Effect of Acenocoumarol amongst Patients Who Have Undergone Prosthetic Valve Replacement

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Abstract: *Background: There is a increased risk of thromboembolism in patients with mechanical prosthetic heart valves (MPHV). To reduce the incidence a long term anticoagulant is administered post surgery. As sex based difference in these patients is not clear this study was done to study the efficacy of the oral anticoagulant and the sex based difference in the patients with MPHV. Methodology: It is a Pre and post-intervention study conducted in the Institute of Cardiovascular and Thoracic surgery, in a tertiary care centre from January 2021 to January 2022. Based on the inclusion and exclusion criteria the sample size recruited during the study time is 100. Demographic details were got from the patient information sheet. ESR and PT INR were done before surgery, after surgery and at the time of discharge. Data was entered in MS Excel 10. Statistical analysis was done in SPSS 23. Continuous data were expressed in terms of Mean±Standard deviation and Categorical variable were expressed in terms of numbers (percentages). P-value of <0.05 is considered as significant. Results: Female preponderance is seen 55%. Majority of our study participants were found to be in 41-50 years of age category. Comorbidities was found to be more in females. Mitral-aortic valve surgery was mostly observed in females. The most common comorbidity observed was Hypertension followed by Diabetes. Age and Number of Comorbidities found to have statistically significant association. Conclusion: In our study, it is found that the female sex has been associated with Mitro-aortic and mitral valve MPHV. High INR, increased ageing and comorbidities plays an important role in the mortality in both sexes.*

Keywords: Mechanical prosthetic, mortality, comorbidities, anticoagulant

1. Introduction

The most common cardiovascular condition is Valvular heart disease. Worldwide around 300, 000 prosthetic heart valves were replaced every year. Mechanical valves and bio prosthetic valves are two commonly used replacements for diseased heart valves. According to the American Heart Association guidelines in 2020, it is recommended to use the prosthetic valve replacement only if a patient develops symptoms and when it is not suitable to do a valve repair (1) (2). For heart valve replacement of severely diseased patients, Mechanical or Tissue valve can be used. It has reported that long term mortality benefit occurs in patients with young age who had both mitral valve replacement (MVR) and aortic valve replacement (AVR). The possibility of reoperation is low (3) (4). Thus the survival rate was 10-15 years for patients with >50 years of age and the morbidity as the result of valve was also found to be lower (5) (6). Though the durability of the Mechanical heart valve was more compared to the bio-prosthesis it was considered to be more thrombogenic. Through the emergence of new bileaflet mechanical prosthetic heart valve (MPHV) the chances for thrombogenicity is less (7).

In order to reduce the risk of valve thrombosis, thromboembolism and mortality patients who had mechanical prosthetic heart valve received indefinite oral anticoagulation therapy along with the vitamin K antagonist (8) (9). The PLECTRUM cohort analysis stated that the international normalised ratio ranging 2.0-3.0 is associated with the poor anticoagulation quality (10). This study is done to find the sex based difference in anticoagulated patients with mechanical prosthetic heart valve as it is an unexplored area.

Aim:
To study the efficacy of oral anticoagulant and its sex based differences on patients undergoing mechanical prosthetic heart valve.

2. Methodology

Study setting:
It is a hospital based study conducted in the institute of Cardiovascular and Thoracic surgery, Madras medical college & Rajiv Gandhi Government General Hospital which is a tertiary care centre. The study period was from January 2021 to January 2022.

Study Design:
Pre and post-intervention study

Sample Size:
Based on the inclusion and the exclusion criteria the eligible study participants were recruited throughout the study period. The finally obtained sample size is 100.

Inclusion criteria
- Patients who had a mechanical heart valve (Both Aortic and Mitral) aged more than 18 years and of either sexes during the study period

Exclusion criteria
- Patients with coagulation disorders
- Patients who underwent other cardiothoracic surgery procedures

Institutional Ethical committee clearance was not needed as it is a retrospective observational study. Baseline characteristics like Age, Sex, Associated comorbidities and dosage of anticoagulants and the complications were noted

Statistical analysis:
After collecting the data, it was entered in MS excel

Windows10. Statistical analysis was done in SPSS 23. Continuous data were expressed in terms of Mean±Standard deviation and. Categorical variable were expressed in terms of numbers (percentages). P-value of <0.05 is considered as significant

3. Results

Table 1: Baseline characteristics of the study participants

Variables	Male	Female	P value
Mean Age	42.20±11.30	36.56±12.58	<0.02*
Age category <20 21-30 31-40 41-50 51-60 >60	2 (4.4%) 7 (15.6%) 6 (13.3%) 21 (46.7%) 8 (17.8%) 1 (2.2%)	8 (14.5%) 10 (18.2%) 15 (27.3%) 17 (30.9%) 4 (7.3%) 1 (1.8%)	<0.03*
Number of Comorbidities	1.59±1.23	1.69±1.22	<0.001*
Surgery AVR DVR MVR	1 (1.8%) 7 (12.7%) 47 (85.5%)	6 (13.3%) 10 (22.2%) 29 (64.4%)	0.2
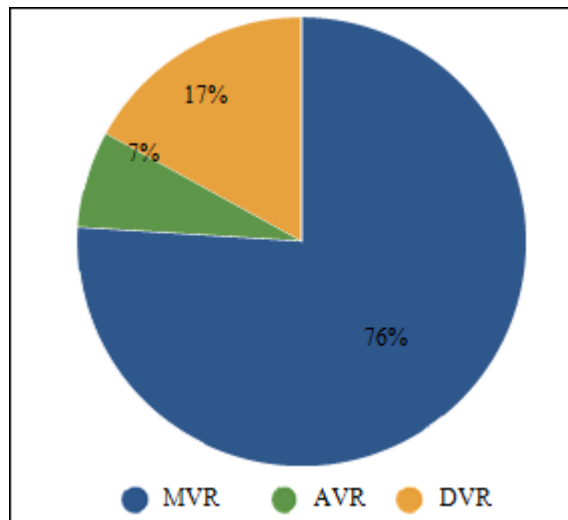
Among the study participants (N=100) we observe a female preponderance (F=55 and M=45). The mean age of the male is 42.20±11.30 with minimum age is 19 and the maximum age is 62. The mean age of female is 36.56±12.58 with the minimum age is 13 and the maximum age is 69. There is a difference between the male and female is found to be statistically significant. Among the study participants, both have mitral valve (M=85.5% and F=64.4%) as common site for the MPHV. Mitroaortic was more common in the females (22.2%) compared to males (12.7%). More MPHV was done in females compared to male but the difference is not found to be statistically significant.
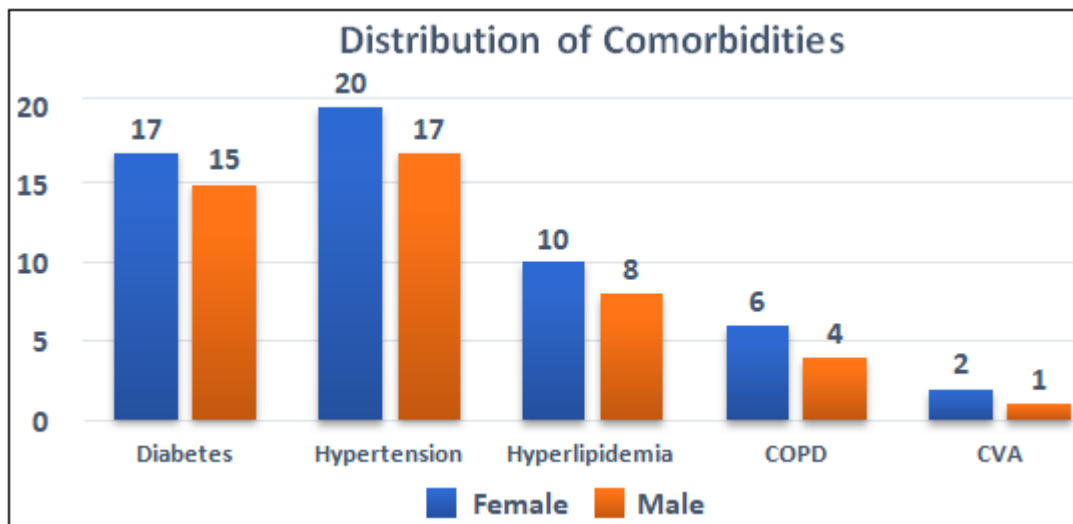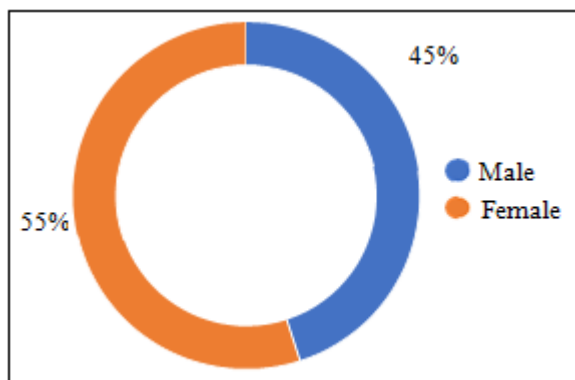

Figure: Presentation of Comorbidities among the study participants

The most common comorbidity condition in both the sexes is Hypertension followed by Diabetes. The third most common comorbidity is Hyperlipidemia. Females in our study have more comorbidities compared to males.

Table 2: Laboratory findings of the study participants

	Male	Female	P value
ESR	22.73±8.78	20.54±9.54	0.23
INR Pre-surgery Post surgery at the time of discharge	1.194±.411 1.872±.769 2.250±.639	1.264±.458 1.910±.757 2.603±.2.97	0.42 0.80 0.4

When comparing the anticoagulation quality in the presurgery state the mean value of INR was found to be little more in female compared to the male. Similarly at the time of the discharge also the mean value of the INR was found to be more in female compared to male but the difference is found to be not statistically significant.

4. Discussion

Jo Ting Huang et al in his study done among the Asian patients for anticoagulation related outcomes stated that the thromboembolic events were more in the patients with INR 2 to 2.5 was not higher compared to the INR value of 2.5-3 in the MVR group. It was found that in 1990s in order to prevent the thromboembolic events following the mechanical heart valve replacement there is a targeted value of INR to be maintained in such patients. Thus a low dose of anticoagulant was suggested for such patients. Later many studies like Gohlke-Barwolf et al (11), Acar J et al (12) portrayed the thromboembolic events occurred after the mechanical prothetic heart valve replacement and its INR. The risk of thrombosis and embolism is more in mechanical prosthetic heart valve, so it is necessary to take oral anticoagulants as regularly.

The mean age of the study participants is 39.52±12.2 which is similar to the results in the study done by Dhanya et al (13). Females Preponderance is observed in our study which is also similar. The most commonly used valve for replacelent is Mitral valve which is similar to the studies done by Aktar et al (14), Yu HY et al (15) and John S et al (16).

The most common comorbidity to occur in our study is Hypertension followed by Diabetes. This finding is similar to Pastori et al (17) study which is done among the Italy participants. Studies done by Akhtar et al (14) and Hirsh et al (18) stated that the INR range for the Asian population was less. Thus in Akhtar et al study it is stated patients with low INR2-2.5 has less risk of developing thromboembolic complications.

The most common factors which is found to be associated with the mortality were the age, increased INR range, comorbidities and ageing etc.

In general, recent mechanical valve implantation is a strong risk factor for thromboembolic complications, especially in the first 3 to 6 months after surgery. In patients not receiving long-term anticoagulation therapy, the average rate of major thromboembolism is estimated to be 4 to 8 per 100 patient years. This risk is reduced to 2.2 per 100 patient years with antiplatelet therapy, and further reduced to 1 per 100 patient years with oral anticoagulation. Thus, the utilization of postoperative anticoagulation therapy reduces the incidence of major embolism by approximately 75% and has become the standard of care for all patients with mechanical prosthesis. (19, 20, 21)

5. Limitation

The main limitation of the study our small sample size. The second limitation is the study design we didn't have a long follow up to rule out any thromboembolic events or bleeding events which occurs later.

6. Conclusion

From our study, it is concluded that female preponderance was observed among the study participants. Most common surgery done was MVR followed by DVR. There is a statistically significant association was found in age and comorbities between the two groups. The majority patients had Hypertension followed by Diabetes. The mean value of the INR has found to be more in the females compared to males. Thus increasing age, comorbidities, Increased pre op INR have been found to be associated with higher mortality.

We observed that the most important factor to prevent complications is repeated counselling and patient education to make them understand the importance of anticoagulation and recognition of the complications. The compliance to anticoagulation will reduce the incidence of morbidity and mortality:

7. Recommendation

It is recommended to do a randomized control trial studies in order to find the efficacy comparing the various anticoagulants which can be used for the initiation in MVR patients.

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