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RESEARCH ARTICLE

BENEFICIAL EFFECT OF CARDIAC REHABILITATION ON MOROCCAN PATIENTS AFTER VALVULAR SURGERY

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Abstract

Introduction : Valvular disease is common in Morocco, frequently followed by a heart surgery. Cardiac rehabilitation can improve functional and cardio-respiratory capacities after valve surgery, joining training sessions, therapeutic education, and optimization. The present study features the results in Moroccan patients. The objective of the study is to confirm the hypothesis that cardiac rehabilitation is beneficial after valvular surgery.

Methods : It's a retrospectivestudy made between November 2017 and January 2020 including40 patients after valvular surgery incardiac rehabilitation unit of cardiology centerof Mohamed V Military Hospital.All of them had aclinical examination, laboratory test, ECG, echocardiography, 6 minuteswalk test and test with VO2 max.

Results : The average age was 45.6 ± 12.3 years with a male predominance.Regarding cardiovascular risk factors, we found sedentary lifestyle, smoking, dyslipidemia, hypertension, and diabetes.Echocardiography showed a preservedejection fraction (EF = 55.69 % ± 11.02 %).After 20 cardiac rehabilitation sessions, all patients improved their effort capacities.They increased the distance covered in6-minutes walk test from 500 to 545.7m, andstress test parameters from 82.5 ± 32.93 W to 100.2 ± 36.8 W for the load, from 32 ± 8.24 to 21.7 ± 9.8 ml/kg/min for the VO2 max and the training heart rate decreased from 111.5 bpm to 107.6 bpm (beats per minute).

Conclusion : This study demonstrated that cardiac rehabilitation program is clearly beneficial in patients after valvular surgery by theimprovement of their functional and cardio-respiratory capacities.

Introduction:-

A valve disease is an organic and/or functional damage to heart valve. The frequency is increasing due to the aging of population and represents a major cause of death.

Degenerative valve disease predominatesin developed countries [1], unlike in low or middle income countries, like Morocco, where rhumatismal valve disease is most commun[2]. In those counstries, cardiovascular disease remains a growing epidemic.

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After a valvular surgery, resumption of normal life can become a physical, mental and social challenge. Therefore, guidelines stress the importance of cardiovascular rehabilitation.

The aim of the study is to evaluate the benefice of cardiac rehabilitation in the improvement of functional and cardio-respiratory capacities after valvular surgery.

Methods:-

Study profile:
it's a retrospective study, including 40 patients admitted incardiac rehabilitation unit of cardiology center Mohamed V Military Hospital between November 2017 and January 2020.

Participants:
all of patients who underwent a valvular surgery were included in this study.

Data collection and analysis:
all of patients had physical examination, laboratory test, ECG, echocardiogram, 6 minuteswalk test and stress test with Vo2 max.

For each patient, the following data were retrieved from medical records: age, gender, etiology, cardiac risk factors, medical and surgical history, adding a complete physical examination, laboratory tests, ECG, echocardiography, 6-minutes walk test, and a stress test with VO2 analysing theload, VO2 max and training heart beat, at the beginning and the end of the program.The program contains 20 training sessions, a therapeutic education, dietetic program and psychological follow up.

All the data collection completed, we used the SPSS statistics 19.0 software. The statistical significance level was set at $P \leq 0.05$.

Results:-

The eligibility of the patients were only based on the fact that they underwent valvular surgery. We report here 40 patients.

Sociodemographic characteristics:
the average age is 45.6 ± 12.3 years with a male predominance (55%). The rheumatic valve disease remains the predominant etiology with a percentage of 95%. Mitral valve replacement with a tricusp reconstruction was performed in 50% of the patients, 25% had an aortic valve replacement, 10% had a mitral valve replacement and 15% had a mitral and aortic valve replacement associated to a tricusp reconstruction (figure 1).

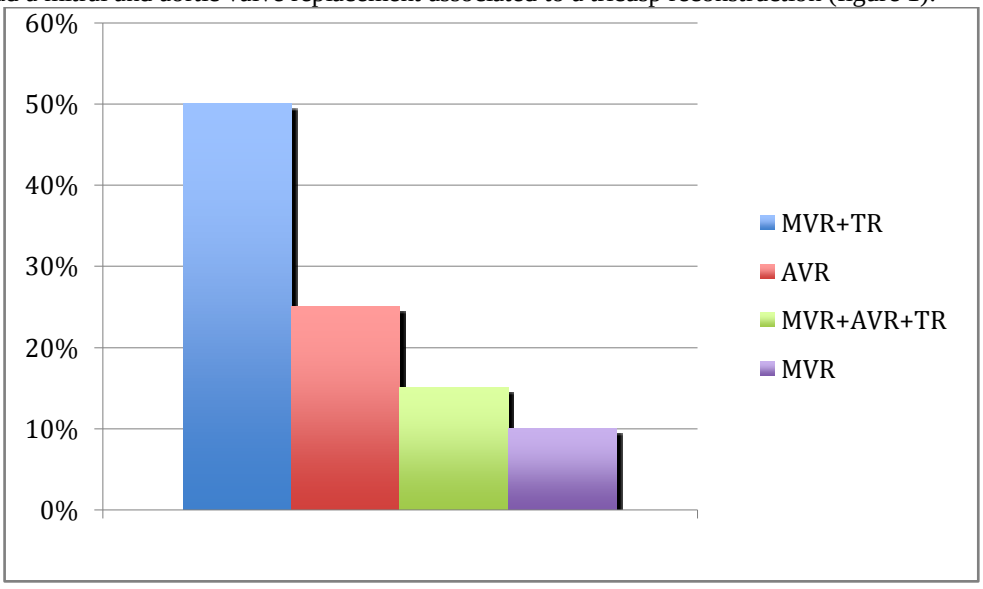

Figure 1:-Representation of the percentage of the different valvular diseases.

Cardiovascular risk factors:
we found sedentarylifestyle (40%), smoking (30.8%), dyslipidemia (28%), hypertension (20%), and diabetes (16.7%) (Figure 2).

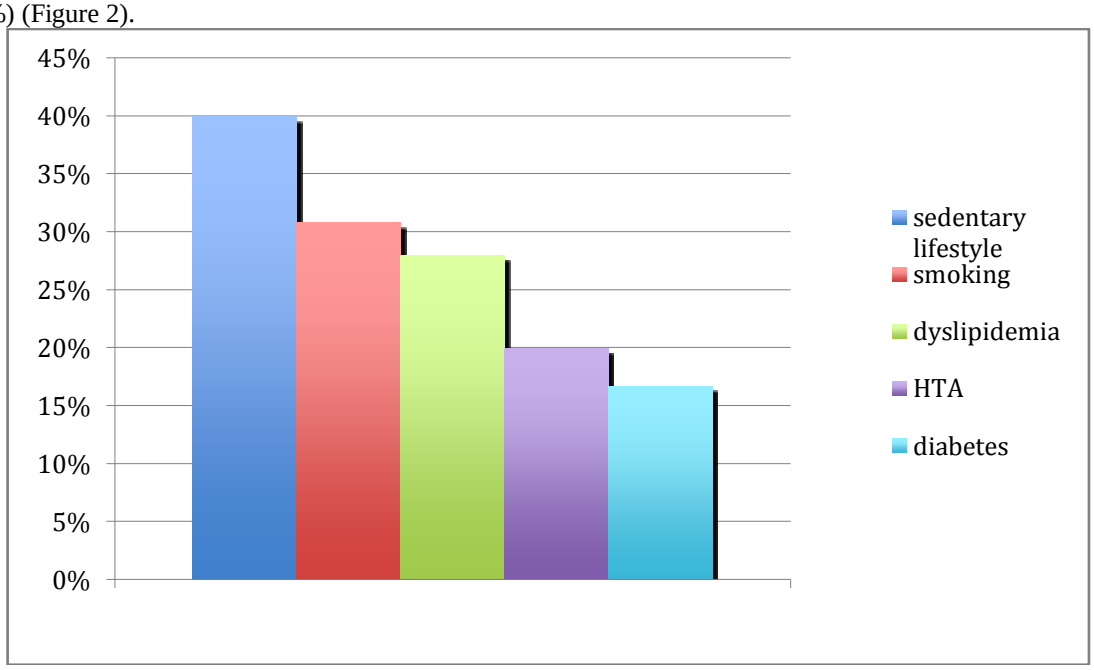

Figure 2:- Representation of percentage of cardiovascular risk factors.

In echocardiogram:
the ejection fraction was generally preserved (EF= 55.69 % ± 11.02 %).

Results after 20 cardiac rehabilitation sessions:
all patients improved their effort capacities.

Therefore, the distance covered in 6-minute walk test increased from 500m to 545.7m ($P < 0.02$). The stress test showed that the load (in Watts) increased from 82.5 ± 32.93 W to 100.2 ± 36.8 W ($P = 0.01$). VO2 max (high maximum oxygen absorption) increased from 15.32 ± 8.24 to 21.7 ± 9.8 ml/kg/min and the training heart rate decreased from 111.5 bpm to 107.6 bpm (beats per minute) ($P = 0.01$) (Table 1).

	Before CR	**After CR**	**P value**
Load (W)	82.5 ± 32.93	100.2 ± 36.8	0.01
V02 max (ml/kg/min)	15.32 ± 8.24	21.7 ± 9.8	0.02
Training heart rate (bpm)	111.5	107.6	0.001

Table 1:- Representation of the values of load, VO2 max, training heart beat before and after CR **(cardiac rehabilitation).**

Discussion:-

World Health Organization has defined cardiac rehabilitation as « the activities required to influence favourably the underlying cause of diseases, as well as to provide the best possible physical, mental and social conditions, so that patients may, by their own efforts, preserve or resume when lost as normal place as possible in community ».

In our study, the average age is lower than Gotzmann et al.'sstudy (78.6 ± 6.6 years) [3, 4]. The older age in Europe is probably partly due to advances in the medical field and the predominance of the degenerative pathology. Nevertheless, the younger age in our population would be justified by predominance of rheumatic pathology that appears in a younger age.

Regarding gender, the male predominance is commun in our study and in a European study where 75% of patients are male, as are also the majority of studies which confirm this predominance [5].

These results are clearly in favor of the fact that male sex represents a cardiovascular risk factor. This difference can be explained by the fact that before menopause, estrogens have a protective effect [6]. Moreover, women are less able to completecardiovascular rehabilitation program, in particular because of multiple social constraints [7].

In our study, rhumatismal disease is clearly prodominant, against a rate of 22% in a European study in which there is a predominance of degenerative pathology [8, 9]. Indeed, frequency of rheumatic valve disease is decreasing due to the almost disappearance of acute rheumatic fever in developed countries. Acute rheumatic fever remains a public health problem in our context, more generally in low or middle income countries, with a frequency of 10 per 1000 of rheumatic valve disease [10].

Cardiovascular risk factors are recurrent in valvular disease, which are sedentary lifestyle, smoking, dyslipidemia, hypertension and diabetes. A European study shows that 53% of patients have at least 2 cardiovascular risk factors [11]. According to the Euro Heart valvular heart disease survey, patients with diagnosed valvular heart disease are often older, with a higher prevalence of other cardiovascular risk factors and co-morbidities [12].

Overall in our study, most of patients did not have rythm disturbances, except for a few cases with atrial fibrillation (AF). Cardiac arrhythmias, of which AF is the most common, can affect a person's ability to work and to be self-sufficient [13]. The presence of arrhythmias is predictive of complications [14].

In our study, the improvement in the load is comparable to French study where it is 31% [15, 9]. The improvement in VO2 max of 41.8% also is comparrable to an improvement of 23.8% in the same French study. This improvement may be associated with the effect of exercise. There is an improved quality of life and exercise tolerance through physical exercise compared to those who could not achieve it [14]. This improvement is independent of age, gender, ejection fraction, beta blocker, ARB II or ACE inhibitor intake, the presence of AF and hemoglobin level [15]. It is only due to physical exercise ($r = 0.42$; $p = 0.001$) [15]. The improvement in load, training heart rate and VO2 max is strongly indicative of value of cardiovascular rehabilitation in improving patient's abilities.

The gain in distance traveled was 57m in the 6-minute walk test before and after rehabilitation program. It is consistent with European studies which also find a significant improvement. It was a 130m improvement in an Italian study [11]. It is important to note that there are differences between patients depending on age, gender, cardiac risk factors, type of surgery performed, and patient's motivation.

There are some potential bias related to the fact that it was a retrospective study and not prospective, and also related to the low number of patients recruted.

Conclusion:-

In summary, we conclude that cardiac rehabilitation is clearly benefic. The results of most above mentioned studies are in line with most of those of this study. It seems that cardiac rehabilitation can be benefic through physical training, therapeutic education and therapeutic optimization, involving a trained medical and paramedical staff. The follow-up of patients after valvular surgery who benefited this program showed a significant benefice.

As such a study was conduced in Rabat (Morocco), in the first cardiac rehabilitation center of the country.

In our study, the results showed that cardiac rehabilitation clearly improves functional and cardio-respiratory capacities of patients after valvular surgery. Its systematic implementation is strongly recommended and classed IIa in the actual guidelines. Awareness about cardiac rehabilitation is needed in our populations, where social constraint may be an obstacle, to improve both involvement and treatment of patients.

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Disclosure Of Conflict Of Interest

Conflict of interest: none declared.

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