THE ROLE OF NICARDIPINE IN THE MANAGEMENT OF HYPERTENSIVE CRISIS

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What is Hypertension?

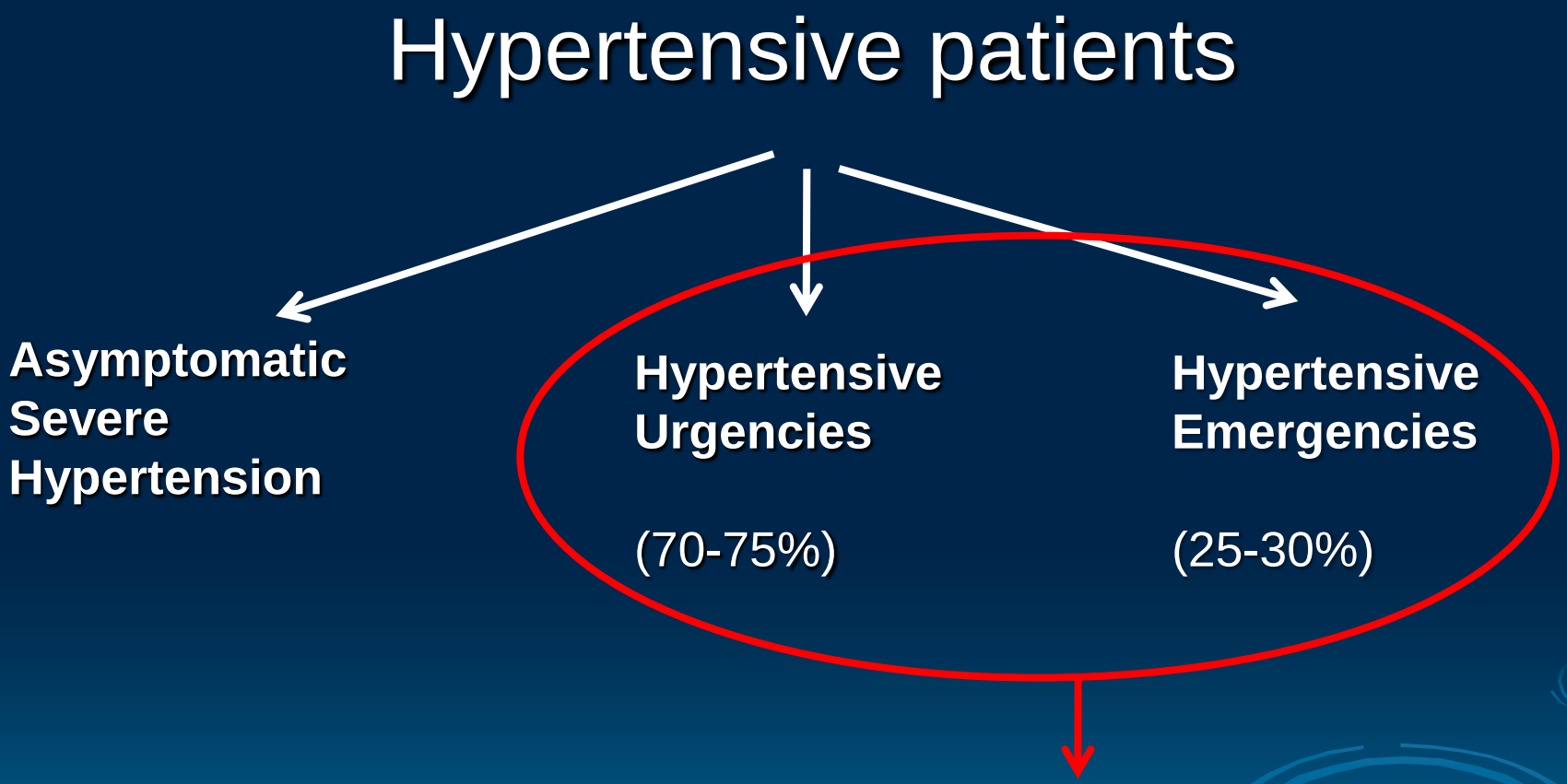
JNC-7 (American) Classification of Blood Pressure

Category	Systolic		Diastolic
Optimal	<120	and / or	<80
Normal	<130	and / or	<85
High-Normal	130-139	and / or	85-89
Stage 1 (mild hypertension)	140-159	and / or	90-99
Stage 2 (moderate to severe hypertension)	≥160	and / or	≥100-109
Isolated Systolic Hypertension (ISH)	≥140	and	<90

The category pertains to the highest risk blood pressure

***ISH=Isolated Systolic Hypertension.**

JAMA 2003;289:2560-72


Hypertensive patients
Asymptomatic Severe Hypertension
Hypertensive Urgencies
(70-75%)
Hypertensive Emergencies
(25-30%)
Hypertensive Crisis

Asymptomatic Severe Hypertension

- Blood pressure ≥ 180/110 mmHg
- Incidental findings in asymptomatic patient.
- Abscence of symptoms beyond mild or moderate headache
- Without evidence of acute target organ damage

Hypertensive Urgencies

- No absolute blood pressure level. Usually blood pressure ≥180/110 mmHg
- Rapidity of BP elevation of greater import than magnitude of the elevation
- Presence of symptoms beyond mild or moderate headache
- Without evidence of acute target organ damage

Hypertensive Emergencies

- Usually very high blood pressure (often > 220/140 mmHg)
- Rapidity of BP elevation of greater import than magnitude of the elevation
- Accompanied by evidence of life-threatening organ dysfunction

Prim Care Clin Office Pract 2008; 35: 475–487

Epidemiology of Hypertensive crisis

- **Recently, came down to < 1 % of hypertensive patients, due to better management.**
- **Common in the black & elderly patients.**
- **Majority of patients have previous history of HTN and treatment**
- Formed 1/4 of the medical urgencies and emergencies
- Hypertensive urgencies constituted 76 % of the hypertensive crises while emergencies were 24%.

Zampaglione et al, Hypertension 1996; 27(1)144-147

Causes of Hypertensive Crisis

- Essential hypertension
  - Medication noncompliance
- Secondary hypertension
  - Aortic coarctation
  - Cushing's syndrome
  - Elevated ICP
  - Renal dysfunction
  - Pregnancy
  - Hyperparathyroidism
  - Hyperthyroidism
  - Pheochromocytoma
  - Primary aldosteronism

JNC 7, *JAMA* 2003; 289:2560-2572.

Some Examples of Hypertensive Emergencies and Urgencies

Hypertennsive Emergencies	Hypertensive Urgencies
Accelerated/malignant hypertension	Accelerated/malignant hypertension*
Hypertensive encephalopathy	Severe hypertension associated with coronary artery disease
Acute left ventricular failure	Severe HT in the organ transplant patient
Acute aortic dissection	Preoperative hypertension
Intracranial hemorrhage	Hypertension associated with burns
Pheochromacytoma crisis	Severe, uncontrolled HT
Monoamine oxidase inhibitor and tyramine interaction	
Eclampsia	
Substances/drug-induced acute hypertension	

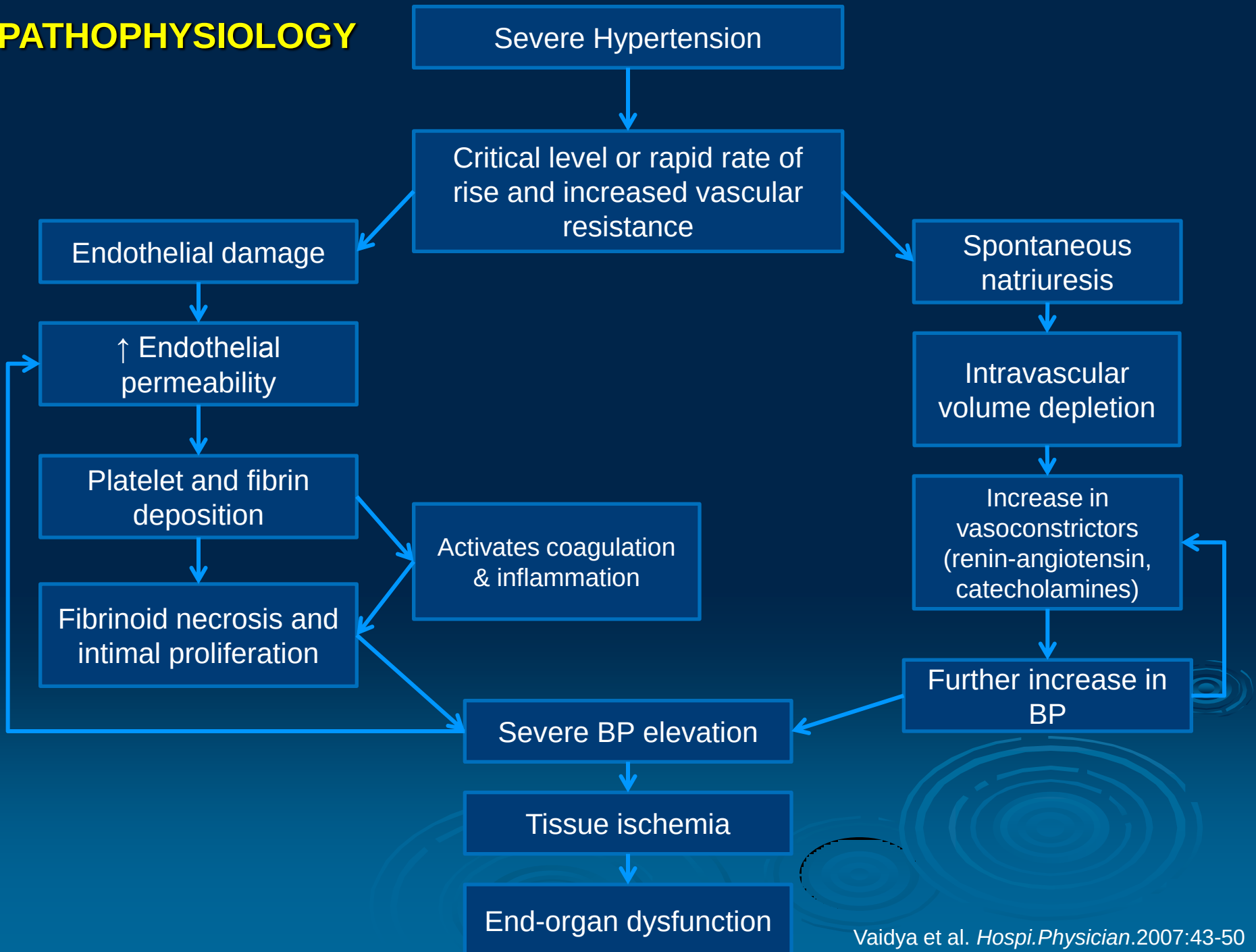
*Also can be considered an emergency on the basis of acute target organ dysfunction

Fenves et al. *Semin. Nephrol.* 2005;25:272-280

Pathophysiology

- Not well understood
- Failure of normal autoregulation and an abrupt rise in systemic vascular resistance

PATHOPHYSIOLOGY



Vaidya et al. *Hospi.Physician*.2007:43-50

Principle of Treatment

The initial goal of antihypertensive therapy is not to rapidly normalize BP but rather to prevent damage to target organ by gradually decreasing mean arterial pressure (MAP), while minimizing the risk of hypoperfusion

Asymptomatic severe hypertension

- Admission may be necessary in those on newly diagnozed or severe non-compliance is suspected. Patients already on treatment need to be reviewed and appropriate measures taken which include optimising treatment by using effective combination therapy

Hypertensive crisis

Hypertensive urgencies

- These patients need to be admitted
- Blood pressure measurement should be repeated after 30 minutes of bed rest.
- Initial treatment should aim for about 25% reduction in blood pressure over 24 hours.

Hypertensive emergencies

- All these patients most be admitted
- The blood pressure need to be reduced relatively quickly
- It is suggested that the blood pressure be reduced by 25% over 3 to 12 hours
- This is best achieved with parenteral drugs.

Management of Hypertensive Emergency (general)

- If this level of BP is well tolerated and the patients is clinically stable , further gradual reductions toward a normal BP can be implemented in the next 24 to 48 hours.
- **Exceptions :**

1. ***Patients with ischemic stroke***
2. ***Aortic dissection SBP should < 100 mmHg***
3. ***Patients whom BP is lowered to enable the use of thrombolytic agents***

Chobanian AV et al, The JNC 7 report, JAMA 2003;389: 2560-70

Parenteral Drugs for Treatment of Hypertensive Emergencies based on JNC 7

Drugs	Dose	Onset	Duration of Action
Sodium nitroprusside	0.25-10 ugr/kg/min	Immediate	1-2 minutes after infusion stopped
Nitroglycerin	5-500 ug/min	1-3 minutes	5-10 minutes
Labetalol HCl	20-80 mg every 10-15 min or 0.5-2 mg/min	5-10 minutes	3-6 minutes
Fenoldopan HCl	0.1-0.3 ug/kg/min	<5 minutes	30-60 minutes
Nicardipine HCl	**5-15 mg/h**	**5-10 minutes**	**15-90 minutes**
Esmolol HCl	250-500 ug/kg/min IV bolus, then 50-100 ug/kg/min by infusion; may repeat bolus after 5 minutes or increase infusion to 300 ug/min	1-2 minutes	10-30 minutes

Chobanian AV et al, The JNC 7 report, JAMA 2003;389-2560-70

Parenteral Drugs for Treatment of Hypertensive Emergencies based on ASA Guideline

Drug	I.V. Bolus Dose	Continous Infus Rate
Labetalol	5 – 20 mg every 15’	2 mg/min (max 300mg/d)
Nicardipine	NA	5-15 mg/h
Esmolol	250 ug/kg IVP loading dose	25-300 ug/kg/m
Enalapril	1,25-5 mg IVP every 6 h	NA
Hydralazine	5 – 20 mg IVP every 30’	1,5-5 ug/kg/m
Nipride	NA	0,1-10 ug/kg/m
NTG	NA	20-400 ug/m

This parenteral drugs are approved for hypertensive emergency in acute ischemic stroke and intracerebral hemmorhage

AHA/ASA Guideline, 2007 update. *Stroke.* 2007;38: 2001-2023.

Parenteral Drugs for Treatment of Hypertensive Emergencies based on CHEST 2007

Acute Pulmonary edema / Systolic dysfunction	Nicardipine, fenoldopam, or nitropruside combined with nitrogliceryn and loop diuretic
Acute Pulmonary edema/ Diastolic dysfunction	Esmolol, metoprolol, labetalol, verapamil, combined with low dose of nitrogliceryn and loop diuretics
Acute Ischemia Coroner	Labetalol or esmolol combined with diuretics
Hypertensive encephalopaty	Nicardipine labetalol, fenoldopam
Acute Aorta Dissection	Labetalol or combined Nicardipine and esmolol or combine nitropruside with esmolol or IV metoprolol
Preeclampsia, eclampsia	Labetalol or nicardipine
Acute Renal failure / microangiopathic anemia	Nicardipine or fenoldopam
Sympathetic crises/ cocaine oveerdose	Verapamil, diltiazem, or nicardipine combined with benzodiazepin
Acute postoperative hypertension	Esmolol, Nicardipine, Labetalol
Acute ischemic stroke/ intracerebral bleeding	Nicardipine, labetalol, fenoldopam

Marik Paul E, Varon Joseph, CHEST 2007;131:1949-62

USE OF NICARDIPINE

- **Nicardipine :**

  . Dihydropiridine class of CCB

- **Reduce peripheral resistance --- blood pressure**

- ***water soluble, light insensitive*, -- can be parenteraly used (difference with nifedipine / sodium nitroprusid)**

PRIMARY HEMODYNAMIC OF NICARDIPINE EFFECT

- peripheral vasodilatation
- preserve or enhanced cardiac pump activity
  ------ improve tissue perfusion
- fall in systemic blood pressure, maintain at desired level
- in comparison with sodium nitropruside – equally effective, but no cyanide toxic effect in long term use
- not associated adverse effect on cardiovascular and renal function

NICARDIPINE

CHARACTERISTIC

1.VASOSELECTIVITY
Nicardipine selectivity 30.000 x in smooth muscle cells blood vessels compared with myocardium

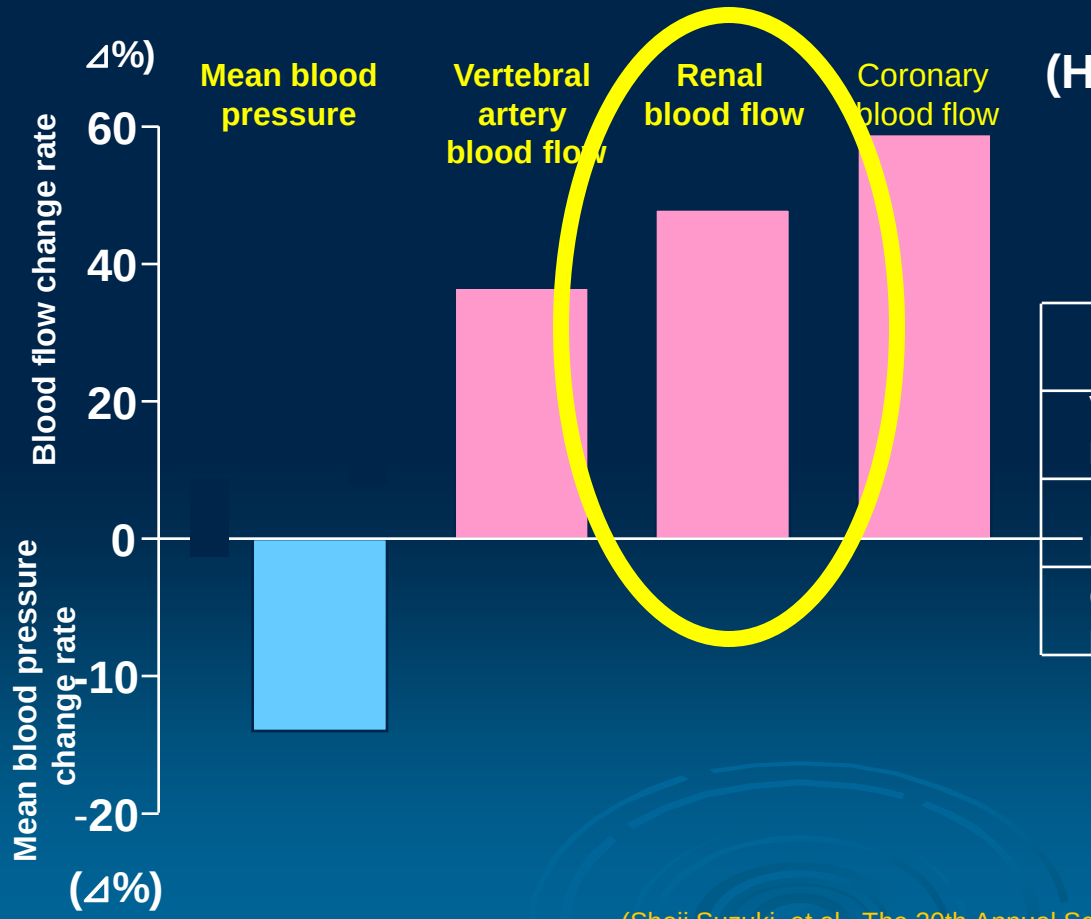
2. Myocardial depression (-)
3. Negative inotropic (-)
4. Rapid and stable antihypertensive effects, reduce blood pressure gradually < 25% in 2 hours, minimal effects to heart rate
5. Increase blood flow in major organs : Renal, coronary artery, cerebral

Actions to increase organ blood flow

Pharmacodynamic action

Perdipine: 3 μg/kg/min × 20 min

(Hypertensive patients, n = 9)



Baseline value

Mean blood pressure	103 ± 11 mmHg
Vertebral artery blood flow	183 ± 65 mL/min
Renal artery blood flow	563 ± 29mL/min
Coronary artery blood flow	121 ± 42 mL/min

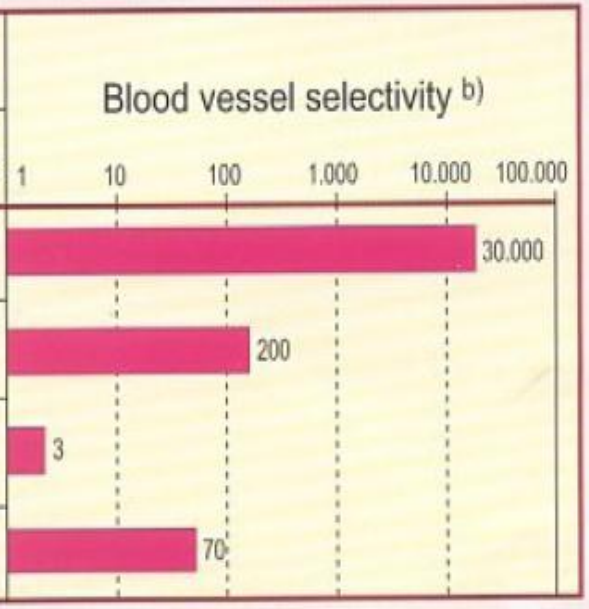
(Shoji Suzuki, et al., The 20th Annual Scientific Meeting of the Japanese Society of Hypertension: 1997)

Tissue selectivity between Calcium Antagonist

Tissue selectivity of various Ca antagonists [1)]

(Isolated rabbit aorta and ventricular muscle preparations, n = 5 to 21, Mean ± SEM)

Drug	Kca^{-1} Value (nM) [a)]	
	Aorta	Ventricular muscle
nicardipine hydrochloride	0.4 ± 0.1	12,000 ± 2.000
nifedipine	3.0 ± 0.9	730 ± 380
verapamil hydrochloride	160 ± 30	490 ± 180
diltiazem hydrochloride	180 ± 20	13,000 ± 4.000



a) Kca^{-1} is the concentration of a Ca antagonist required to shift the Ca^{2+} concentration-response curve two-fold to the right (the lower the value, the greater the suppressive effect)

b) Selectivity = (Kca^{-1} in ventricular muscles/Kca^{-1} in aorta)

Bristow et al. Br J Pharmacol1984; 309:82

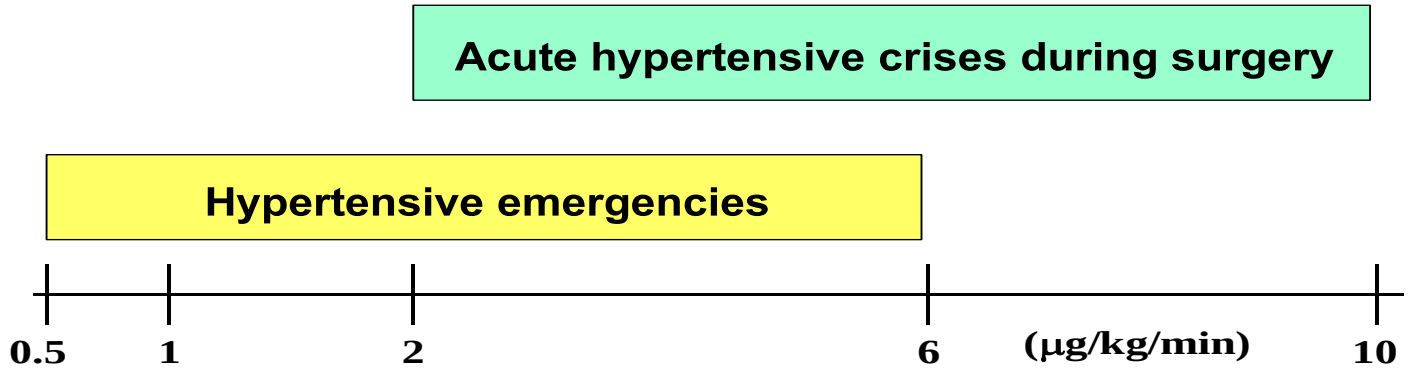
Comparison between Calcium Antagonist

Drug	Coronary Vasodilation	Suppression of Cardiac Contractility	Suppression of SA Node	Suppression of AV Node
Verapamil (phenylalkylamine)	++++	++++	+++++	+++++
Diltiazem (benzothiazepin)	+++	++	+++++	++++
Nicardipine (dihydropyridine)	+++++	0	+	0

Kerins DM. Goodman Gilman’s.10th ed.2001:843-70

DOSIS PERDIPINE

	DIV (μg/kg/min)	Bolus (μg/kg)
Acute hypertensive crises during surgery	2 - 10	10 – 30
Hypertensive emergencies	0.5 – 6	



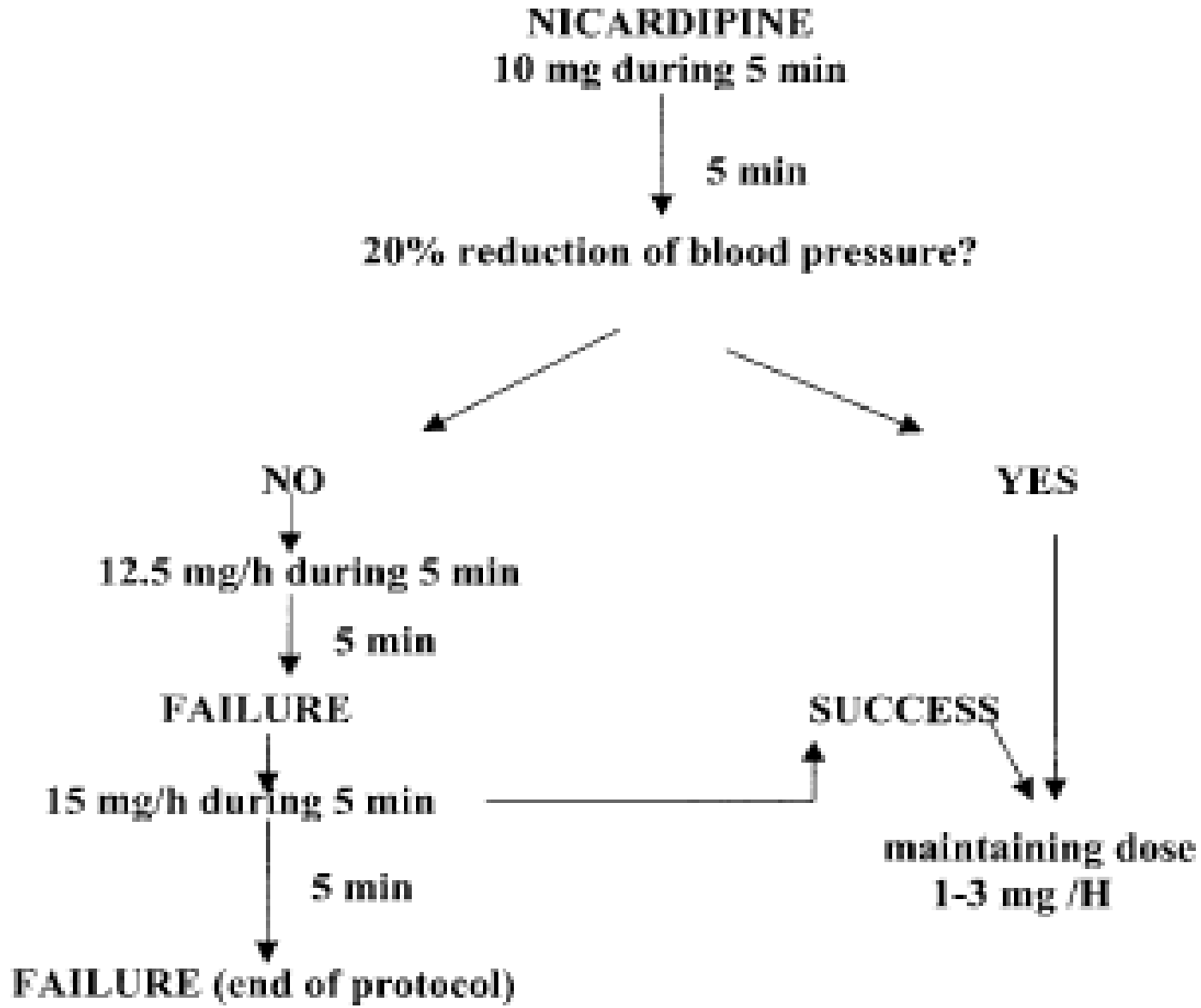


Fig. 3 Scheme of nicardipine administration

TABEL DOSIS

	INDIKASI	DOSIS PERDIPINE® INJEKSI (μg/kgBB/menit)											
		HIPERTENSI EMERGENSI			KRISIS HIPERTENSI AKUT SELAMA OPERASI								
	BERAT BADAN	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
Perdipine® injeksi 1 ampul 10 mg dalam larutan 50 cc (ml/jam) atau Perdipine® injeksi 2 ampul 10 mg dalam larutan 100 cc (Tetes/menit) mikrodrip	40 kg	6	12	18	24	36	48	60	72	84	96	108	120
	50 kg	7.5	15	22.5	30	45	60	75	90	105	120	135	150
	60 kg	9	18	27	36	54	72	90	108	126	144	162	180
	70 kg	10.5	21	31.5	42	63	84	105	126	147	168	189	210
	80 kg	12	24	36	48	72	96	120	144	168	192	216	240
	90 kg	13.5	27	41	54	81	108	135	162	189	216	243	270

Dosage and Administration

Start with the lowest dose.

Eg 0.5 mcg/BW/min → 15 drops → monitoring, if in 5-15 minutes there's no significant blood pressure reducing →

Increasing drip until 20 drop , and then can be increased until desirable blood pressure achieved (about 3-5 drops each after monitoring)

Monitoring blood pressure and heart rate frequently

Before choose to switch to oral, 1 hour before Perdipine is stopped, give oral drugs and Perdipine is tappered of

Nicardipine for the Treatment of Severe Hypertension in Pregnancy: A Review of the Literature

Aim of study:

To evaluate the efficacy and safety of intravenous nicardipine for the treatment of severe hypertension in pregnancy

Sources:

Medline and Cochrane

Patients:

Had chronic or gestational hypertension with or without marked proteinuria

Primary outcomes:

- Reduction of systolic/diastolic and/or mean arterial pressure
- Reduction of time to target blood pressure, and
- Reduction of severe maternal (hypotension, tachycardia) or severe fetal side effects (CTG abnormalities needing direct intervention)

Results:

- All patients had a significant reduction of both diastolic and systolic blood pressure.
- Treatment resulted in a 91% success rate in studies that defined success and 20% reduction of mean arterial blood pressure or systolic/diastolic blood pressure in 87%.
- Target blood pressure was reached within 23 minutes in 70% of the patients, 91% reached target blood pressure within 130 minutes

Conclusion:

Nicardipine is a very effective therapy for treatment of severe hypertension in pregnancy and may be a better alternative to other available treatment options

Bijvank SWAN, Duvekot JJ. Obgyn Survey 2010; 65(5):342-7

Characteristics of included studies

	Carbonne et al [19]	Hanff et al [21]	Elatrous et al [22]		Seki et al [30]			Aya et al [31]
Study design	Observational	Observational	Prospective randomized		Retrospective			Observational
No. patients	30	27	60		50			20
Type of Hypertension Therapy	Mixed Nicardipine	Mixed Nicardipine	Mixed Nicardipine	Mixed Labetalol	Mixed *Short	*Median	*Long	Unknown Nicardipine
GA at inclusion (wk)	33 ± 3.6	27 ± 5	35 ± 4	36 ± 2	33.9	33.4	15.8	32.3 ± 2.4
Systolic BP at inclusion (mm Hg)	180 ± 16	191 ± 40	176 ± 10	171 ± 8	NA	NA	NA	186 ± 10.6
Diastolic BP at inclusion (mm Hg)	116 ± 6.7	104 ± 24	110 ± 9	110 ± 10	NA	NA	NA	120 ± 7.7

All data are means ± SEM.
*Nicardipine.
GA indicates gestational age; NA, not available.

Antihypertensive effects of nicardipine administered intravenously

	Carbonne et al [19]			Hanff et al [21]	Elatrous et al [22]	Seki et al [30]			Aya et al [31]
Dosage	2 mg/h	4 mg/h	6 mg/h	NA	NA	Short*	Median*	Long*	NA
No. patients	9	8	3	27	30	20	20	10	20
Study period (days unless otherwise stated)		5.3		1 h	1 h	3.8	15.2	115.5	1 h
Significant BP reduction		Yes		Yes	Yes	Yes	Yes	Yes	Yes
No. patients with 20% reduction of BP	9†	8†	3†	NA	21‡		NA		20§
Time to success (min)	72.2	123.7	130	23	11.1		NA		18.3

*Dosage ranged from 20 to 80 mg/d.
†Diastolic blood pressure.
‡Both systolic and diastolic blood pressure.
§Mean arterial pressure.
GA indicates gestational age; NA, not available.

Bijvank SWAN, Duvekot JJ. Obgyn Survey 2010, 65(5):342-7

Nicardipine Treatment of Hypertension During Pregnancy

Objective:

To assess the effects of nicardipine, a dihydropyridine CCB, on the fetus and mother in hypertensive pregnant women

Methods:

-40 pregnant patients with mild or moderate hypertension received oral nicardipine 20 mg 3x/day (mean duration of treatment 9 $\pm$ 2.1 weeks)

-20 patients with severe preeclampsia (diastolic blood pressure ≥110 mmHG and 24-h proteinuria ≥500 mg) received nicardipine IV at 2, 4, or 6 mg/Kg/h (mean duration of treatment 5.3$\pm$3.6 days)

Carbonne B, Jannet D, Touboul C et al; Obstet Gynecol 1993;81:908-14

Results:

Table 1. Hemodynamic Changes With Oral Nicardipine Between Day 0 of Treatment, Day 8 of Treatment, Day of Delivery, and Day 7 Postpartum

	Day 0	Day 8	Delivery	Day 7 postpartum
Systolic blood pressure (mmHg)	152.8 ± 15.5	135.8 ± 15.0*	141.5 ± 19.5†	134.9 ± 17.3*
Diastolic blood pressure (mmHg)	95.5 ± 6.1	85.4 ± 11.4*	87.1 ± 11.8*	80.6 ± 13.7*
Maternal heart rate (bpm)	88.4 ± 10.7	85.5 ± 8.1 (NS)	84.5 ± 9.7 (NS)	79.2 ± 8.1*

NS = not significant when compared to the control group, by Student *t* test; bpm = beats per minute.
Data are presented as mean ± SD.
* $P < .001$, Student *t* test.
† $P < .01$, Student *t* test.

Table 2. Biologic Data Before Treatment With Oral or Intravenous Nicardipine and on Delivery Day

	Oral treatment		Intravenous treatment	
	Day 0	Delivery	Day 0	Delivery
Uric acid (μmol/L)	286 ± 101	322 ± 120 (NS)	350 ± 95	360 ± 83 (NS)
Creatinine (μmol/L)	63 ± 24	68 ± 33 (NS)	74 ± 23	81 ± 39 (NS)
Platelets ($10^3/\mu L$)	285 ± 86	269 ± 97 (NS)	200 ± 63	191 ± 69 (NS)

NS = not significant when compared to the values on day 0, by Student *t* test.
Data are presented as mean ± SD.

Carbonne B, Jannet D, Touboul C et al; Obstet Gynecol 1993;81:908-14

Table 3. Doppler Studies Performed at 34 Weeks' Gestation in the Oral Group and the Intravenous Group

	Day 0	During treatment
Oral treatment*		
Umbilical artery	0.33 ± 0.07	0.31 ± 0.07 (NS)
Uterine artery	0.46 ± 0.11	0.42 ± 0.09 (NS)
Middle cerebral artery	0.24 ± 0.08	0.24 ± 0.09 (NS)
Intravenous treatment†		
Umbilical artery	0.30 ± 0.09	0.33 ± 0.09 (NS)

NS = not significant when compared to the values on day 0, by Student *t* test.

Data are presented as mean ± SD, using the ratio of least-diastolic velocity to peak systolic velocity (D/S).

* Mean duration of treatment 6 weeks.

† 48 hours of treatment.

Carbonne B, Jannet D, Touboul C et al; Obstet Gynecol 1993;81:908-14

Table 4. Pregnancy and Neonatal Outcomes After Treatment With Oral and Intravenous Nicardipine

Variable	Mean ± SD	Range	*N* (%)
Oral treatment (*N* = 40)			
Term of delivery (wk)	36.4 ± 2.8	26–40	
<37 wk			15 (37.5%)
Birth weight (g)	2524 ± 808	810–4180	
<10th percentile			17 (42.5%)
Birth height (cm)	45.95 ± 3.7	36–52.5	
<10th percentile			14 (35%)
Head circumference (cm)	32 ± 2.9	22.5–37	
<10th percentile			10 (25%)
Apgar score, 1 min	6.7 ± 3.3	1–10	
<7			14 (35%)
Apgar score, 5 min	8.85 ± 1.7	4–10	
<7			5 (12.5%)
Neonatal glycemia (μmol/L)	3.06 ± 1.0	0.2–4.9	
<2.20			8 (20%)
Neonatal calcemia (μmol/L)	2.24 ± 0.06	2.14–2.29	
<2.00			0
Cord vein pH	7.23 ± 0.10	6.99–7.38	
Transfers in NICU*			7 (17.5%)
Hypotonia			4 (10%)
Intravenous treatment (*N* = 20)			
Term of delivery (wk)	34.7 ± 3.7	28–40	
<37 wk			13 (65%)
Birth weight (g)	2052 ± 954	900–4180	
<10th percentile			15 (75%)
Birth height (cm)	44.3 ± 4.8	37–51	
<10th percentile			8 (40%)
Head circumference (cm)	31.5 ± 2.9	27–35	
<10th percentile			3 (15%)
Apgar score, 1 min	6.6 ± 3.2	1–10	
<7			8 (40%)
Apgar score, 5 min	8.7 ± 1.8	6–10	
<7			2 (10%)
Neonatal glycemia (μmol/L)	3.40 ± 1.1	1.2–5.7	
<2.20			1 (5%)
Neonatal calcemia (μmol/L)	2.41 ± 0.19	2.18–2.75	
<2.00			0
Cord vein pH	7.22 ± 0.09	7.01–7.34	
Transfers in NICU†			6 (30%)
Hypotonia			1 (5%)

NICU = neonatal intensive care unit.
Data are presented as mean ± SD, range, and number of patients with abnormal values.
* Mean term of delivery 31.8 ± 2.9 weeks.
† Mean term of delivery 30.6 ± 2.7 weeks.

Carbonne B, Jannet D, Touboul C et al; Obstet Gynecol 1993;81:908-14

Nicardipine Treatment of Hypertension During Pregnancy

Conclusion:

Oral or IV nicardipine seems to be safe in hypertensive pregnant patients with the dose used in our study

Carbonne B, Jannet D, Touboul C et al; Obstet Gynecol 1993;81:908-14

Article

Long-term treatment with nicardipine for severe pre-eclampsia

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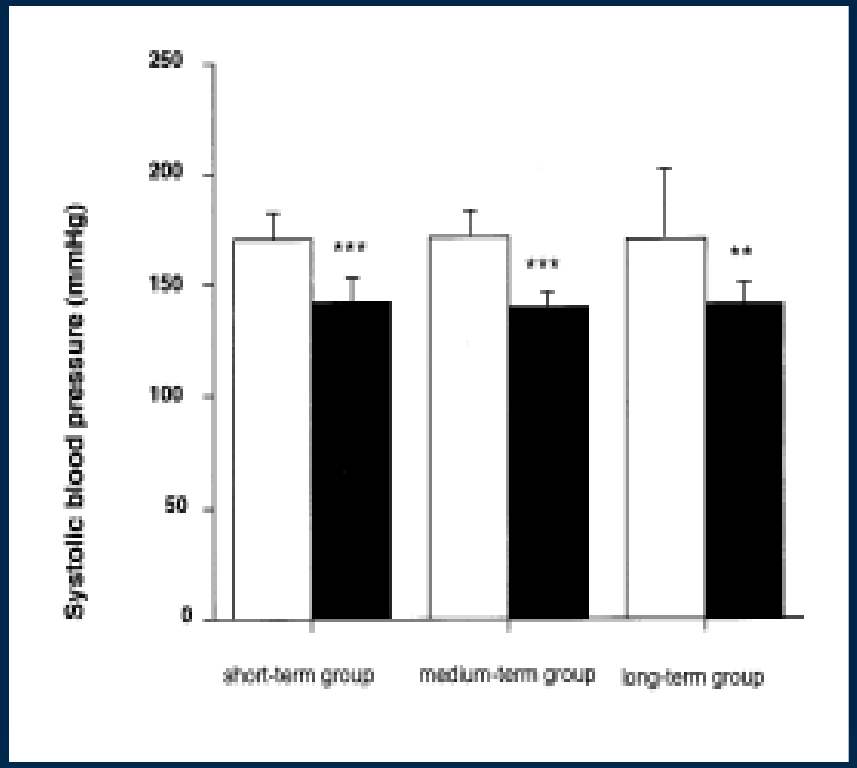
Objective: *To evaluate the safety of long-term nicardipine treatment in severely pre-eclamptic women and their* fetuses newborns.

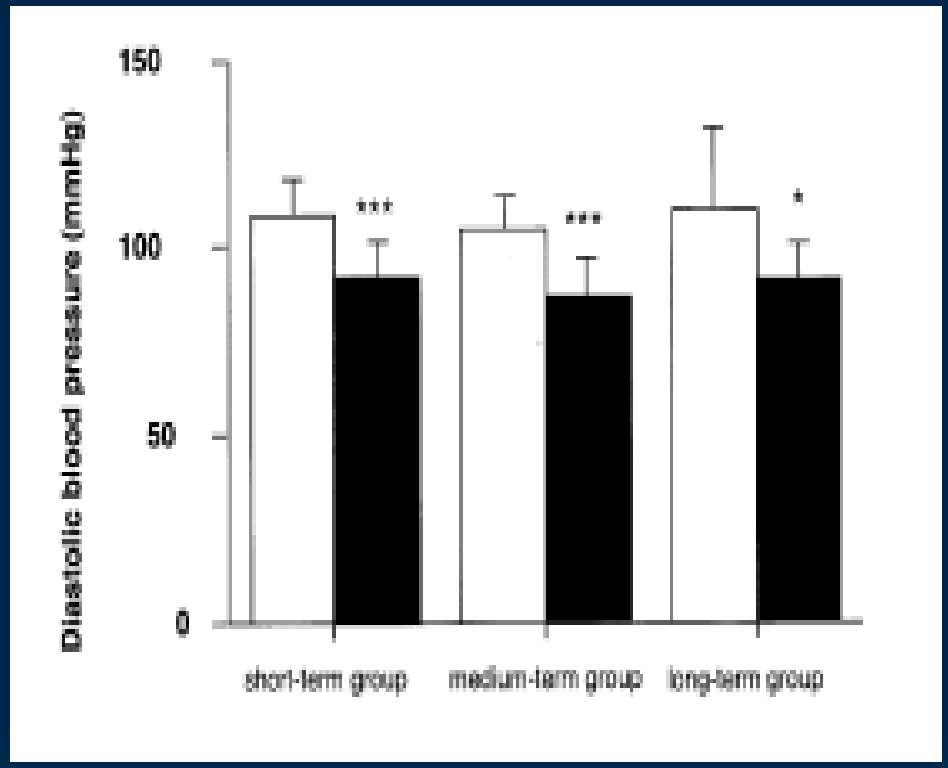
Methods: *We divided 50 pregnant women into three groups according to the length of their* treatment: short-term treatment of severely pre-eclamptic women (7 days or less *n20); medium-term treatment* also of severely pre-eclamptic women (8-28 days, *n20); and long-term treatment of women with severe* superimposed pre-eclampsia (29 days or more, *n10.)*

Table 2
Pregnancy outcome in mothers

	Short-term group ($n = 20$)	Medium-term group ($n = 20$)	Long-term group ($n = 10$)
Gestational age at delivery (weeks)	34.7 ± 3.9	35.9 ± 2.3	34.0 ± 3.2
Range			
Number of premature deliveries	12/20 (60%)	12/20 (60%)	8/10 (80%)
< 28 weeks	1/20 (5%)	0/20 (0%)	0/10 (0%)
≥ 28 weeks	11/20 (55%)	12/20 (60%)	8/10 (80%)
Adverse effect in mother	1/20 (headache)	0/20 (0%)	0/10 (0%)
Abnormal NST	1/20 (loss of variability)	0/20 (0%)	0/10 (0%)

Data are presented as mean $\pm$ S.D. or n (%). There were no significant differences in any of the categories studied.





before administration

after administration

*** p<0.001

** p<0.01

* p<0.025

Fig. 1. The anti-hypertensive effect of nicardipine in three groups. Data are presented as mean ± S.D. Nicardipine significantly lowered both systolic ($P < 0001$, $P < 0001$, $P < 001$) and diastolic blood pressures ($P < 0001$, $P < 0001$, $P < 0025$) in the short-, medium-, and long-term groups.

Table 3
Prolongation of pregnancy

	Prolongation of pregnancy (days)	No. of patients with pregnancy Prolonged ≥ 1 week
Short-term group ($n = 20$)	4.4 ± 5.5	3/20
Range	1–24	
Medium-term group ($n = 20$)	17.2 ± 8.2	19/20
Range	6–40	
Long-term group ($n = 10$)	128.5 ± 88.9	10/10
Range	31–271	
Total ($n = 50$)	34.3 ± 62.2	32/50
	1–271	

Data are presented as mean ± S.D. The prolongation in the duration of pregnancy by the drug was significantly longer ($P < 0001$) in the medium- and long-term administration groups than in the short-term administration group. (Mann-Whitney test).

Table 4
Fetal/neonate outcomes

	Short-term group ($n = 20$)	Medium-term group ($n = 20$)	Long-term group ($n = 10$)
Birth weight (g)	2017.4 ± 795.5	2070 ± 549.3	1643.2 ± 553.00
light-for-date (n)	8 (40%)	7 (35%)	7 (70%)
Apgar score			
at 1 min	7.5 ± 2.1	8.1 ± 1.2	7.1 ± 2.1
at 5 min	9.4 ± 0.9	9.2 ± 0.7	9.2 ± 0.8
≤ 7 at 1 min	6 (30%)	3 (155)	5 (50%)
n at 5 min	1 (5%)	0 (0%)	0 (0%)
Admitted to intensive care neonatal unit (*n*)	12 (60%)	10 (50%)	7 (70%)
Days in intensive care Neonatal unit	82.8 ± 74.7	39.6 ± 15.1	52.8 ± 35.1
Complications (*n*)	1 (5%) Hydrocephalus and retinopathy of prematurity	0 (0%)	0 (0%)
UApH	7.227 ± 0.055	7.230 ± 0.066	7.269 ± 0.055
< 7.200 (*n*)	5 (255)	5 (255)	1 (10%)
Plasma Ca Concentration	8.9 ± 0.5	8.9 ± 0.6	9.2 ± 0.5

Data are presented as mean ± S.D., or *n* (%).

Conclusion

Suggest that long-term treatment with nicardipine for severe pre-eclampsia is as effective and safe as a short- and medium-term treatment.

Short-term treatment of severe hypertension of pregnancy: prospective comparison of nicardipine and labetalol

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Intensive Care Med (2002) 28:1281–1286
DOI 10.1007/s00134-002-1406-3

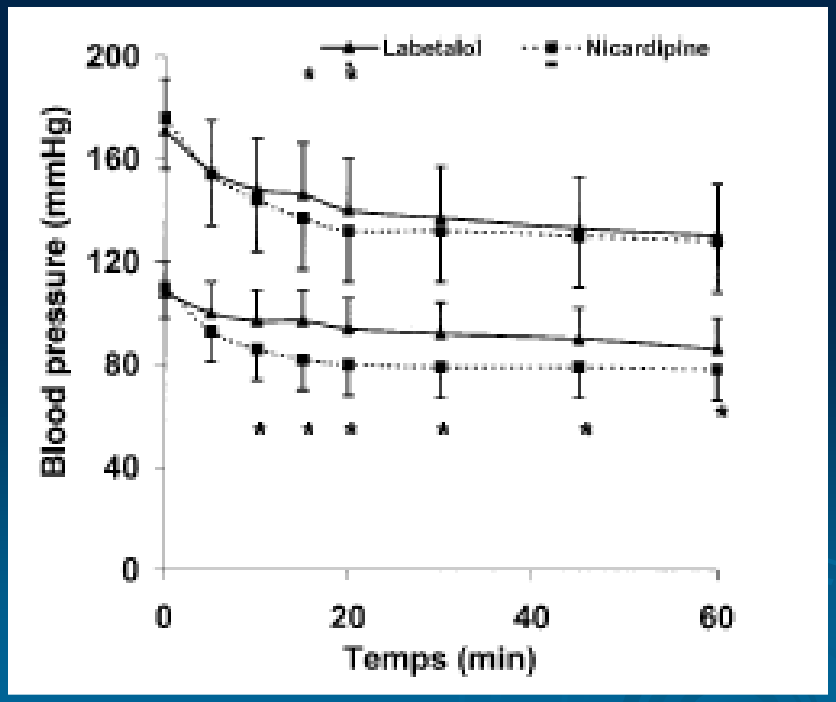
Objectives: To assess the efficacy and safety of nicardipine in comparison to labetalol in the initial management of severe hypertension in pregnancy.

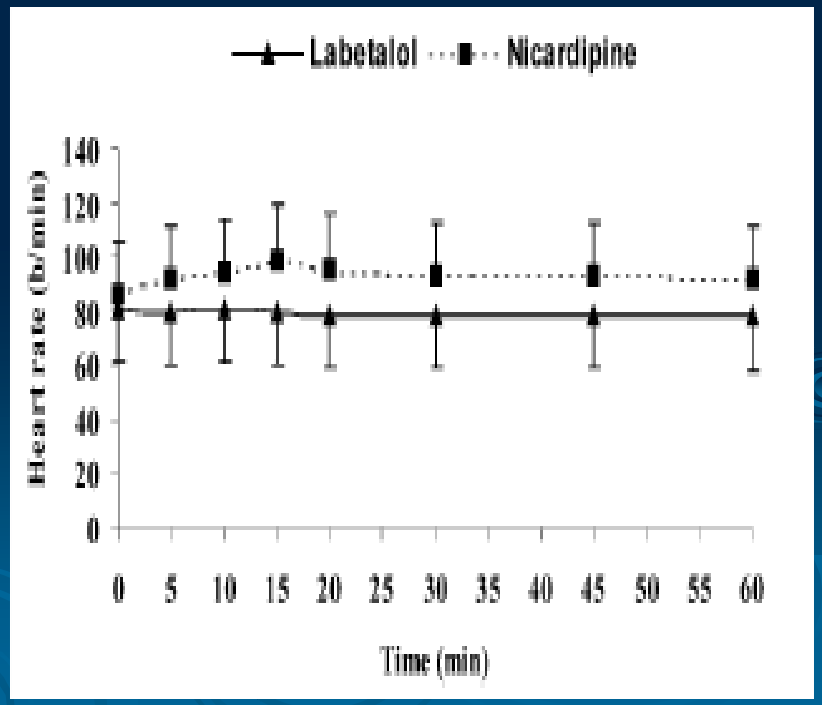
Design: Randomized prospective study. *Setting: The obstetric* ward of the teaching hospital of Monastir Tunisia. *Patients: Sixty* consecutive pregnant women admitted beyond the 24th week of pregnancy with severe hypertension.

Table 3 Comparison of study groups according to principal end-points

	Labetalol (n=30)	Nicardipine (n=30)
Success rate	19 (63%)	21 (70%)
Elapsed time to success (min)	12.38±6.25	11.09±3.68
Number of dose modifications	0.5±0.5	1.43±0.68*

*p<0.05





Conclusion

Nicardipine and labetalol are effective and safe in the initial treatment of severe hypertension of pregnancy.

SUMMARY

- Hypertensive Crises is an urgent situation that need rapid management to prevent organ damage
- Antihypertensive agent that preffered in this condition should be fast action, parenteral, and titratable
- Nicardipine is the only Calcium Antagonist recommended by JNC 7, AHA, 2007, CHEST 2007 to manage hypertensive emergency
- Nicardipine has favorable antiischemic profile because of an increase myocardial , brain, and kidney oxygen supply

THANK YOU FOR YOUR ATTENTION