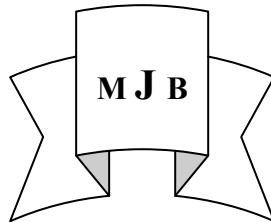


Aortic Regurgitation in Iraqi Hypertensive Patients Frequency and Risk Factors

Ali S. Baay

College of Medicine, University of Babylon, Hilla, Babylon, Iraq.



Abstract

Aortic regurgitation is back flow of the blood from the aorta to the left ventricle, many causes of this relatively common valvular lesion but one of the most important is hypertension a so common medical problem.

Aim of the study: to assess the frequency of, severity and risk factors of aortic regurgitation in hypertensive patients

The results and discussion: show significant No. of hypertensive patients have aortic regurgitation most of them have non significant lesion with the dilatation of aortic root and increasing age are significant risk factors, this finding consistent with most of the studies

Recommendations: it is wise to assess all hypertensive patients with noninvasive simple test, echocardiography, for evidence of aortic regurgitation.

الخلاصة

عدم كفاءة الصمام الأبهري هو جريان الدم من الأبهري إلى البطين الأيسر بشكل عكسي وهناك أسباب عديدة لهذا الضرر الصمامي الشائع نسبياً و واحد من أهم الأسباب هو ارتفاع ضغط الدم الشرياني، المرض الشائع جداً.

الغرض من الدراسة: لتقييم ظهور، شدة و عوامل الخطورة لعدم كفاءة الصمام الأبهري لدى مرضى ارتفاع ضغط الدم الشرياني.

النتيجة و المناقشة: هناك فرق معنوي لظهور عدم كفاءة الصمام الأبهري لدى مرضى ارتفاع ضغط الدم الشرياني و لكن معظمهم ضرر صمامي بسيط مع توسع جذر الأبهري و الشخوخة عوامل خطورة معنوية، وهذه الحقائق متماشية مع معظم الدراسات الأخرى.

التوصيات: من الحكمة دراسة عدم كفاءة الصمام الأبهري لدى مرضى ارتفاع ضغط الدم بواسطة جهاز الإيكو كونه فحصاً لاتداخلياً وبسيطاً و خاصة لدى مجموعة عوامل الخطورة.

Introduction

Aortic valve insufficiency results from leakage and backflow of blood that is ejected from the left ventricle (LV) into the ascending aorta back into the left ventricle.

Many mechanisms contribute to aortic valve insufficiency. These include abnormalities of the aortic valve leaflets and pathologies of the proximal aortic root. [1]

Mechanisms of aortic regurgitation

Rheumatic heart disease still remains the most common cause of severe aortic regurgitation over the past several decades. [2,18], however,

diseases involving the aortic root are becoming more frequent, In fact, more than half of patients who present with pure aortic regurgitation (AR) without any associated cardiac anomalies have aortic valve insufficiency caused by aortic root disease. [3]

Causes of aortic regurgitation include the following: [3]

1. Aortic cusp abnormalities
2. Perforation (e.g., infective endocarditis)
3. Cusp shrinkage
4. Rheumatic disease
5. Rheumatoid disease

6. Ankylosing spondylitis
7. Bicuspid aortic valve
8. Loss of commissural support
9. Ventricular septal defect
10. Dissection (tears) of the aorta
11. Aortic root abnormalities : The usual underlying histopathologic changes in aortic tissue associated with aortic dilatation are summarized as "cystic medial necrosis" and, although qualitatively similar, are variable in severity and include:
 - 1- Dilatation
 - 2- Familial conditions
 - 3- Marfan syndrome
 - 4- hypertension
 - 5- Ehlers-Danlos syndrome
 - 6- Pseudoxanthoma elasticum
 - 7- Idiopathic
 - 8- Distortion (aortitis)
 - 9- Syphilis
 - 10- Rheumatoid disease
 - 11- Ankylosing spondylitis
 - 12- Nonspecific aortitis

Aortic regurgitation can be seen in patients with hypertension frequently and hypertension is one of the most important causes of chronic AR[4]

Although aortic regurgitation of minimal or mild degree is well recognized to occur in patients with systemic hypertension, severe degrees of aortic regurgitation are rare in such patients; aortic valve replacement in such patients has rarely previously been reported. [3]

Early case reports and pathological series suggest that hypertension might directly predispose to aortic regurgitation because of enlargement of the aortic root, but recent pathological and M-mode echocardiographic studies have not found an association between blood pressure and aortic root size when the confounding influence of aging is considered.[3,4,5]

Thus, aortic root diameter is strongly related to age, and senescence may result in cystic medial necrosis.

In contrast, other M-mode echocardiographic studies have noted significant relations of aortic root diameter to systolic and diastolic pressures. [4,6,7,8]

Furthermore, severe aortic regurgitation due to idiopathic aortic root dilatation is associated with antecedent hypertension.[9,16,19] there is what called normal regurgitation seen in 3% of the healthy population by color Doppler but most of the study show higher prevalence among hypertensive patients. [10,11,17]

So hypertension is a key point in the etiology of aortic regurgitation

The aim of the study:

To study the frequency of AR in hypertensive Iraqi patients with assessing the aortic root size at sinus of valsalva, age and gender as risk factors.

Patients and Methods

350 hypertensive patients 170 male and 180 female age ranging between 20-65(mean age52.6) were studied with transthoracic echocardiography by 2D ,M mode and Doppler study were done for all by HDI 1500 machine in Babylon/Iraq from September 2007 to feb.2009.

Inclusion criteria:

- 1- Age 20-65 years
- 2- With blood pressure >140/90 in 2 reading 24 hours apart or had being diagnosed as hypertension on treatment since > 6 months [2]

Patients were divided according to the age into 3 groups

20-35 years old

36-50 years old

51-65 years old

Any patient with AR seen by colure Doppler where labeled as +ve.

Those +ve patients are classify into significant and non significant regurgitation by [12]

Significant AR: any of the following:

- 1- LVEDD> 75mm
- 2- Regurgitant jet width/LVOT diameter ratio>60%
- 3- Vena contracta (the smallest neck of the flow at the level of aortic valve) width>6mm
- 4- AR pressure half time(PHT) <250 millisecond
- 5- Dense continuous wave signal
- 6- Diastolic flow reversal in descending aorta: holodiastolic reversal

Non significant AR: any of the following:

- 1- LVEDD<55 mm
- 2- Regurgitant jet width/LVOT diameter ratio<30%
- 3- Vena contracta <3mm
- 4- AR PHT>400 millisecond

- 5- Faint continuous wave signal
- 6- Diastolic flow reversal in descending aorta: early diastolic reversal

The aortic root dimension at the level of sinus of valsalva is measured if >40mm it is enlarged.

332 healthy normotensive persons (175 male and 157 female) are studied similarly as a control group

Statistical analysis

The tests used for the analysis include test for proportion between patients and control and chi square test for the other parameters

Results

The patients group distributed as.

Patients age	male	female	total
20-35	40	55	95
36-50	80	60	140
51-65	50	65	115
total	170	180	350

The control group distribution:

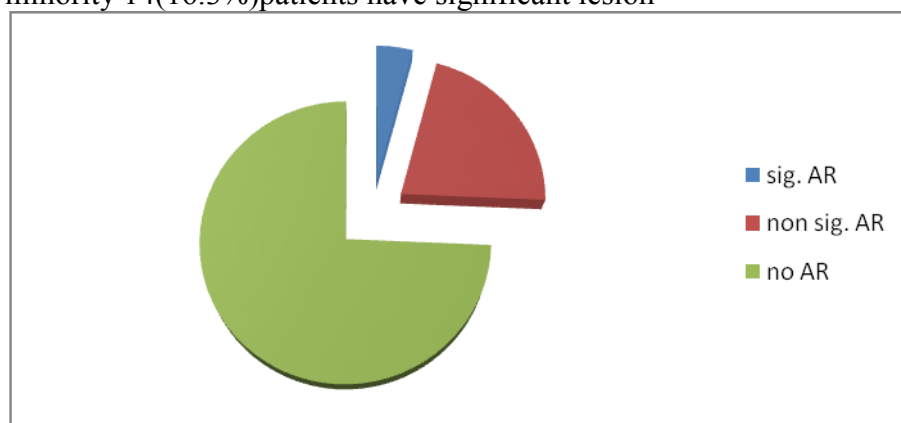
Patients age	male	female	total
20-35	43	48	91
36-50	79	52	131
51-65	53	57	110
total	175	157	332

There are no statistical significances regarding gender and age between patients and control with P value >0.005.

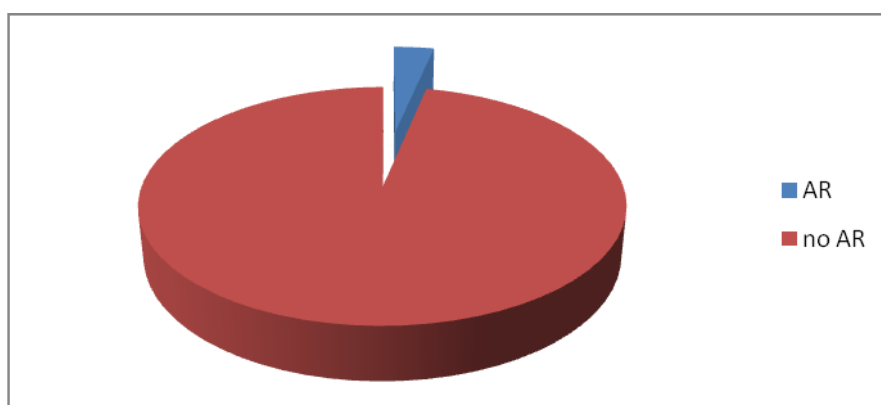
I- Out of 350 patients are involved in the study 86 (24.6%) patient have AR by echocardiography while out of 332 control person only 11(3.3%) have AR with 95% confident interval between the tow proportion.



II- Out of 86 patients have AR, 72 (83.7%) have non significant regurgitation while the minority 14 (16.3%) patients have significant lesion



III- Regarding control group; only 11 patients (3.3%) have AR all of them are non significant



Regarding the risk factors study:

I- Age:

For pat.

age	AR	No AR	total	P value
20-35	24	71	95	0.49
36-50	20	120	140	0.7
51-65	42	73	115	0.35
total	86	264	350	

There is a significant difference between the frequency of AR between young and old age with P value <0.05 (0.026)

For control

Age	AR	No AR	total
20-35	2	89	91
36-50	2	129	131
51-65	7	103	110
Total	11	321	332

II- Gender:

Gender	AR	No AR	total
Male	42	128	170
female	44	136	180
total	86	264	350

For control

gender	AR	No AR	total
Male	5	170	175
female	6	151	157
total	11	321	332

There is no statistically significant difference in the frequency of AR between male and female with P value 0.83(>0.05)

III- Aortic root size:

size	AR	No AR	total
enlarge	66	4	70
normal	20	260	280
total	86	264	350

For the control

size	AR	No AR	total
enlarge	7	2	9
normal	4	219	323
total	11	321	332

There is a statistically significant difference in the frequency of AR between those with dilated aortic root comparing with the normal root

Discussion

The hypertension is a common cause of AR due to dilatation or distortion of the aortic root causing changes in the valve function leading to regurgitation but in most of cases is non significant. The findings in this study show that AR seen more commonly in hypertensives than in normotensive persons.

Most of patients with AR show non significant regurgitation.

The risks factors with significant difference are old age (>50years) and dilated aortic root at the level of sinus of valsalva while the gender show no significant difference

The finding of hypertension as a cause of non significant aortic regurgitation are consistent with other studies as Vittorio Palmieri et al study which show same finding even in the use of larger sample size but differ from Waller BF study which show severe AR in hypertensive patients that need valve replacement. [12,13,14,15.]

J Kontos et al study and Lonati L et Lonati L study show the same findings of age and aortic root size as a risk factors although the former study show relation of aortic root size at any level not only at the sinus of valsalva as in our study

Conclusions

- 1- Hypertension can cause AR but in most cases are non significant
- 2- Echocardiography is a reliable method for assessing the heart in hypertension and predict complications
- 3- The risk increase more in age older than 50 years and in presence of dilated aortic root
- 4- The gender show no difference

Recommendation

It is wise to screen hypertensive patients for cardiac complications with safe non invasive way by echo. To detect AR.

References

- 1- Vasan RS, Larson MG, Levy D. Determinants of echocardiographic aortic root size: the Framingham Heart Study. *Circulation*. 1995;91: 734-740.
- 2- Kim M, Roman MJ, Cavallini MC, Schwartz JE, Pickering TG, Devereux RB. Effect of hypertension on aortic root size and prevalence of aortic regurgitation. *Hypertension*. 1996;28:47-52.
- 3- Pearson AC, Gudipati C, Nagelhout D, Sear J, Cohen JD, Labovitz AJ. Echocardiographic evaluation of cardiac structure and function in elderly subjects with isolated systolic hypertension. *J Am Coll Cardiol*. 1991;17:422-430.
- 4- Puchner TC, Huston JH, Hellmuth GA. Aortic valve insufficiency in arterial hypertension. *Am J Cardiol*. 1960;5:758-760
- 5- Palmieri V, de Simone G, Roman MJ, Schwartz JE, Pickering TG, Devereux RB. Ambulatory blood pressure and metabolic abnormalities in hypertensive subjects with inappropriately high left ventricular mass [published correction appears in *Hypertension*. 2000;36:147]. *Hypertension*. 1999;34:1032-1040.
- 6- Lukaski HC, Johnson PE, Bolonchuk WW, Lykken GI.

Assessment of fat-free mass using bioelectrical impedance measurements of the human body. *Am J Clin Nutr*. 1985;41:810-817.

- 7- Roman MJ, Devereux RB, Kramer-Fox R, O'Loughlin J. Twodimensional echocardiographic aortic root dimensions in normal children and adults. *Am J Cardiol*. 1989;64:507-512.

- 8- Hahn RT, Roman MJ, Mogtader AH, Devereux RB. Association of aortic dilation with regurgitant, stenotic, and functionally normal bicuspid aortic valves. *J Am Coll Cardiol*. 1992;19:283-288.

- 9- Vasan RS, Larson MG, Levy D. Determinants of echocardiographic aortic root size. *Circulation*. 1995;91:734-740.

- 10- Krovetz LJ. Age-related changes in size of the aortic root. *Am Heart J*. 1975;90:569-574.

- 11- Gerstenblith G, Frederiksen J, Yin FCP, Fortuin NJ, Lakatta EG, Weisfeldt ML. Echocardiographic assessment of a normal aging population. *Circulation*. 1977;56:273-278.

- 12- Roman MJ, Devereux RB, Niles NW, Hochreiter C, Kligfield P, Sato N, Spitzer MC, Borer JS. Aortic root dilatation as a cause of isolated, severe aortic regurgitation. *Ann Intern Med*. 1987;106:800-807.

- 13- Virmani R, Avolio AP, Mergner WJ, Robinowitz M, Herderick EE, Cornhill JF, Guo SY, Liu TH, Ou DY, O'Rourke M. Effect of aging on aortic morphology in populations with high and low prevalence of hypertension and atherosclerosis: comparison between occidental and Chinese communities. *Am J Pathol*. 1991;139:1119-1129.

- 14- Aortic Root Dilatation at Sinuses of Valsalva and Aortic Regurgitation in Hypertensive and Normotensive Subjects : The Hypertension Genetic Epidemiology Network Study

Hypertension, May 1, 2001; 37(5): 1229 – 1235
 15- Is aortic dilatation an atherosclerosis-related process?: Clinical, laboratory, and transesophageal echocardiogram-
 phiccorrelates of thoracic aortic dimensions in the populationwith implications for thoracic aortic aneurysm formation J. Am. Coll. Cardiol., September 17, 20 03; 42(6): 1076 - 1083.

16- Valvular Heart Disease: Aortic Regurgitation Circulation, July 5, 2005; 112(1): 125 - 134.
 17- Pulse Pressure Is Inversely Related to Aortic Root Diameter Implications for the Pathogenesis of Systolic Hypertension Hypertension, February 1, 2008; 51(2): 196 – 202
 18- Aortic Root Diameter and Longitudinal Blood Pressure Tracking Hypertension, September 1, 2008; 52(3): 473 - 477.