Research Article

Intravenous metoprolol in severe hypertension

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Abstract

Introduction: To study the effect of intravenous metoprolol in severe hypertension. The use of betablockers in the management of severe hypertension was not considered for the fear of paradoxical rise in blood pressure, but it has been found that IV metoprolol is safe and effective in the management severe hypertension with careful clinical monitoring even in the absence of ICU facility. (Khokhani 1993) **Materials and Methods**: Patient presenting with severe hypertension of unknown etiology were taken for the study. The study has been carried out at GMC, Aurangabad for about three years. Metoprolol (Betaloc) was given intravenously at the rate of 1mg/min .Systolic, diastolic blood pressure and heart rate recorded at various intervals. Adverse reaction if any noted **Result**: The study has been carried out for three years on 34 cases of severe hypertension, admitted at GMC Aurangabad. After giving IV Metoprolol the fall in systolic, diastolic blood pressure was statistically significant .The fall starts at the end of five minutes and continued up to ninety minutes. Our study compared with this study, (Kokhani *et al* 1993), it is observed that results in both studies are same. No side effect observed during the study. **Conclusion**: After the administration of IV Metoprolol the fall in blood pressure and heart rate was statistically significant. A safe diastolic blood pressure (≤ 110 mm of hg) effect were observed during the study and does not require scrupulous monitoring was achieved. It is thus concluded that IV Metoprolol is a safe and effective drug in patient of severe hypertension. No side effects were observed during the study and does not require scrupulous monitoring.

Keywords: Metoprolol, Severe Hypertension.

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INTRODUCTION

An elevated arterial pressure is probably the most important public health problem bring common, asymptomatic, readily detectable, usually treatable and often leading to lethal complications if left untreated. The approach to management of hypertension has changed radically in recent years. Considerable progress has been made in the strategies available for therapy of mild to moderate hypertension which is now routinely handled without hospitalization. However hypertensive crisis which includes variety of circumstances needs hospitalization requiring rapid reduction of blood pressure Traditionally, hypertensive crisis have been classified as (1) true emergencies requiring immediate reduction of blood pressure (not necessarily to normal) using antihypertensive agents parentally, and (2) hypertensive urgencies that can usually be treated with orally administered drugs to reduce blood pressure within 24 hours. A persistent diastolic pressure exceeding 130 mm of hg is often associated with vascular damage, but some patients sustain vascular damage at much lower pressure while others manage to withstand even higher pressures without apparent harm. This signifies that rapidity of rise is more important than absolute level of diastolic blood pressure in producing acute vascular damage (Kaplan, 1992). To study the effect of intravenous metoprolol in severe hypertension. The use of beta blockers in the management of severe hypertension was not considered for the fear of paradoxical rise in blood pressure, but it has been found that IV metoprolol is safe and effective in the management severe hypertension with careful clinical monitoring even in the absence of ICU facility. (Khokhani 1993) Patient presenting with severe hypertension of unknown etiology were taken for the study. The study has been carried out at GMC, Aurangabad for about three years. Metoprolol (Betaloc) was given intravenously at the rate of 1mg/min. Systolic, diastolic blood pressure and heart rate recorded at various intervals.

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MATERIAL AND METHODS

All the cases presenting with severe hypertension (diastolic blood pressure ≥ 115mmof hg) irrespective of etiology were taken for study. The study has been carried out for three years in the Department of medicine, Govt. medical College and Hospital, Aurangabad. The cases in who use of betablockers was contraindicated like bronchial asthma, COPD, congestive cardiac failure. Severe bradycardia was excluded from the study. In all the cases detail history and ECG, fundus examination performed Metoprolol (Betaloc) was given intravenously as a single dose at the rate of 1 mg/minute upto a maximum dose of 15mg till the patient achieved safe diastolic pressure of ≤ 110 mm of Hg or full dose was administered whichever was earlier. To assess the efficacy of drug, after intravenous Metoprolol, supine systolic, diastolic and heart rate was recorded at 0, 5,10,15,20,30,45,60 and 90 minutes .Adverse reaction if any noted

OBSERVATIONS

This study was carried out for three years on 34 patient of severe hypertension admitted at GMC Aurangabad. The age of patient ranged from 28 to 75 years with the mean age of 50.4 years .Out of 34 cases, 16 cases (47%) were males and 18 cases (53%) were females. The male to female ratio was 8:9. Table no 1)

Table 1: Age and sex distribution chart

Age	Male	Female	Total no. of cases	%
20-30	1	-	1	2.9
31-40	4	7	11	32.4
41-50	4	3	7	20.6
51-60	4	3	7	20.6
61-70	2	5	7	20.6
71 and above	1	-	1	2.9
Total	**16 (47 %)**	**18 (53 %)**	**34 (100 %)**	**100.0**

Out of 34 cases, 28 (82.35%) cases were newly detected and 6(17.65%) cases were already diagnosed to have hypertension. 30(88.24%) cases were symptomatic and 4 (14.29%) were asymptomatic .ECG was normal in 22(64.7%)cases ,12 (35.3%) cases showed evidence of left ventricular hypertrophy. (Table no 2)

Table 2: ECG Changes in 34 pt

Ecg changes	No. Of cases	%
Normal	22	64.7
Left ventricular hypertrophy	12	35.3

Table 3: Parameters at 0 hours

Parameters	Range	Mean ± SD mm of Hg
SBP	160 -290	207 ± 29.95
DBP	118 -150	127 ± 8.19
MAP	133 -190	154 ± 13.71
HR	72-100/Min	90 ± 5.79

It was observed that at zero hour systolic blood pressure ranged between 160 -290 mm of Hg with a mean of 207 ± 29.85 SD. Range of diastolic blood pressure observed was 118 -150 mm of Hg with a mean of 127 ± 8.19 SD. The heart rate ranged between 72 -100 beats/min. With a mean of 90 ± 5.79 SD (Table no 3) Observations After Injecting Metoprolol The systolic and diastolic blood pressure was recorded at the intervals of 5,10,15,20,30,45,60 and 90 minutes after giving injection metoprolol intravenously in a dose of 1mg/min maximum dose being administered being 15mg

Table 4: Systolic Blood Pressure Different Intervals after Injection of Metoprolol

Time	Range	Mean ±SD mm hg	% reduction
0	160-290	207 ± 29.95	-
5	150-270	200 ± 28.82	3.38
10	160-270	198 ± 29.38	4.35
15	150-270	197 ± 28.55	4.83
20	150-260	193 ± 28.02	6.76
30	140-260	193 ± 28.02	6.76
45	140-260	192 ± 26.95*	7.25
60	140-260	191 ± 26.50*	7.25
90	140-240	191 ± 25.25*	7.73

SEM * P < 0.05

The systolic blood pressure observed at 0 hour ranged from 160 to290 mm of Hg with a mean of 207± 29.95 mm of Hg. Fall in SBP started at the end of 5 minutes and continued up to 90 minutes. The maximum fall was 7.73 % .No fall in SBP was observed in 8 (23.53%) (Table no 4) (Table no 8)

Table 5: Diastolic Blood Pressure at Different Intervals after Injection of Metoprolol

Time	Range	Mean± SD mm of hg	% Reduction
0	118 – 150	127± 8.19	-
5	116 – 140	124± 7.77	2.36
10	118 – 150	123± 6.69*	3.15
15	110 – 150	120± 9.02*	5.51
20	110 – 140	117± 9.23*	7.83
30	100 – 140	115± 9.34*	9.45
45	100 – 140	110± 10.52*	13.39
60	100 – 140	109± 10.14*	14.17
90	100 – 140	109± 9.56*	14.17

SEM ® < 0.05

Khokhani *et al* (1993) in their study observed similar results. The diastolic blood pressure observed at 0 hour ranged from 118 to150 mm of Hg with a mean of 12.7± 8.19 mm of Hg. Fall in SBP started at the end of 5 minutes and continued up to 90 minutes. The maximum fall was 14.17%. (Table no 5) (Table no 9). The heart rate observed at 0 hour ranged from 72 to1oo beats/min with a mean of 90± 5.79 beats/min. Fall in heart rate started at the end of 5 minutes and continued up to 90 minutes. The maximum fall was 15.56% (Table no.6). To achieve safe

diastolic blood pressure the target is 110 mm of Hg (Kaplan 1994). It was achieved in 24 (70.59%) (Table no. 7). No side effects observed during the study. Khokhani *et al* (1993) in their study observed similar results.

Table 6: Heart Rate at Different Intervals after Injection of Metoprolol

Time	Range	Mean± SD mm of hg	% Reduction
0	72-100	90± 5.79	-
5	60-92	84± 7.19*	6.67
10	60-90	83± 7.26*	7.78
15	60-90	80± 7.01*	11.11
20	60-90	79± 6.61*	12.22
30	60-90	77± 6.57*	14.44
45	60-90	76± 6.49*	15.56
60	60-90	76± 6.60*	15.56
90	60-90	76± 6.54*	15.56

Table 7: Safe Diastolic Blood Pressure After Injection Of Metoprolol

Time[min]	No .of cases	%
5	-	0
10	-	0
15	8	23.5
20	15	44.12
30	19	55.88
45	22	64.71
60	23	67.64
90	24	70.59

Table 8: Fall in systolic blood pressure in relation to time

Time [min]	Fall in SBP [Mean]	No. of cases [out of 34]	%
5	7.0	18	52.94
10	8.52	22	64.71
15	10.1	23	67.65
20	11.3	24	70.59
30	13.5	26	76.47
45	14,5	26	76.47
60	14.6	26	76.47
90	15.5	26	76.47

Table 9: Fall in diastolic blood pressure in relation to time

Time [min]	Fall in DBP [mean]	No. of cases [out of 34]	%
5	2.8	12	35.29
10	3.8	15	44.12
15	6.9	27	79.41
20	10.0	30	88.24
30	12.5	33	97.01
45	16.9	33	97.01
60	17.9	33	97.01
90	18.4	34	100.00

DISCUSSION

In the present study, 34 patients of severe hypertension were taken to find out the use of IV Metoprolol (Betaloc) in severe hypertension. Hypertensive crisis can be broadly classified into hypertensive emergencies and urgencies. Hypertensive emergencies require prompt treatment in the hospital with parenteral antihypertensive agents to prevent immediate progression of end organ damage. Hypertensive urgencies require the treatment with rapidly acting oral agents either inside or outside the hospital depending on the circumstances (Fergusson *et al* 1986) The JNC Report (1984) described various agents used for emergencies and urgencies but it does not mention the agents of choice in each situation. Manoria (1995), has discussed the features necessary for an ideal antihypertensive agent to be used in hypertensive emergency. IV Metoprolol is found to be safe and effective. Its advantage over other parenteral drugs is that it can be given with careful clinical monitoring in the absence of intensive care facility. It also reduces shearing force by decreasing dp/dt^2 and used in clinical condition like severe hypertension associated with unstable angina, acute myocardial infarction (Khokhani *et al* 1993) In the present study, it was observed that the age ranged from 28-75 years with the mean age of 50.4 years. Incidence of severe hypertension was found to be higher i.e. 94.2% from 4^{th} to 6^{th} decades of life .Due to more stress and presence of addictions common in this age group (Pandey et.al. 1981). Out of 34 cases 16 (47%) cases were males and 18 (53%) females with a male to female ratio 8: 9 Headache was found to be most common symptom in 76.66% of cases.ECG was normal in 22 (64.7%) and LVH in 12 (35.3%). The systolic blood pressure observed at 0 hour ranged from 160 to290 mm of Hg with a mean of 207± 29.95 mm of Hg. Fall in SBP started at the end of 5 minutes and continued up to 90 minutes. The maximum fall was 7.73 % .No fall in SBP was observed in 8 (23.53%) Khokhani *et al* (1993) in their study observed similar results. The diastolic blood pressure observed at 0 hour ranged from 118 to150 mm of Hg with a mean of 12.7± 8.19 mm of Hg. Fall in SBP started at the end of 5 minutes and continued up to 90 minutes. The maximum fall was 14.17%. The heart rate observed at 0 hour ranged from 72 to1oo beats/min with a mean of 90±5.79 beats/min. Fall in heart rate started at the end of 5 minutes and continued up to 90 minutes. The maximum fall was 15.56%. To achieve safe diastolic blood pressure the target is 110 mm of Hg (Kaplan 1994). No side effects observed during the study. Khokhani *et al* (1993) in their study observed similar results

CONCLUSION

After the administration of IV Metoprolol the fall in systolic blood pressure , diastolic blood pressure and heart rate was statistically significant($p < 0.05$) noted at the end of 5 minute and the fall continued up to 90 minutes . A safe diastolic blood pressure ($\leq$ 110 mm of Hg) was achieved at the end of 15, 20, 30, 45, 60 and 90 minutes. It is thus concluded that IV Metoprolol is a safe

and effective drug in patient of severe hypertension. No side effects were observed. It does not require scrupulous monitoring.

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