Sublingual Nifedipine in Acute Hypertensive Crisis *

by
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INTRODUCTION

Hypertensive crisis is a curable form of otherwise highly lethal cardiovascular emergency.

The accelerated increments in both systolic and diastolic blood pressure result in vascular changes known as fibrinoid necrosis. Brain, kidney and heart bears the main b.unt. The changes are reversible if B.P. is lowered in time and rapidly.

Prompt reduction of blood pressure is the key to the management of Hypertensive crisis. Dizoxide and Nitroprusside I/V are used to lower the blood pressure in this setting. Both of these drugs need very close supervision and mointoring of the patient. Calcium Entry blocking agents-Nifedipine is well known for its antihypertensive properties in moderate to severe hypertension. We have described 8 patients where sublingual administration of 10-20 mg Nifedipine resulted in prompt reduction in the dangerously elevated B.P. levels.

MATERIALS AND METHODS

Eight patients presenting to the emergency room of National Institute of Cardiovascular

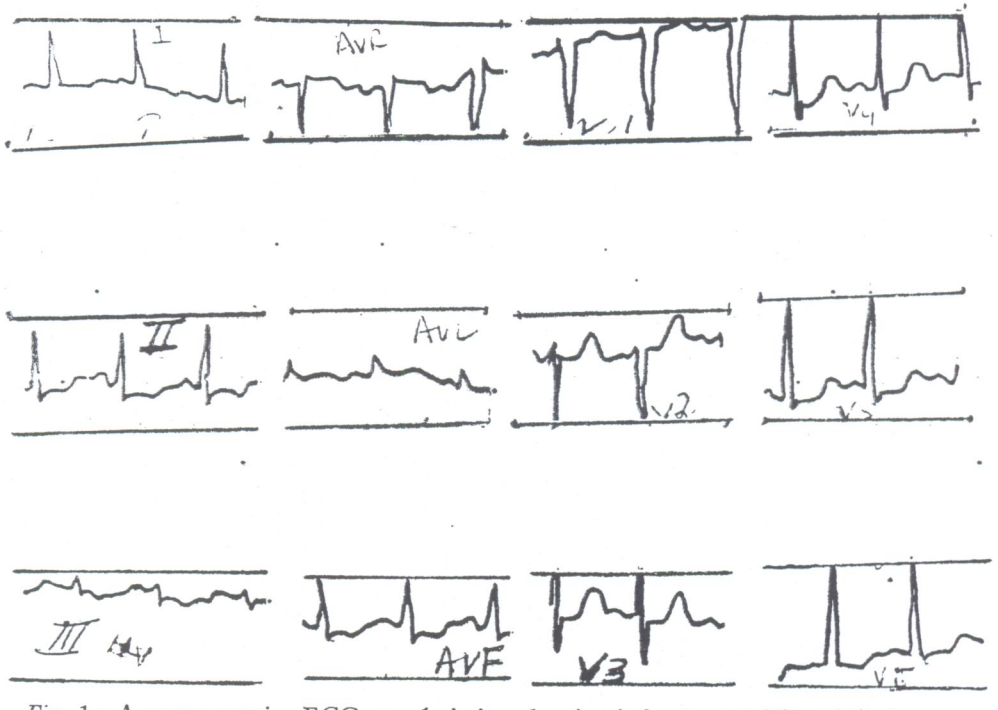


Fig. 1 : A representative ECG on admission showing inferolateral ST and T changes.

*From The National Institute of Cardiovascular Diseases (Pakistan), Karachi.

Diseases, Karachi, since 14th April, 1982 with the diagnosis of Hypertensive crisis were included in this study.

Three patients were females and five patients were males. All patients were referred by a family physician to the emergency room of National Institute of Cardiovascular Disease, Karachi, with the diagnosis of severe hypertension six patients were known to be hypertensives for at least 4 months and were taking antihypertensive medications irregularly. Two patients were not known to be hypertensives before. All were admitted to the North Ward of National Institute of Cardiovascular Diseases, after being given preliminary emergency treatment at the Emergency room.

B.P. was checked in the E.R. by wall mounted mercury sphygmomomemeter with the patient supine and a pillow under the rech. Appearance and disappearance of the Korotkovs sounds is taken as the systolic or diastolic pressure respectively. Table No. 1 gives the clinical presentation of these patients. The routine emergency treatment given to

Table I: HYPERTENSIVE CRISIS
Definition of Hypertensive Crisis as used in this study.

1. Diastolic Pressure Of ≥ 140 mm Hg or above.
2. Occipital headaches
3. Restlessness; Generalized hyperaesthesia Coupled with numbness & Tingling.
4. CLOUDY SENSORIUM.
5. decrease urine output.
6. ST & T wave changes reversing with therapy.

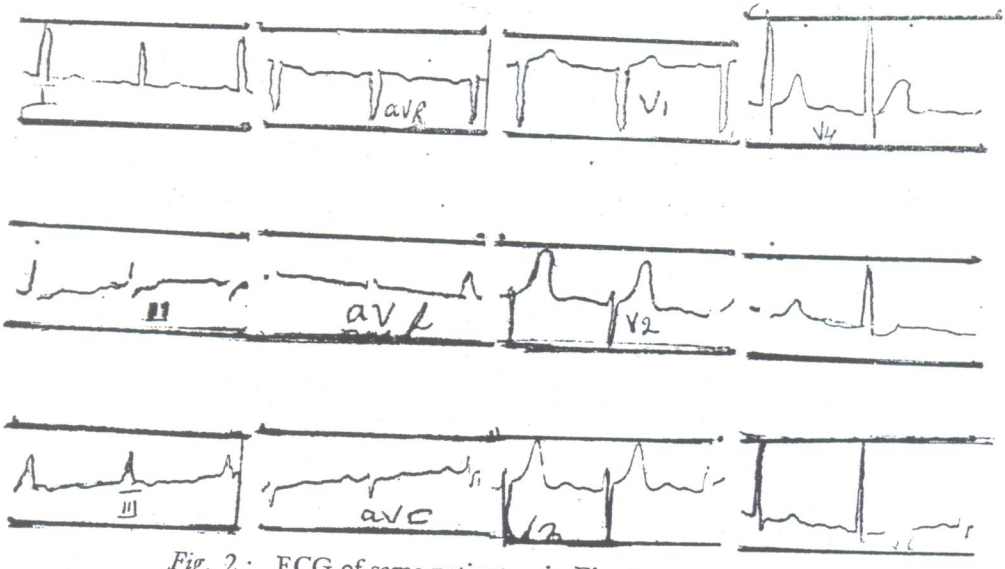


Fig. 2: ECG of same patient as in Fig. 1 one week later.

these patients in the E.R. is shown table No. II. The mainstay of therapy as will be noticed is intravenous Lasix. Four ampoules of which are given initially and is usually repeated after 1-2 hours. The patients were kept in the E.R. for 2-3 hours following this therapy and were shifted to the ward because of failure to bring down the B.P.

Table II: HYPERTENSIVE CRISIS

Routine Management in N.I.C.V.D.

1. Rest
2. Inj. Lasix 4 amp. I/V Stat
3. Inj. Catapres 1 amp. I/V Stat
4. Repeat if no response in 20-25 mts.
5. Aldomet 3 tab Stat then (250 mg) 2 QID

All patients had B.P. checked before the start of sublingual nifidine and then every 5 minutes for 15 minutes; then every 15 minutes for 2 hours. Then 1/2 hourly for 4 hrs. The other investigations carried out were Hb, WBC, random blood sugar, urea, serium Sodium potasium, and Chloride estimation., ECG and chest x-ray was done on the day of admission and repeated after one week (Fig. 1 and 2).

S/L Nifidipine administation

The contents of 3 or 4 capules. nifidpine are drawn in a 2 c.c. syringe and then an initial 10 mg in instilled in the sublingual space. If the patient was fully concious and somewhat co-operative then he is asked to chew the capsule but not to swalow the contents.

Figures 3 - 7 Summarize the effects of sublingual Nifidipine in these patients.

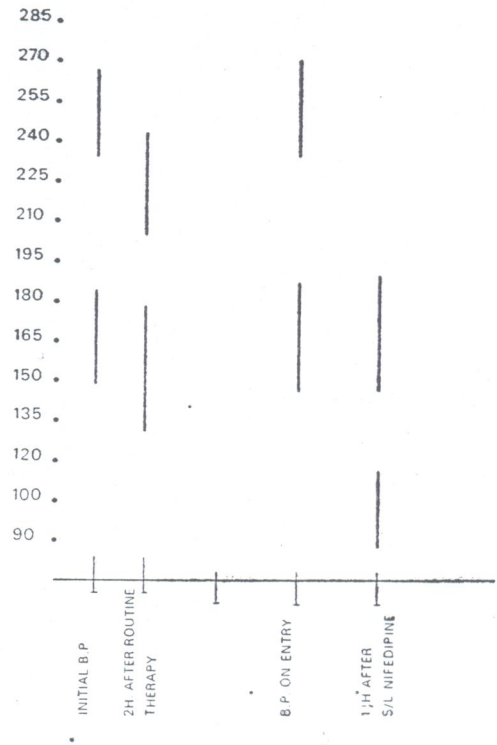


Fig. 3 :

DISCUSSION

Hypertensive crisis variously called hypertensive emergencies or hypertensive encephlopathy is a life threatening situation resulting from rapid and marked elevation of diastolic arterial pressure (1,2). For survival of the patient prompt reduction of blood pressure esp. of diastolic B.P. is of utmost importance (3,4). Patients who are known to be hypertensives of the idiopathic (essential) variety or secondary to renal causes or Cushing

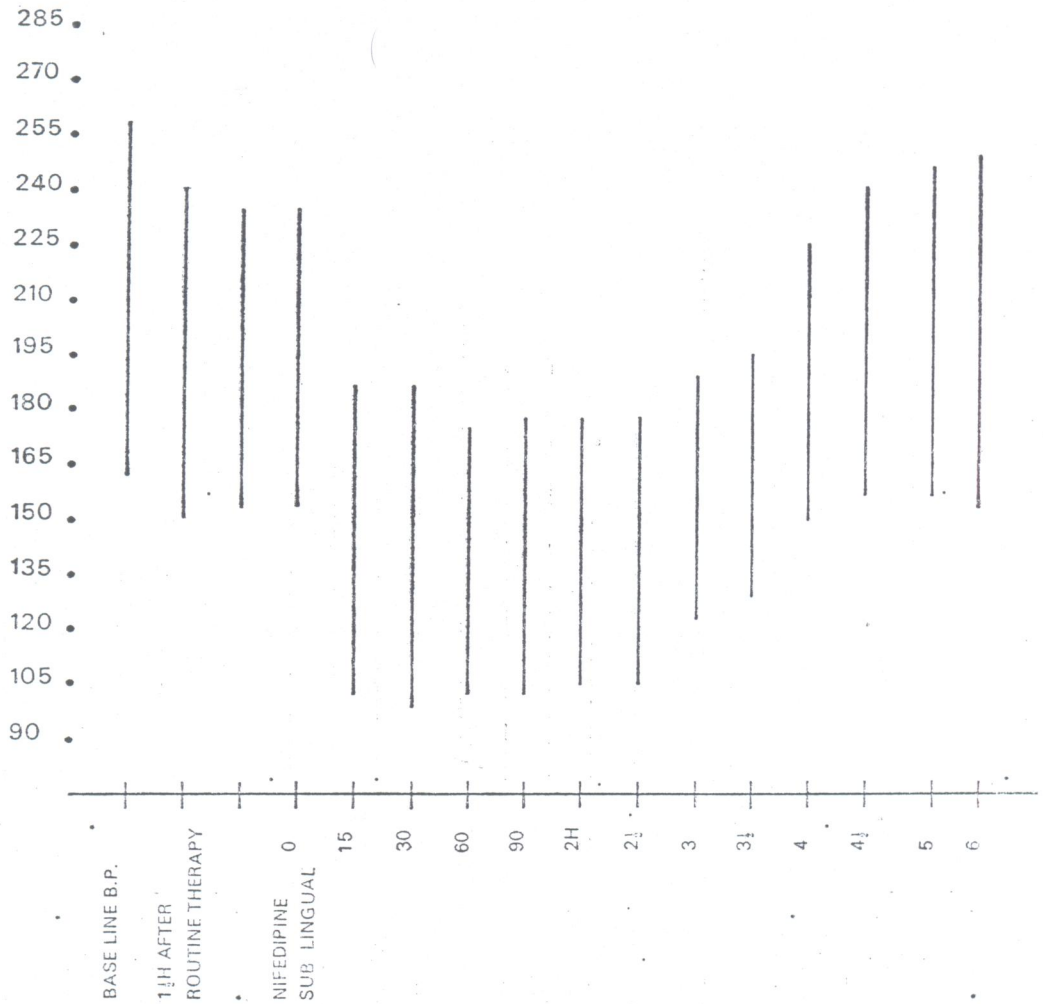
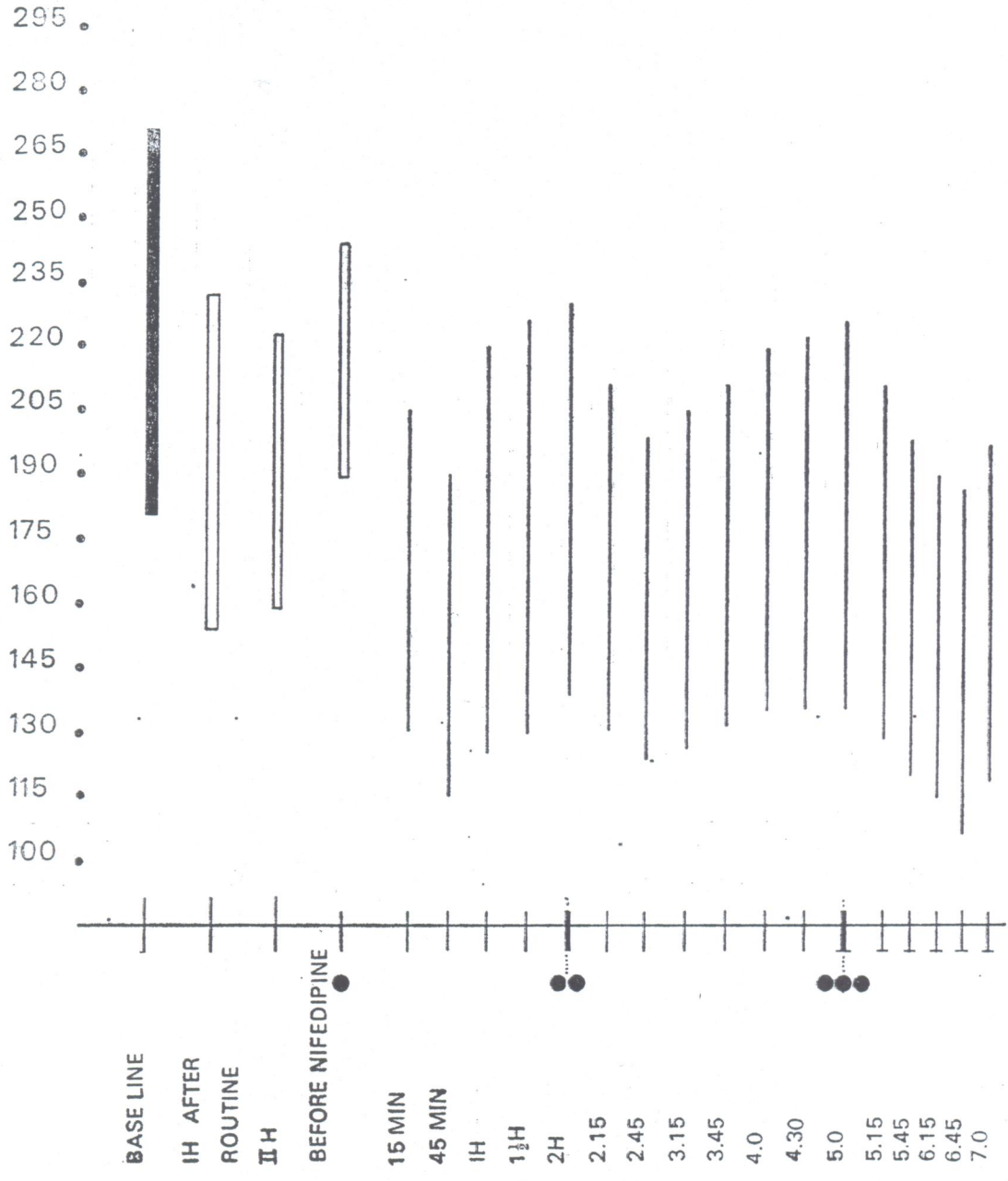


Fig. 4:

syndrome or Pheochromocytoma are liable to develope acute hypertensive crisis. The exact cause for the sudden elevation in blood pressure levels are not definetely known. A period of low urine out put precedes the rapid increments of blood pressure in these individuals. Sometimes sudden withdrawal of therapy esp of beta blockers and clonidine may result in hypertensive crisis. In the past patients taking monoamine oxidase nhibitors if given diets containg high levels of Tyrosine were known to develop sudden elevation of B.P. In some sensitive hypertensive individuals nasal Isoprenline drops may precipitate hypertensive crisis. Whatever


295
280
265
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235
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205
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175
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145
130
115
100
BASE LINE
IH AFTER ROUTINE
II H
BEFORE NIFEDIPINE
15 MIN
45 MIN
1H
1½H
2H
2.15
2.45
3.15
3.45
4.0
4.30
5.0
5.15
5.45
6.15
6.45
7.0

Fig. 5:

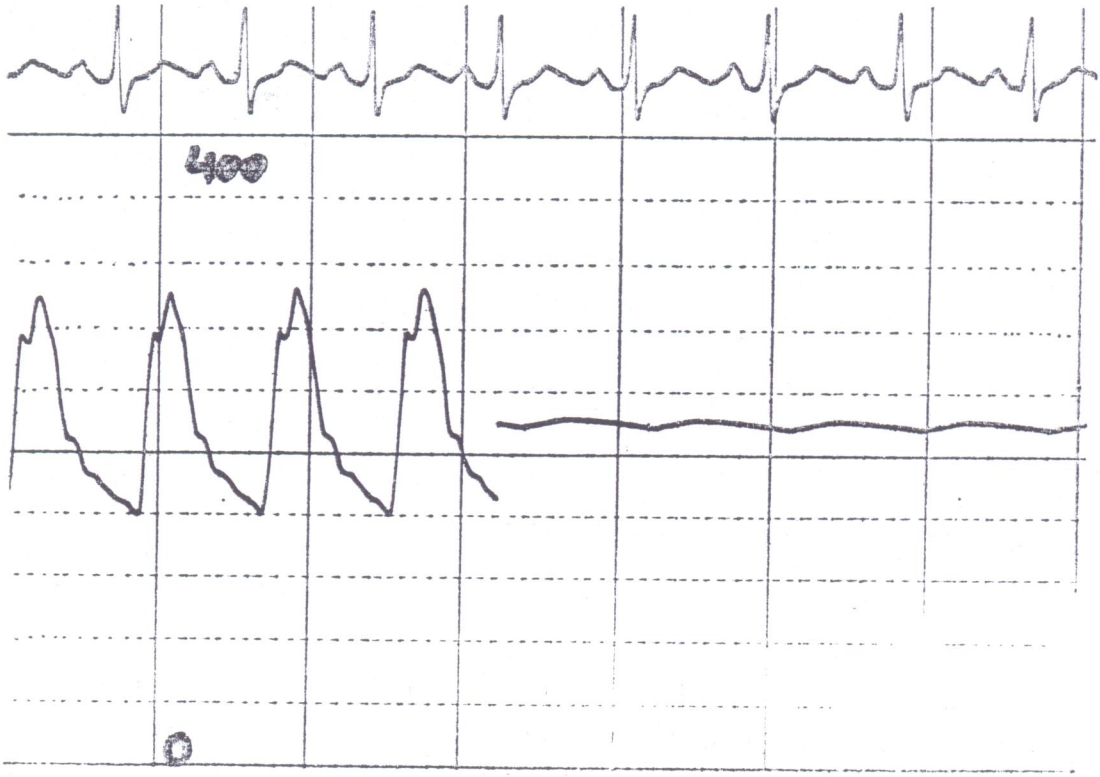

Fig. 6 : Abdominal aortic pressure tracings from 23 years old lady each line is 40 mm Hg. Peak systolic pressure is 300 mm Hg. Diastolic pressure 160 mm Hg. Heart rote 140/mt. mean pressure is 220 mm Hg.

the reason all patients with diastolic pressure above 140 mm Hg especially f they complain of severe headach nausea and vomiting and if there is dullness of the sensoriam must be admitted to a cardiac facility immediately and B.P. must be brought under control promptly. Delay in bringing the B.P. down may result in irreversible damage to the brain, or renal failure. Ultrashort acting drugs are the only choice in such situations. The two most comonly used drugs are Nitroprusside (Nipride) and Diazoxide (Hyperstat) (5,6). Both are strong direct vasodilators. The effect starts within few minutes. Nipride has a very short duration of action and must be given by continuous intravenous infusion. Diazoxide has to be given rapidly (10—15 seconds) intravenously. Both these drugs need careful monitoring not only of B.P. but other Biochemical and clinical parameters. Nipride can not be used for long periods (more than 48 Hours) because of the accumulation of Thiocynate.

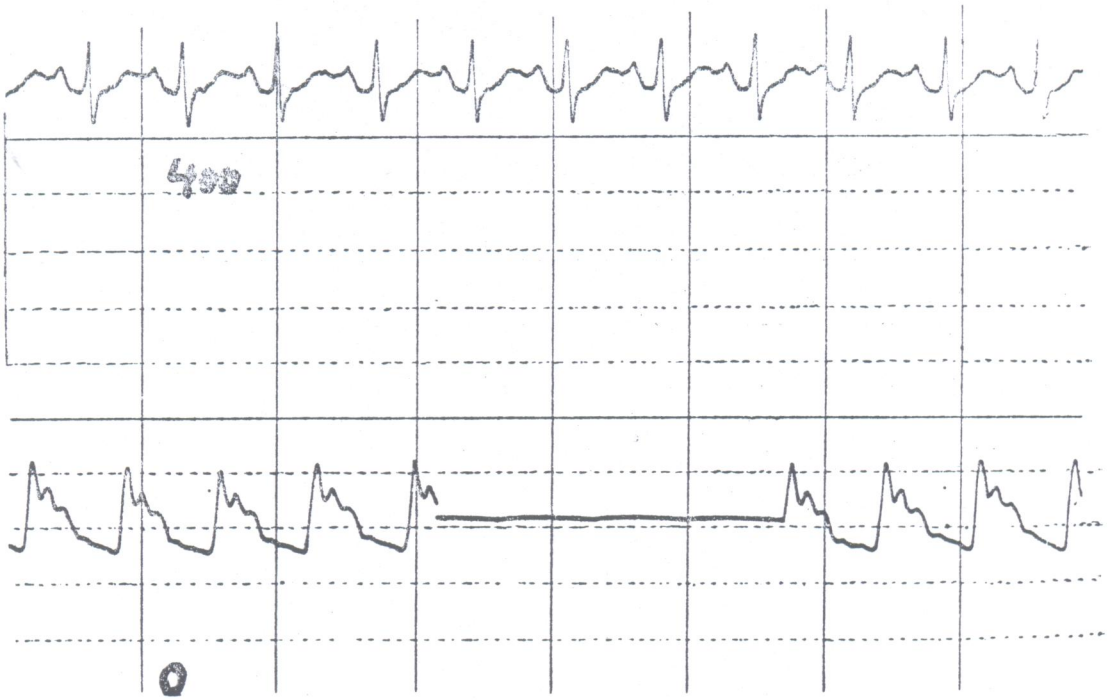

Fig. 7: Same patient just after 10 minuts of 10 mg Sublingual adalat. The systolic pressure is 160 mm Hg. Diastolic is 100 mm Hg. and mean pressure is 130 mm Hg. Heart rote has increased to 160/mt.

Both these drugs are not available in Pakistan except in few specialized centres thus the routine therapy given to these patients consist of Intravenous furosemide and I/M Methyldopa or I/V clonidine. (Table No. I).

The 8 patients included in this study had only 5-10% reduction in B.P. after 1½ Hour of the administration of routine therapy as shown in Figs. 4 & 5. All of them had marked symptoms of cerebral malfunction in terms of drowsiness, nausea and vomiting.

Sublingual nifidipine administration in a dosage of 10 mg produced two types of responses. Type one consists of a prompt reduction of both systolic and diastolic pressure with in 5-15 minutes and sustained for 2—3 hours with gradual return to the pretreatment level in 4-5 hours. Administration of S/L nifidipine after 3 hours results in a sustained reduction of B.P. concomitant administration of methyldopa by 1/m or 1/v route or betablockers by oral route will result in adequate control of B.P. over next few days (figure 4). Type two response is shown in (figure 5). The B.P. reduction is not as pronounced and there is a rapid return to high levels. Repetition of sublingual nifidipine in (5 mg) increment

every 1 hour results in sustained effective control of B.P. None of these patients developed hypertension, reflex tachycardia was seen in the majority of patients, causing disturbing palpitation in two patients.

After the completion of the study a 21 years old lady being investigated for secondary hypertension by aortography was encountered, soon after the cathetra was placed in the abdominal aorta it was discovered that the B.P. is 370/190 (see figure) patient complained of violent headaches and extreme degree of vertigo. 10 mg of nifidipine subligual was administratired which immediately controlled the B.P. within 10 minutes (see figure). The investigation, was completed there after.

The exact mode of nifidipine to lower B.P. is not definitely known. A large volume of work is available as to the action of nifidipine on the entry of calcium ions through the slow channel in the smooth muscles of the coronary arteries and other arterioles. The role of calcium ions to maintain a contractile state by the contractile proteins is under great scrutiny, although the rate and rythmicity of contraction of vascular smooth muscule differ from those in cardiac muscle the extent of contraction is a function of the mycoplasmic calcium ion concentration. Thus blocking the entry of calcium ions in to the cytoplasm of the smooth muscle of the arterioles results in strong vasodilation. It has been shown that the effect of nifidipine depends upon pretreatment levels of blood pressure. In the normotensive individuals the B.P. in only slightly decreased and 1-1% reduction of B.P. occurs. In moderately hypertensive individuals a reduction of 14-16% is achieved. In severely hypertensive patients 19-20% and in malignant hypertensive 25-50% reduction is achieved (8, 9, 10, 12). As noticed in our 8 patients nifedipine causes an average of 33% reduction in systolic pressure and 39% reduction in diastolic blood pressure level. The mean duration of action was about 3 hours.

In addition to vasodilatation which appears to be its primary action, nifidipine is also known to block the secretion of aldosterone and may have some effect directly on the kidneys (11).

Oral administration of nifidipine alone or in combination with methyldopa has been shown to effectively lower blood pressure in short term as well as long term studies in moderate to severe hypertension. The reflex tachycardia seen with nifidipine above is not seen when combined with methyldopa or beta blocker.

Guazzi et al in 1977 described 3 patients with hypertensive encephalopathy having B.P. of 307/190. The B.P. came down to 160/85-90 within 15-20 minutes of subligual 10-20 mg nifidipine. Our experience further document that subligual nifedipine effectively and promptly lowers elevated B.P. in hypertensive crisis and should he preferred to the costly cumbersome I/V regimens used in hypertensive crisis.

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