



**Emergency Department
Hypertensive Patient
Emergencies:
*Case Presentations and
Panel Discussion***

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**2007 EMA Advanced
Emergency & Acute Care
Medicine Conference**

*Atlantic City, NJ
September 24, 2007*

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Disclosures

- FERNE Chairman and President
- FERNE advisory board for The Medicine Company in May 2007
- FERNE grant by The Medicines Company to support this program
- No individual financial disclosures

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Learning Objectives

- Determine the definition of hypertensive emergencies, and discuss their epidemiology and pathophysiology in ED patients with stroke syndromes.
- Identify what therapies are available for the treatment of ED patients with hypertensive emergencies and stroke syndromes.

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Learning Objectives

- Discuss the clinically relevant endpoints for the evaluation and management of ED patients with hypertensive emergencies.
- Understand what guidelines and recommendations assist emergency care providers in optimally treating ED patients with hypertensive emergencies and stroke syndromes.

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Case Presentation

A 64 year old male patient with a history of hypertension and diabetes presents to the Emergency Department with a new onset of ipsilateral right-sided facial droop, arm and leg weakness, aphasia, and gaze to the left. His vital signs are BP 240/135, HR110, RR 16, and Temp 98.4.

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ED Neuroprotection: *Key Concepts*

- Outcome related to infarct volume
- Need to limit infarct size
- Aggressively Rx ischemic penumbra

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ED Neuroprotection: *Key Concepts*

- Outcome related to infarct volume

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Infarct Volume and Outcome


- Vessel occlusion
- Infarct core
- Ischemic penumbra

- How large is the core in the ED?
- What is the penumbra conversion?
- Do ED therapies limit infarct growth?

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ED Neuroprotection: *Key Concepts*

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Limiting Infarct Size

- Enhance perfusion
- Treat hypoxia, hypotension
- Limit ischemic cascade effects
- Prevent complications

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Preventing Complications



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Aggressively Rx Ischemic Penumbra

- Maximize cerebral perfusion
- Provide optimal substrates, O₂
- Avoid cell death
- Maintain intact blood brain barrier

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Cerebral Perfusion

- $CPP = MAP - ICP$
- Cerebral perfusion pressure
- Mean arterial pressure
- Intracranial pressure

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Cerebral Perfusion

- $CPP = MAP - ICP$
- If $MAP = 110$ mmHg, $ICP = 10$ mmHg
- CPP then equals 100 mmHg
- Cerebral blood flow auto-regulation
- CPP maintained over range of MAPs
- Pathological ICP elevations limited

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Mean Arterial Pressure

- 120 / 75 $MAP = 90$ mmHg
- 210 / 120 $MAP = 150$ mmHg
- 180 / 110 $MAP = 132$ mmHg
- How much MAP therapy is OK?
- What agents provide best Rx?
- How to avoid watershed infarct?

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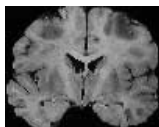


Watershed Infarct

wa-ter-shed (wô t r-sh d) *n.*

1. A ridge of high land dividing two areas that are drained by different river systems. Also called *water parting*.
2. The region draining into a river, river system, or other body of water.
3. A critical point that marks a division or a change of course; a turning point:

watershed infarction *n.*
Infarction of the cerebral cortex
in an area of blood supply
between two major cerebral
arteries.



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ED Neuroprotection: *Key Concepts*

- Outcome related to infarct volume
- Need to limit infarct size
- Aggressively Rx ischemic penumbra
- ED MD is the best neuroprotectant

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MAP Calculation

- BP 240/135
- $MAP = 1/3 SBP + 2/3 DBP$
- One third systolic = 80
- Two thirds diastolic = 90
- $MAP = 170$ mm Hg

Robert A. Giles, MD, FACEP



ED Patient BP Management

- BP 240/135
- $MAP = 170$ mm Hg
- 25% reduction??
- $MAP = 130$ mm Hg
- BP 180/105

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Key Clinical Question

- How should this hypertensive emergency be managed in the setting of this stroke syndrome in order to minimize the risk of hemorrhage and to maximize the chance for a good outcome for this patient?

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Clinical Questions

- Are hypertensive urgency and emergencies as well as the need to treat ED patients defined mostly by the severity of end organ illness manifested by the patient as opposed to the actual BP value?

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Clinical Questions

- Is the amount of desired blood pressure reduction based on the initial BP value, the end organ involved, the severity of illness, complication risk, or the apparent response to therapy that the ED patient manifests during the therapy?
- What is that amount?

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Clinical Questions

- Is there a consensus in the ED community on an optimum value or range of BP values at which therapy can be terminated because of success in reaching a therapeutic endpoint?
- Who determines this consensus?

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Clinical Questions

- What is this optimal endpoint in the treatment of hypertensive blood pressure management, and is it based upon Systolic BP, Diastolic BP, Mean Arterial BP, or some end organ function?
- Why?

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Clinical Questions

- Does this optimal therapeutic endpoint need to be modified based on the type of stroke syndrome such as acute ischemic stroke as compared to intracerebral hemorrhage or subarachnoid hemorrhage?

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Clinical Questions

- Does this optimal therapeutic endpoint need to be modified based on specific other end organ involvement, such as acute renal failure or acute myocardial infarction?

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Clinical Questions

- What are the optimal medication therapies available to manage the blood pressure of the patient with a hypertensive emergency?
- Is there a “best choice” therapy?
- Why?

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Clinical Questions

- What drugs do you most commonly use to treat ED patients with hypertensive emergencies as well as those who have a concomitant stroke syndrome?

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Clinical Questions

- Do you use esmolol?
- Do you use labetalol?
- Do you use nitroglycerine?
- Do you use sodium nitroprusside?

- How? Why?

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Clinical Questions

- Do you use nicardipine?
- Do you use hydralazine?
- Do you use enalaprilat?
- Do you use fenoldopam?
- Do you use phentolamine?

- How? Why?

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Clinical Questions

- Do you use oral agents?
- Do you unit dose for IVP agents?
- Do you avoid continuous infusion Rx?
- Do you mix agents?

- How? Why?

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Clinical Questions

- Is there an optimal time course for treatment of elevated blood pressure?
- If yes, can this standard be implemented in all comprehensive Emergency Departments, or should it be achieved optimally in the intensive care unit?

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Clinical Questions

- Is there a specific perspective of the treating nurse regarding what we do and how we can improve the process and patient outcomes?

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Clinical Questions

- How are we recording these changing Vitals and Blood Pressures that are automatically generated?
- Are they a part of the RN or MD electronic medical record?
- Can they be retrieved retrospectively?

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Clinical Questions

- Should patients with hypertensive emergencies be treated in the EMS setting?
- How?

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Clinical Questions

- What published guidelines should be studied by all EMS and ED emergency care providers because of their broad scope and proven clinical relevance and applicability to successful hypertension management, enhanced reperfusion and neuroprotection, and correlation to improved clinical outcome?

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Clinical Questions

- What are the medico-legal implications of the ED management of patients with hypertensive emergencies and those with concomitant stroke syndromes?

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Clinical Questions

- Are there any as of yet not discussed or resolved issues?
- Is there any other important information to discuss?

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Conclusions

- Medicine is an art, not a science
- Vice versa is also true
- We conduct clinical trials every day
- Therapeutic trials, N = 1
- We observe and converge towards a unified approach without knowing it
- This session assists in the process

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Questions?

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