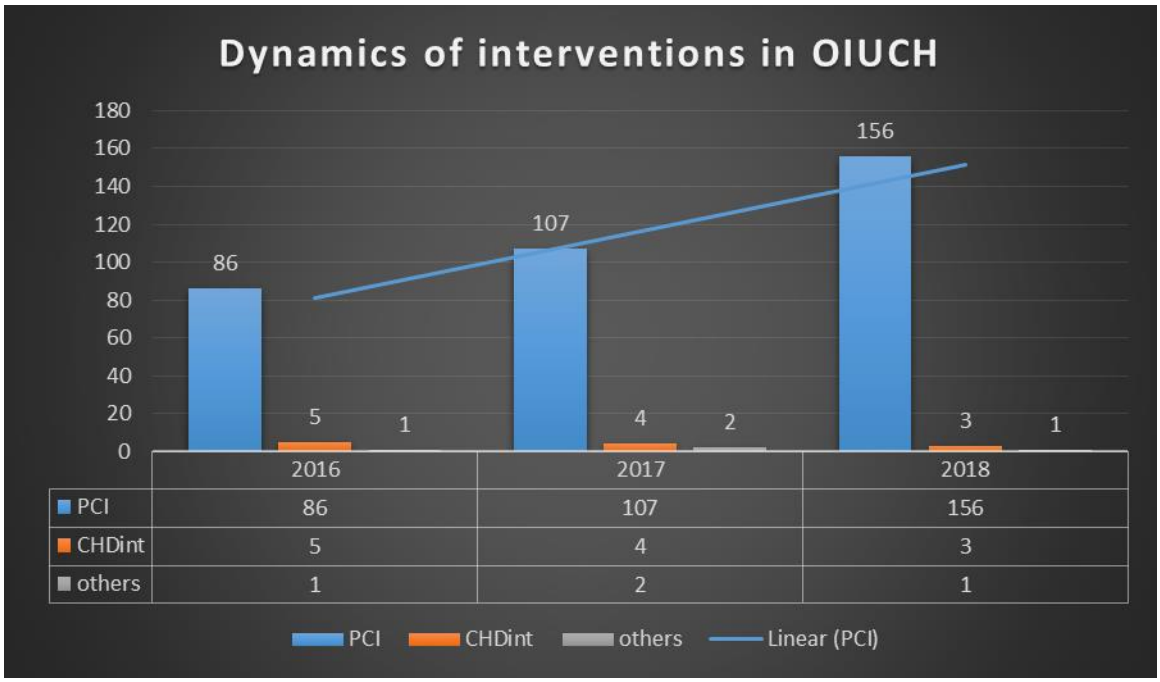

Figure 5. Dynamics of interventions in OIUCH
OIUCH - Osh Interregional United Clinical Hospital

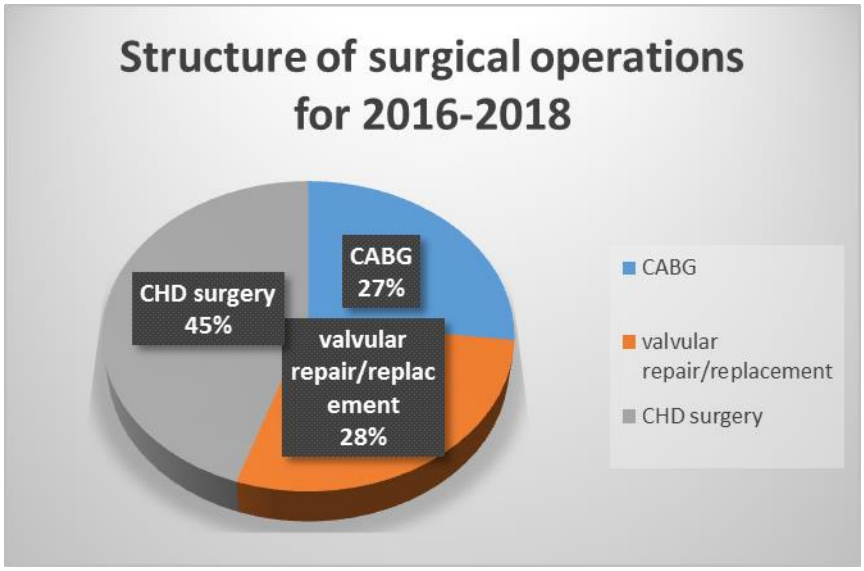

Figure 6. Structure of surgical operations for 2016-2018
CABG – coronary bypass surgery, CHD – congenital heart disease

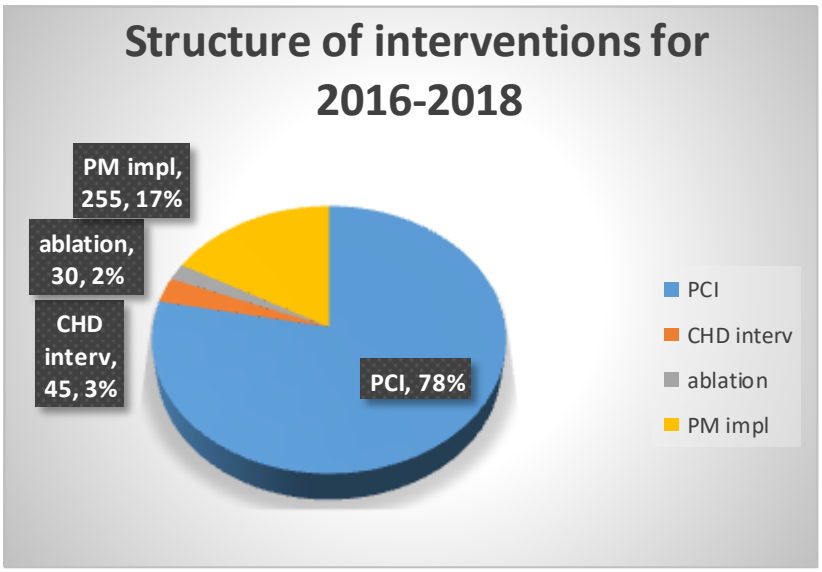

Figure 7. Structure of interventions for 2016-2018
CHD – congenital heart disease, PCI – percutaneous coronary intervention, PM - pacemaker

Cardiac surgery center presented high surgical availability, by means of procedural ratio to whole hospitalizations in 2016-2018: 98%, 99% and 100% respectively. Osh Interregional Hospital interventional rates were as follows: 11.7%, 14.7% and 21.4% by years.

As seen from tables of hospitalization cases of SRIHSOT, coronary heart disease as underlying condition of heart failure prevailed in both clinics: 1699 (38.3%) and 1884 (82%) of all cases.

The second major etiological factors of heart failure in SRIHSOT are congenital heart diseases. Roughly, 80% of hospitalized patients had NYHA II class of heart failure. As seen from tables and diagrams, congenital heart diseases surgery predominated when surgical cases were compared (45% of all surgery cases for three years) and is represented by steady increase: 454, 463, and 532.

The third place in etiological factors of heart failure was presented by acquired valvular heart diseases. Only in SRIHSOT, these patients underwent operation. Dynamics of surgery shows some fluctuations in time periods: 217, 380 and 315, respectively.

According to OIUCH data, cardiomyopathies and myocarditis registered in 58 and 21 cases, respectively, whereas in SRIHSOT they have not been mentioned. Nevertheless, these conditions have not been subjected to surgery or intervention.

Discussion

The date of birth of cardiac surgery in Kyrgyzstan is considered May 19, 1959. On this very day, in the Department of General Surgery of the Republican Clinical Hospital of the Ministry of Health of the Kyrgyz SSR, in the city of Frunze, professor, academician Akhunbaev Isa Konoevich performed the first heart operation in Central Asia and Kyrgyzstan - digital mitral commissurotomy. From that date, cardiac surgery is directed into clinical practice and development (12).

Heart failure plays a major role in patient selection for surgical treatment in most cardiac patients (13, 14). In addition, surgery evidently decreases progression or fatal outcomes of heart failure. In the STICH-trial, the addition of coronary bypass surgery for medical therapy decreased events of sudden death and pump failure (15).

One of the main challenges for cardiac surgeons is to prevent perioperational, more precisely, postoperative heart failure development (16).

Availability and extent of procedures varied by centers, and it can be associated with healthcare status of hospitals. Cardiac surgery center presented high surgical availability, by means of procedural ratio to whole hospitalizations in 2016-2018: 98%, 99% and 100% respectively. Osh Interregional Hospital interventional rates are as follows: 11.7%, 14.7% and 21.4% by years.

If we compare surgery and intervention in SRIHSOT, rate of coronary bypass surgery was increased gradually and subsequently predominated over percutaneous coronary interventions: 144 vs. 273, 324 vs. 298 and 402 vs. 258, respectively. It can be explained by improvement of cardiac care from 2017th, since the development of state programs concerning optimal management of acute coronary syndromes and treatment of coronary heart disease, improvement of therapeutic management based on contemporary guidelines, as well as increasing in quantity of private cardiac centers with angiographic and surgical facilities. Similar condition also noticed by OIUCH center, where number of interventions increased by years: 86, 107 and 156, respectively.

SRIHSOT is the single tertiary reference center for surgical management of congenital heart diseases. Therefore, we can assume general statistics of whole republic operable congenital defects from database of this center. OIUCH data showed only 23 cases of CHD, and 12 (52%) of them underwent intervention. On the other hand, interventional management of amenable congenital defects encountered with challenges. Firstly, it can be considered due to personal issues, so it urgently necessitates increase in qualified pediatric cardiologists. We do not have enough data regarding to types of achieved congenital heart disease procedures and extent of operations/interventions. In further investigations, this point must be taken into account.

In the group of valvular heart diseases, no interventional procedures were performed neither in SRIHSOT nor in OIUCH. In addition, these cases necessitate performance of interventional cardiologists, though transcutaneous aortic valve implantation and endovascular techniques must be carried out into practice.

We realize the activation of interventional management of rhythm and conduction disturbances by 2018. It can be associated with development of arrhythmia care in Republic recent years by implementation of electrophysiological studies and radiofrequency ablations.

Conclusion: In our study, we analyzed structure of surgical and interventional procedures performed in patients with II-III NYHA classes. Availability and extent of procedures either surgery or intervention varied by centers, thus, cardiac surgery center had a big difference from interregional hospital.

Generally, procedures handled in both hospitals are steadily increasing. As in therapeutic cases, coronary heart disease predominated among all underlying disorders of heart failure. Hopefully, precise investigations concerning surgical and interventional management of heart failure, including survival analysis of these patients will be conducted in further studies.

Conflict of interest: None to declare
Authorship: T.Z.K., K.A., I.A., B.I., A.Zh., D.A.A. equally contributed to study and preparation of manuscript
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