An Anesthesia Perspective on Perioperative Hypertension

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Meet the Patient: Mrs. Fatema Begum (40 Y/O)

Clinical History

Chief Complaints:
Recurrent right upper quadrant abdominal pain and postprandial discomfort.

Diagnosis: Ultrasound confirmed multiple gallstones

Planned Procedure: Elective Laparoscopic Cholecystectomy under General Anaesthesia

Hypertension History: 3 years duration.

- Bisoprolol 2.5 mg daily
- Amlodipin 5 mg daily

Patient Snapshot : Preoperative Assessment

Presenting context

Blood pressure is **slightly elevated** but in an acceptable range for undergoing elective surgery

Contributor

Preoperative anxiety and fear due to sympathetic nervous system activation

Catecholamines ↑ → SVR ↑ → BP ↑

Intervention

Reassurance

PREOPERATIVE BP
145/96 mmHg

PREOPERATIVE HR
62 b/m

SPO2
99

Clinical & Lab Findings

Negative Target Organ Symptoms: No chest pain, dyspnea, oedema, blurring of vision or neurological deficits.

ECG: Normal.
Echo- Normal, EF= 60%

Investigations: Normal Hb, normal serum creatinine, normal electrolytes, acceptable blood glucose.

The Anesthesia Starts

Pre induction

BP- 140/90 mmHg, **HR-** 64 b/m, **SPO2-** 100%

Induction

1. Preoxygenation: 100% Oxygen for 2 minute
2. Blunt sympathetic response: IV Lignocaine
3. Premedication: Atropine
4. Analgesia: Opioid (Fentanyl)
5. Choice of Anaesthetic agent: Propofol
6. Muscle relaxant: Suxamethonium

The First Challenge: Airway

INTUBATION RESPONSE

Laryngoscopy & Intubation

Following preoxygenation and smooth induction, direct laryngoscopy is performed.

Monitor Suddenly Shows:

BP 158/86 mmHg | HR 86 b/min

Pathophysiology:

Airway stimulation

↓

Instance sympathetic discharge

↓

Catecholamine release

↓

Increase BP, HR

The Laparoscopic Twist

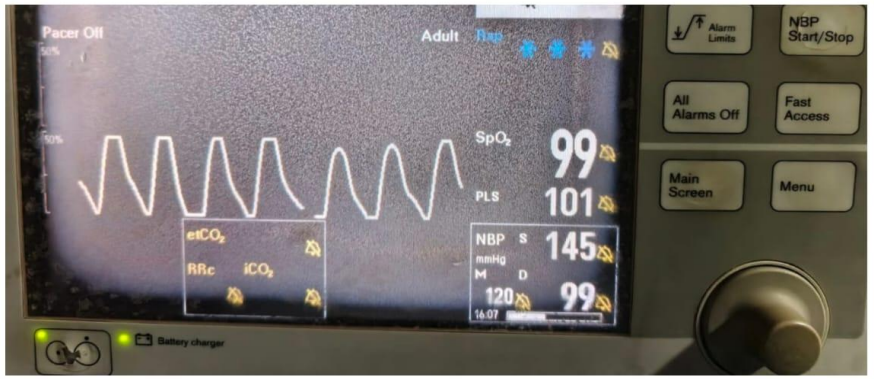
PNEUMOPERITONEUM

CO_2 Insufflation Initiated

The surgeon creates pneumoperitoneum. Intra-abdominal pressure rises to 12-14 mmHg.

Hemodynamic Response:
BP 145/99 mmHg | HR 101 b/min

Laparoscopy is visually "minor" due to tiny skin incisions, but creates profound physiological stress.



Why Does Pneumoperitoneum Matter?

Mechanical Effects

↑ Intra-abdominal Pressure (IAP)

↓

Compression of abdominal aorta & visceral beds

↓

Systemic Vascular Resistance (SVR) ↑ → BP ↑

Humoral & Chemical

CO_2 Absorption across peritoneum

↓

$PaCO_2$ ↑ (Hypercarbia)

↓

Direct Sympathetic Stimulation → HR ↑ & BP ↑

Neuroendocrine Surge

Renin-Angiotensin System Activation

↓

Vasopressin (ADH) Release

↓

Exacerbated afterload

Position Change: The Sudden Drop

145/99

104/80

mmHg Blood Pressure

REVERSE TRENDELENBURG TILT

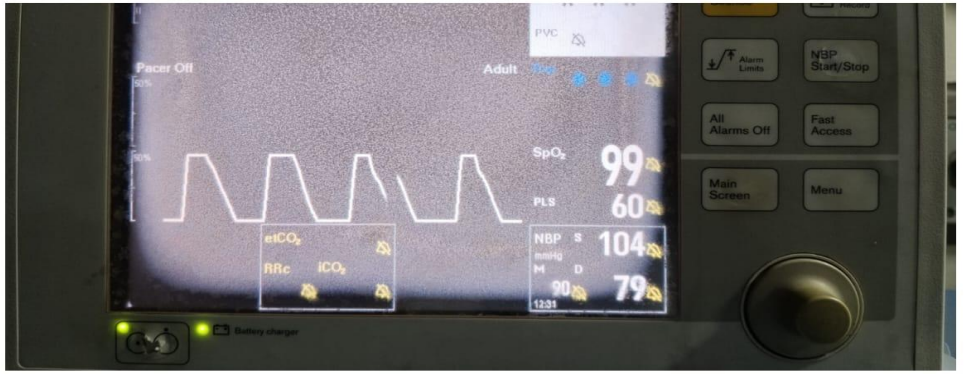
"What Happened?"

Patient tilted head-up, right side up for gallbladder exposure

Key Clinical Message:

Reduce venous return → Reduces cardiac output

→ Decrease BP



The Balancing Act

Maintenance

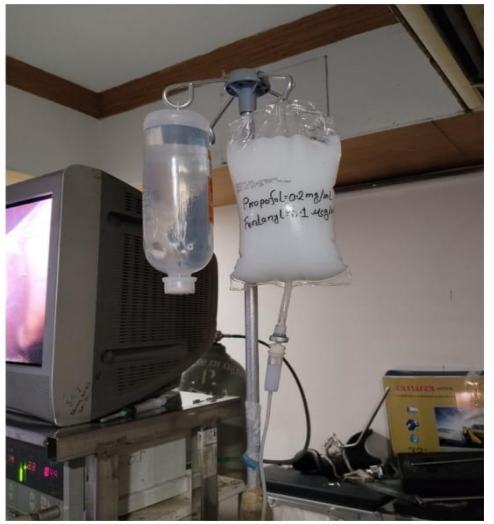
- **Adequate depth of anaesthesia:** Increase concentration of volatile anaesthetic, IV propofol infusion.
- **Adequate analgesia:** IV opioid, IV Paracetamol or Ketorolac
- **Antihypertensive:** IV Labetalol or Nitrates.
- **Avoid fluid overload**

We are trying to maintain:

❤ Coronary perfusion
🧠 Cerebral perfusion
□ Adequate oxygenation/ventilation
□ Adequate organ perfusion.

While allowing:

🔪 Surgical conditions
🫁 Pneumoperitoneum



The Most Dangerous Phase?

The operation is finished.

The surgeon says: "We're done."

But the anesthesiologist thinks

"Not yet."

EMERGENCE

Another period of sympathetic stimulation

Identify & Treat Emergence Triggers

- **Airway Stimulation:** ETT tube biting & coughing
- **Inadequate Analgesia:** Residual port site pain
- **Physiological Stimuli:** Full bladder / Shivering / Hypercarbia

Extubation: Another Hemodynamic Test

Awakening and airway stimulation may recreate the sympathetic surge.

BP
158/100 mmHg

HR
106 b/min

Don't simply treat the number

First assess the patient, airway, oxygenation, ventilation, pain and level of agitation.

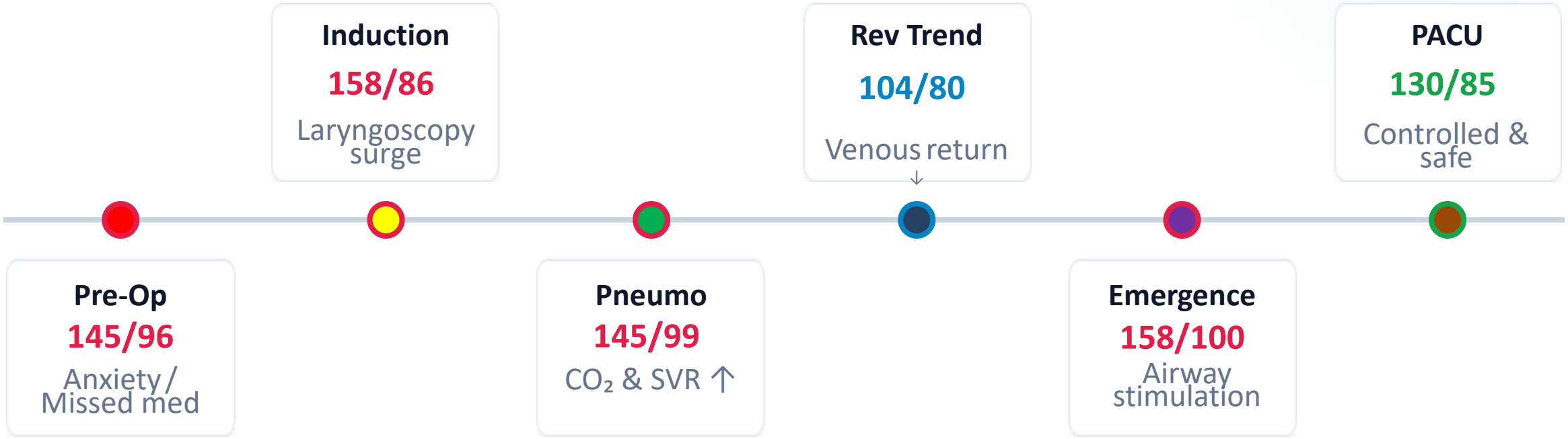
Extubation → Stimulation of stress response → Catecholamine release → ↑ BP , ↑ HR

- Pain
- Agitation
- Airway stimulation
- Hypercarbia
- Bladder distension
- Hypoxia
- Shivering

Recovery: Safe arrival

Phase	Hemodynamic Status
Recovery	BP 130/85 mmHg HR 66 b/m
Cardiac	Normal sinus rhythm
Neurological	Fully alert, oriented
Respiratory	SpO_2 99% on 2L O_2

The Case in One Picture: Hemodynamic Journey



The perioperative BP roller coaster

Hypertension (Definition & Classification)

Definition

Sustained systolic blood pressure above 140 mmHg or a diastolic blood pressure above 90 mmHg is termed as hypertension.

Worldwide hypertension is the leading risk factor for perioperative morbidity and mortality, particularly in untreated or poorly treated patient.

Classification

Stage	Systolic Blood Pressure	Diastolic Blood Pressure
Normal	<120	<80
Prehypertension	120–139	80–89
Stage 1 hypertension	140–159	90–99
Stage 2 hypertension	≥160	≥100

Causes of Perioperative Hypertension

Pre-operative

- Anxiety and fear
- White coat hypertension
- Missed antihypertensive drug
- Uncontrolled chronic hypertension

Intra-operative

- Laryngoscopy and intubation
- Light anaesthesia
- Inadequate analgesia
- Surgical stimulation
- Hypoxia/ hypercarbia
- Fluid overload

Post-operative

- Pain
- Agitation/anxiety
- Shivering
- Hypoxia/hypercarbia
- Emergence and extubation
- Urinary retention
- Withdrawal of medication

Why Does Hypertension Matter Around Surgery?

Before surgery

Long-standing hypertension may coexist with heart, kidney or vascular disease.

Good assessment helps the team understand baseline BP and overall risk.

It is a major risk factor for:

- .Myocardial Infarction
- .Stroke
- .CKD
- .Arrhythmia
- .Heart failure

During surgery

Anesthesia, pain, airway stimulation, blood loss, fluid changes, carbon dioxide and surgical stress can move BP up or down.

After surgery

Pain, agitation, shivering, hypoxia, hypercarbia, hospital environment and missed medicines can contribute to BP changes.

General Management of Hypertension

LIFESTYLE

1. Healthy eating
2. Physical activity
3. Healthy weight
4. Adequate sleep
5. Avoiding tobacco.

GOAL

Age < 60years: 140/90 mmHg
Age > 60 years 150/90 mmHg

MEDICATION

Commonly used hypertensives are

1. ACE inhibitors: Ramipril, Captopril, Enalapril
2. ARB: Losartan, Valsartan, Telmisartan, Olmesartan
3. Beta blockers: Bisoprolol, Atenolol, Metoprolol
4. CCB: Amlodipine, Nifedipine
5. Diuretics: Thiazides, Frusemide, Spironolactone
6. Vasodilators: Hydralazine, Nitrates

Evaluation & Optimization

EVALUATION

- Duration & degree of control
- History of chest pain, dyspnea, exercise intolerance
- Associated comorbidities
- Previous cardiovascular events

Planning

- Be prepare for any kind of emergence during surgery

OPTIMIZATION

- Continue or hold medications
- Continue antiplatelets but withdrawal of oral anticoagulants 5 days prior operation needed
- Correction of electrolyte abnormalities
- Optimization of other comorbidities
- An opinion from a cardiologist highly appreciated
- Airway assessment
- Appropriate preoperative fasting
- Premedication: Anxiolytics or Sedatives

Antihypertensive medications: continue or hold?

β-blocker	Usually continue if chronic	Abrupt withdrawal can be harmful
ACEI / ARB	Usually hold peri-op	Perioperative severe hypotension risk
CCB	Usually continue	Watch BP/HR
Diuretics	Usually hold on the day of operation	Volume / electrolyte issues

Medication decisions are class-specific and patient-specific.

When to Postpone Surgery

EMERGENCY SURGERY

Do not postpone a life-saving operation solely because of a high BP reading. The anesthesia team manages severe hypertension and other risks in real time.

ELECTIVE SURGERY — CONSIDER POSTPONEMENT WHEN:

- **≥180 mmHg systolic**
- **≥110 mmHg diastolic**
- **Evidence of acute target organ damage**

When Surgery Can Proceed After Postponement

POSTPONE → OPTIMIZE → REASSESS → PROCEED

STANDARD OPTIMIZATION

A delay of 14-30 days is recommended to safely adjust oral medications and allow the body's vascular autoregulation to adapt.

RAPID CLEARANCE

If high BP was temporary — for example anxiety, pain, or a missed dose, once consistent surgery can be rescheduled in a few days.

EXTENDED DELAY

If investigation reveals target organ damage the procedure may be delayed for several months.

KEY MESSAGE

Do not use a fixed number of days for every patient. Surgery can proceed when the cause is addressed, the patient is clinically stable, and the anesthesia/surgical team considers the risk acceptable.

Intraoperative BP Target

Aim

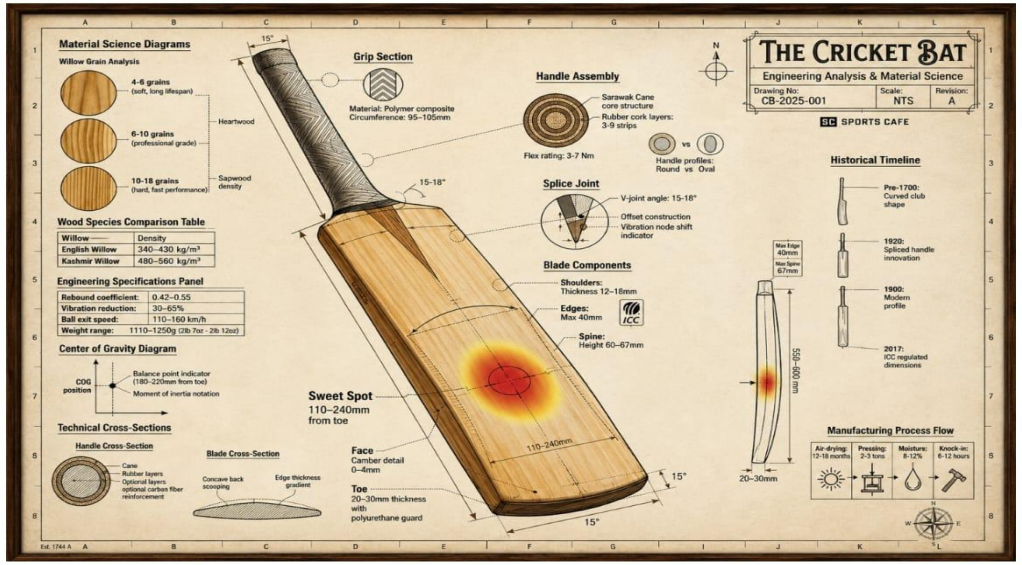
Avoid both severe hypotension and hypertension.

Target

- During surgery, intraoperative BP in a chronic hypertensive patient should not be fluctuated by not more than **20%** below their baseline **(the sweet spot)**.
- MAP should be **65-70 mmHg**

Danger

Dropping the pressure by more than 20% can cause profound hypoperfusion leading to **End Organ Damage**



Maintenance: The SMART Strategy for Perioperative BP

S — Search for the Cause: Pain? Anxiety? Hypoxia? Hypercarbia? Withdrawal?

M — Maintain Adequate Depth: Suppress sympathetic surges with anaesthetics & opioid synergy.

A — Anticipate Stimulation: Pre-empt laryngoscopy, pneumoperitoneum, and extubation.

R — Respond with Titratable Therapy: Match short-acting drugs according to cause and situation.
HTN+ Tachycardia: Labetalol
HTN+ Bradycardia: GTN

T — Target Safe Perfusion: Treat overall tissue perfusion rather than chasing an aesthetic monitor value.

Hypertensive patient during Spinal Anaesthesia

Hypertensive patient may develop **significant hypotension** commonly or paradoxical sharp rise of BP after spinal anaesthesia.

Prevent and Prepare:

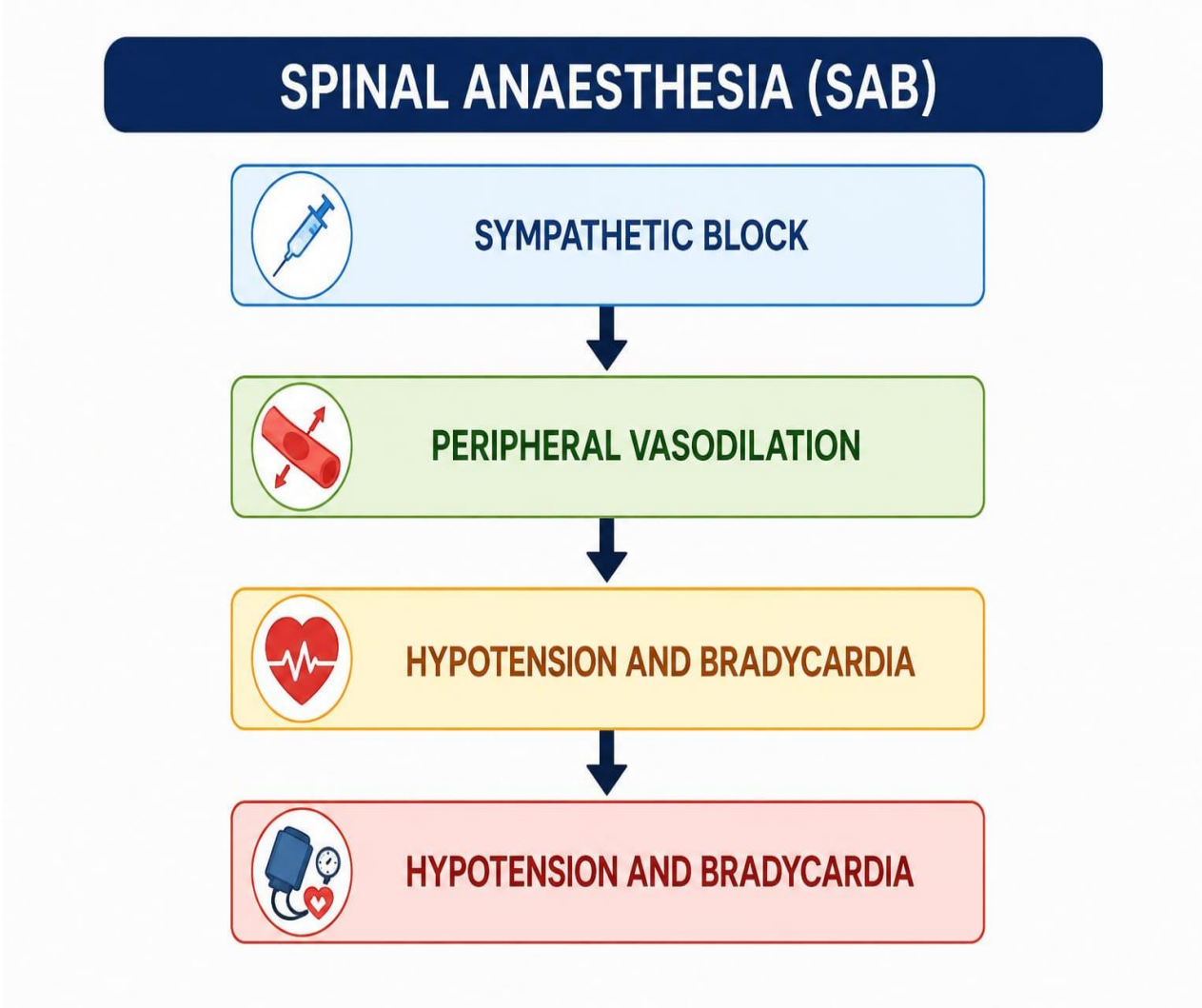
>Adequate monitoring

>Judicious fluid co-loading

>vasopressor immediately available

>Avoid high spinal block

>Look for blood loss



Common Misunderstandings

“Any high BP means surgery must be cancelled.”

Not necessarily. The reading, symptoms, urgency of surgery and overall risk all matter.

“Treat the BP number immediately by fast acting medication.”

First look for causes and acute target-organ injury, assess requirement of titratable IV drug.

“Hypertension is only a problem before surgery.”

BP can change during induction, surgery, emergence and recovery.

“One reading diagnoses hypertension.”

Repeated, accurate measurements and clinical assessment are important.

“Antihypertensives can be added or withdrawn at anytime.”

Abrupt stopping or adding certain antihypertensives can trigger severe BP spikes or profound hypotension.

“Hypertensive patient does not become hypotensive”

Highly vulnerable to severe intraoperative hypotension because their vascular autoregulation curve is shifted.

Summary & Closing

Thank You!

We appreciate your time and engagement throughout this session.

Questions & Discussion