EPIDEMIOLOGICAL CHARACTERISTICS, ETIOLOGICAL SPECTRUM AND MANAGEMENT OF VALVULAR HEART DISEASE : ABOUT 959 CASES

LES CARACTERISTIQUES EPIDEMIOLOGIQUES, ETIOLOGIQUES ET THERAPEUTIQUE DES VALVULOPATHIES : A PROPOS DE 959 CAS

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Abstract

Background: Valvular heart diseases (VHD) occur frequently in Nord Africa.
Patients and methods: The retrospective study included 959 consecutive patients with abnormal valvular structure who were screened by transthoracic echocardiography at a single department of cardiology from January 2010 to December 2013.
Results: Mean age was 53 ± 16 years and the female/male ratio was 0.57. VHD was native in 77% of patients. Mitral stenosis was the most frequent lesion (44.1%), followed by multiple VHDs (22.3%). Rheumatic origin (66.6%) was the more frequent etiology in VHD followed by degenerative in 17.1%, ischemic in 8.1%, endocarditis in 1.4% and congenital in 0.9%. Postoperative mortality was 13.6% for all VHD.
Conclusion: This study showed that the main cause of VHD is rheumatic fever. Mitral stenosis and multiple valvular lesions are the most frequent VHDs in North Africa.

Key words: Cardiac Surgery; Heart Valve; rheumatic heart disease; Valvular Heart Disease

Résumé

Introduction: Les valvulopathies sont très fréquentes dans notre contexte nord africain
Patients et Méthodes : Etude rétrospective monocentrique incluant 959 patients atteints de valvulopathies significatives confirmés par échocardiographie entre janvier 2010 et Décembre 2013.
Résultats : L'âge moyen des patients était de 53 ± 16 ans, le sex ratio est de 0.57. La majorité des patients avaient une valvulopathie native (77%). Le rétrécissement mitral était la valvulopathie la plus fréquente (44.1%), suivi par les polyvalvulopathies (22.3%). L'origine rhumatismale était l'étiologie la plus fréquente (66.6%) suivie par l'étiologie dégénérative dans 17.1%, l'ischémique dans 8.1%, l'endocardite infectieuse dans 1.4% et l'origine congénitale dans 0.9%. La mortalité post opératoire était de 13,6% toutes valvulopathies confondues.
Conclusion : La majeure cause de valvulopathies dans notre contexte est rhumatismale. Le rétrécissement mitral et les valvulopathies multiples sont les valvulopathies les plus fréquentes en Tunisie.

Mots clés : valvulopathies ; chirurgie valvulaire ; valve cardiaque ;valvulopathies rhumatismales.

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ملخص

مقدمة: أمراض صمامات القلب شائعة جدا في سياقنا في شمال افريقيا.
المرضى والطرق: نستعرض دراسة استعادية مركزية واحدة شملت 959 مريضا يعانون من مرض كبير بصمام القلب أكده كشف صدى القلب بين جانفي 2010 وديسمبر 2013.
النتائج: كان متوسط عمر المرضى بين 53 ± 16 عاما، ونسبة الجنس هي 0.57. وكانت الغالبية العظمى من المرضى الذين يعانون أمراض صمام الأصلي (77٪). كان التضيق التاجي المرض الأكثر شيوعا (44.1٪)، تليها التضيقات الصمامية المتعددة(22.3٪). كانت الروماتيزمية الأصل المسببات الأكثر شيوعا (66.6٪)، يليها المسببات التنكسية في 17.1٪، ثم الإقفارية الدماغية في8.1٪ ، والتهاب الشغاف في 1.4٪ و في الأخير النوع الخلقي في 0.9٪. وكانت وفيات ما بعد الجراحة 13.6٪ لجميع الأمراض صمام.
والخلاصة: إن السبب الرئيسي للمرض الصمامي في سياقنا هو النوع الروماتيزمي. تضيق الصمام التاجي وأمراض صمامات متعددة هي المرض الصمامي الأكثر شيوعا في تونس.

الكلمات المفاتيح: أمراض صمامات القلب ; جراحة الصمام ; صمام القلب ;أمراض الصمامات الروماتيزمية

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INTRODUCTION

Valvular heart diseases (VHD) are the most common causes of mortality and morbidity after coronary artery disease, hypertension and heart failure [1]. The prevalence of VHD is 2.5% in developed countries [2]. In developing countries, rheumatic heart disease remains the primary cause of VHD [3]. There are no statistics available in the North of Africa with regard to the prevalence, treatment patterns and result of treatment of valvular heart disease.

The objective of the present study is to analyze the epidemiological profile of patients with abnormal valvular structure and function and to highlight the etiological spectrum and management of valvular heart disease (VHD) in a North African cardiovascular center.

PATIENTS AND METHODS

The present retrospective study included 959 consecutive patients with abnormal valvular structure and function who were screened by transthoracic echocardiography (TTE) at the in-patient department of Hedi Chaker Hospital between January 2010 and December 2013. Data on baseline characteristics, potential etiology, and treatment strategies were collected from electronic medical records. A thirty-day follow-up was complete only for the patients who underwent an intervention.

The patients were selected in accordance with the criteria of "The European Heart Survey (EHS) on valvular heart disease" [4]. There were:

Age ≥ 18 years and:

♦ Primary and significant VHD as defined by echocardiography
♦ Aortic stenosis (AS) with a maximal jet velocity ≥ 2.5 m/sec,
♦ Or mitral stenosis (MS) with a valve area ≤ 2 cm²,
♦ Or mitral regurgitation (MR) with a grade $\geq 2/4$,
♦ Or aortic regurgitation (AR) with a grade $\geq 2/4$,
♦ Or diagnosis of suspected or definite endocarditis as assessed by Duke University criteria Stenotic VHD was defined as mild with a valve area $\square 1.5$ cm², as moderate with valve area 1-1.5 cm², and as severe with valve area $\square 1.0$ cm².

Under standard echocardiographic criteria [5], rheumatic VHD was diagnosed on the basis of the medical history of acute rheumatic fever and/or precordial abnormalities, including the presence of a cardiac murmur. Degenerative VHD was defined according to echocardiographic criteria for calcific valve disease, and ischemic VHD was identified based on a medical history of ischemic heart disease.

A statistical analysis was carried out using SPSS soft-ware 18.0. All continuous variables were expressed as the mean ± standard deviation. Categorical variables were expressed as percentages or ratios. For continuous variables, comparisons among the groups were made using the analysis of variance (ANOVA de Welch) test. Categorial variables were analysed using the chi-square de pearson test. Two-sided p values of less than 0,05 were accepted as significant.

RESULTATS

Population :

The study included 959 patients; the type of VHD was detailed in all patients. The type of VHD is shown on table I. Among the single native left sided valve disease, mitral stenosis (MS) was the most frequent (423 patients, 44.1%) followed by mitral regurgitation (MR) (198 patients, 20.6%), aortic stenosis (AS) (84 patients, 8.8%), and aortic regurgitation (AR) (40 patients, 4.2%). Multiple valve disease represented a significant sub-group (22.3%), 79.7% were double, 15.6% were triple and 4.7% involved quadruple valve disease.

The majority of previous interventions were conservative surgery (88.6%) and 73.3% of which were percutaneous balloon mitral valvuloplasty (PBV).

The only cause of MS is rheumatic. In MR, ischemic etiology was also most commun followed by degenerative etiology, then rheumatic disease; endocarditis was present in 3.1%. In AS the etiology was mostly degenerative (86.9%). In AR, rheumatic etiology was also predominant, but degenerative origin was present in 25.5 % and endocarditis accounted for 5% (figure 1).

As regards the main clinical characteristics, the mean age was 53 ± 16 years (range 18-97), 64% of patients were females. While AS increased with age, MS decreased.

The most important symptom was dyspnea (48.4 %). Syncope was common in AS (56%) and palpitation was frequent in MS (39 %).

Investigations:

The investigations performed are detailed in table II. Transoaesophageal echocardiography was performed in 20.5 % of the total population. Coronary angiography was performed in 12.9 % of cases and 76.4 % in operated patients. It showed the presence of coronary artery disease in 16 % of cases: 1-vessel in 10%, 2-vessel in 4 % and 3-vessel in 2 %.

Sub group of patients with severe valve disease

Single valve native was severe in 589 patients, 140 with MS, 107 with MR, 78 with AS and 28 with AR. Out of the 589 patients, 161 (27.3%) underwent a valvular intervention during the study period.

At inclusion 22% of patients were in NHYA class I, 56.8% in class II, 15.8% in class III, and 5.2% in class IV.

Smoking was the most frequent accompanying major cardiovascular risk factor followed by hypertension. Smoking was less frequent in MS compared to other VHDs. Hypertension was less frequent in patients with multiple VHD or MS (table III).

Type of intervention

The type of intervention, either surgical or percutaneous, in patients with single valve disease is shown in table IV. Percutaneous balloon commissurotomy was used in 36.8% of patients with MS. For other valve diseases only a quarter underwent a valve intervention.

Operative mortality and morbidity:

Operative thirty-day mortality was in 13.6 per 100. Among the most frequent major perioperative complications were infective endocarditis (7.4%) followed by bleeding (1.26%) and tamponade (1.26%). Perioperative myocardial infarction and auriculo-ventricular block were rare (0.62%).

Table I: Type of valvular heart disease

	N	%
Mitral stenosis	423	44.1
Mitral regurgitation	198	20.6
Aortic stenosis	84	8.8
Aortic regurgitation	40	4.2
Multiple valve disease	214	22.3
Total	959	100

Table II: Investigations performed

	Mitral stenosis (N=423)	Mitral regurgitation (N=198)	Aortic stenosis (N=84)	Aortic regurgitation (N=40)	Multiple valve disease (N=214)	Total (N=959)
Transoesophageal echocardiography (%)	53.2	17.6	3	3.5	22.6	20.5
Coronary angiography (%)	6.4	11.6	26.2	15	21.5	12.9

Table III: the clinical and echocardiographic characteristics of the patients with severe valve disease

|	All cases (n=589)	MS (N=179)	MR (N= 112)	AS (N=80)	AR (N=32)	MVD (N=186)	P
Female (%)	360; 61.1	144; 80.4	48; 42.9	39; 48.8	18; 56.3	111, 59.7	<0.001
Age (years, SD)	54.93 17.39	49.15 13.84	61.44 18.03	69.2 15.4	46.41 19.53	51.56 15.82	<0.001
Etiologies (%)							<0.001
Rheumatic	355(60.3)	179 (100)	18 (16.1)	5 (6.3)	17 (53.1)	136 (73.1)	<0.001
Degenerative	144 (24.4)	0	44 (39.3)	71 (88.8)	10 (31.3)	19 (10.2)	-
Endocarditis	12 (2)	0	6 (5.4)	0	4 (12.5)	2 (1.1)	
Ischaemic	23 (3.9)	0	23 (20.5)	0	0	0	-
congenital	6 (1)	0	0	4 (5)	1 (3.1)	1 (0.5)	-
Other	21 (3.6)	0	21(18.8)	0	0	0	-
Multiples	28 (4.8)	0	0	0	0	28 (15.1)	-
Fonctional capacity (%)		37 (20.7)			17 (53.2)	43 (23.1)	0.003
NYHA class I	130 (22)	113 (63.1)	18 (16)	15 (18.8)	13 (40.6)	106 (57)	0.085
NYHA class II	335 (56.8)	20 (11.2)	56 (50)	47 (58.7)	2 (6.2)	23 (12.4)	<0.001
NYHA class III	93 (15.8)	9 (5)	32 (28.5)	16 (20)	0 (0)	14 (7.5)	-
NYHA class IV	31 (5.2)		6 (5.3)	2 (2.5)			
Comorbide risk factors (%)							
Hypertension	94 (16)	20 (11.2)	23 (20.5)	25 (31.3)	7 (21.9)	19 (10.2)	<0.001
DM	56 (9.5)	12 (6.7)	16 (14.3)	10 (12.5)	1 (3.1)	17 (9.1)	-
Smoking	168 (28.5)	25 (14)	50 (44.6)	31 (38.8)	8 (25)	45 (29)	<0.001
LVEF (%)	50.29 (±17.05)	55.41 (±12.53)	43.4 (±20.17)	50.34 (±13.23)	48.35 (±19.98)	49.83 (±18.23)	<0.001

AS: aortic stenotic, AR: aortic regurgitation, DM: diabetes mellitus, LVEF: left ventricular ejection fraction, MR: mitral regurgitation, MS: mitral stenosis, MVD: multiple valvular disease, NYHA: New York Heart Association

Table IV : Type of intervention in severe single native left-sided valve disease

	Total cases N=403	Mitral stenosis N=179	Mitral regurgitation N=112	Aortic stenosis N=80	Aortic regurgitation N=32
Mechanical prosthesis (N)	66	36	13	11	6
Bioprosthesis (N)	15	1	2	9	3
Valve repair (N)	11	0	11	0	0
Total surgical intervention(N)	92	37	26	20	9

Figure 1: The etiologies of valve diseases of the patients who underwent valve intervention
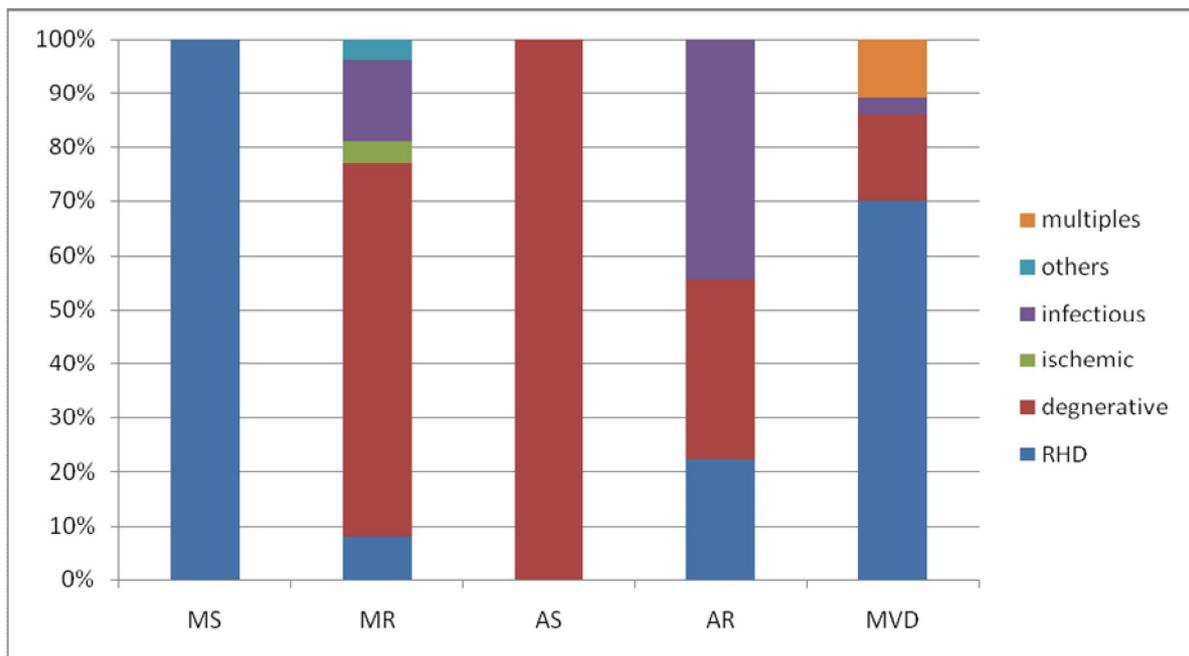
AR: aortic regurgitation; AS: aortic stenosis; MR: mitral regurgitation; MS: mitral stenosis; MVD: multiple valvular disease

DISCUSSION

This study found that VHD was more common among young people, frequent among women, and that the most common cause of VHD was acute rheumatic fever (ARF).

Dyspnea was the most common symptom, and the most frequent valve diseases were MS and multiple VHDs.

PBV was the most common treatment modality in MS and mechanic prosthetic valve replacement was the most common treatment modality in other VHDs.

Our study indicated that the most frequent VHDs were MS (44.1%) and multiple VHD (22,3%) and the most frequent etiologies were ARF (66.6%) and degenerative causes (17.1%). Ischemic etiology was more frequent in MR than in other VHDs.

The euro heart valve survey study [4] demonstrated that the most frequent VHDs were degenerative AS (33.9%) and MR (24.8%). These findings might be explained by the socio economic development, indeed, in developed countries degenerative VHD predominates but in developing countries rheumatic etiology is prevalent.

In South Africa center [6], the prevalence of rheumatic VHD was reported at 72% between 2006 and 2007. In a Turkish survey that included 1300 patients hospitalized in 42 centers in 2009, rheumatic VHD accounted for 46% of all VHD patients with a mean age of 57 [7].

However, rheumatic VHD as a second cause of VHD was present in only 22% of patients according to a European epidemiological survey [8].

MS was more frequent in women than in men, and its most common cause was ARF [9]. It was reported in the EHS study that ARF was the cause of MS in 85.4% of patients, and that 81% of whom were women [4]. The present study revealed that ARF accounts for all cases of MS (100%) and that 80.4% of whom were women. The frequency of MS is 0.1% in USA, and 9% in Europe [4,10]. In Turkey the incidence of MS is 15% [7]. In this study MS was the more common VHD. This indicates that MS is more common in North Africa and Turkey than in the USA and Europe.

Rheumatic fever remains a serious public health problem throughout the world. Rheumatic heart diseases which are common in poor and densely population areas, are less common in countries where precautions are taken against rheumatic fever [11, 12, 13]. Our study showed that ARF is

the primary etiology of VHD in adults in North Africa.

While some surveys indicate that the frequency of VHD is similar in both genders, others show that MR is more common among men [14, 15, 16].

In our study MR is more common among men. However there is a higher prevalence of aortic valve stenosis in men than in women but, in our finding, frequency of AS is similar in both genders. Rheumatic heart disease is more frequent in women compared to men [2, 17,18,19]. Our findings are compatible with the latter (75%).

In Europe and USA it is indicated that the valve disease frequency increases with age [4, 14]. Our study just as in Turkish registry, also shows that while AS incidence increases with age MS decreases and there are not important differences among the other VHDs regarding age [7].

In the present study 77% of patients with severe valve diseases had NYHA class I-II symptoms indicating relatively an early diagnosis. These findings are compatible with the result of Turkish registry [7] where 64% of patients had NYHA class I-II

However, in the EHS study 29.5% of the patients had NYHA class II and 43.1% had class III symptoms [4,14].

Our study indicates that smoking (29%) and hypertension (16%) occur frequently in individuals with VHD but diabetes mellitus is less frequently associated with VHD (10%). However it was reported in the EHS study that smoking (38.7%), hypertension (49.1%); diabetes mellitus (15.3%), hyperlipidemia (35.5%) and family history (25.7%) frequently accompany VHD [4, 14].

Coronary angiography was the second most frequently performed investigation in our study (12.9% that is 20.8% to the severe valvulopathies). It is recommended in diagnostic work-up if there is a risk of coronary artery disease in patient with a symptomatic and significant VHD [9, 20].

In the EHS study the coronary angiography is performed in 43% of patients. This investigation was less commonly used in our trial because of a lower mean age of our patients and a fewer number of operated patients (16.7%).

Bioprosthetic valve replacement was preferred in AS patients more than 65 years old [4, 21, 22]. The mean age was greater among cases with a bioprosthetic valve replacement compared to cases with a mechanical valve replacement. Age has been reported as the most important factor in prosthetic valve implantation. In our study, there is a low

number of patients with bioprosthesis and in the majority of cases it is implanted in AS (45%).

The EHS study [4] indicated treatment of MR by surgical repair (46.5%), bioprosthetic valve replacement in elderly patients with AS, and mechanical valve replacement in other VHDs. PBV was applied in only 33.9% of MS cases. The lower rate of PBV in the EHS study might be attributed to old age, calcifications and deformation in the mitral valve [4, 14, 23]. Our study determined that PBV is used in 64% of MS cases. The reason for the difference between our results and the ESH study findings may be the increased incidence of rheumatic fever as the origin of VHD, the relatively young age of our MS study group, and valve structure. In literature, it has been reported that PBV is frequently preferred in treatment of rheumatic VHD [24] confirming our findings.

Our study indicates that valve repair is suggested for treatment of MR, which occurs with an incidence of 42%, not lower than reported by the EHS study. This finding can be explained by the common degenerative origin of MR (61.3%), which is suitable for repair.

The risk of valve replacement was low in the aortic position but the risk of intervention in MS was very low due the fact [4]. Our findings confirm the lower risk of valve replacement in the aortic position but in the MS, mortality was higher in our experience. Overall mortality and morbidity after intervention observed in our study are higher than in the EHS study. But in this survey the mortality and the morbidity after valve intervention are slightly lower than in the most surgical registry such as the STS database in the USA and the United Kingdom Cardiac Surgical Register [4, 25, 26, 27].

LIMITATIONS OF THE STUDY

The main limitation of this study was the fact that it was a retrospective cohort study and that the findings are mostly based on a regional single center database.

Therefore, national multicenter epidemiological prospective surveys are needed to reduce selection bias and confirm these findings.

CONCLUSION

The most frequent cause of valve disease in North Africa is ARF. MS and multiple VHD are the most common forms of valve disease. PBV and valve replacement are frequently suggested treatments in MS. The effective primary prevention of rheumatic fever and increased awareness among the public would significantly decrease the burden of VHD in our country.

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