# Ready Reckoner in Medicine

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JAYPEE

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*KK Pareek, Ashutosh Chaturvedi*

## INTRODUCTION

Hypertension is a leading risk factor for cardiovascular conditions, and currently, over 30% of adults are affected by hypertension. While essential hypertension (hypertension without a known cause) is identified as the primary cause, 10% of individuals with hypertension are diagnosed with secondary hypertension. The prevalence of secondary hypertension varies with age and it is most prevalent at the extremes of age. It accounts for 70–85% of hypertension cases in children less than 12 years of age, and approximately 17% of cases in adults aged 65 and older.

Secondary hypertension is characterized by high blood pressure (BP) due to a specific underlying cause. Because its occurrence is quite rare, conducting routine assessments in every hypertension case is neither cost-efficient nor time-effective. Nonetheless, recognizing the cause and pathophysiology of secondary hypertension is crucial in specific patient populations. It not only directs one to the right treatment but can also lead to a total resolution of hypertension and the cessation of antihypertensive medication.

Healthcare professionals managing hypertension should recognize clinical indicators that might point to a secondary cause of the condition. Timely diagnosis is essential because addressing the underlying cause can cure or significantly improve hypertension and reduce long-term cardiovascular risk.

## CAUSES OF SECONDARY HYPERTENSION

### Renal Causes

- Renal parenchymal disease (CKD, glomerulonephritis, polycystic kidney disease)
- Renovascular disease (atherosclerotic RAS, fibromuscular dysplasia)
- Renin-secreting tumors

### Endocrine Causes

- Primary aldosteronism
- Pheochromocytoma/paraganglioma
- Cushing's syndrome
- Congenital adrenal hyperplasia
- Thyroid disorders (hypo-/hyperthyroidism)
- Hyperparathyroidism
- Acromegaly

### Vascular Causes

- Coarctation of the aorta
- Vasculitides (Takayasu arteritis)

### Medication- or Substance-induced

- NSAIDs
- Oral contraceptives
- Steroids
- Calcineurin inhibitors

- EPO
- Sympathomimetics/cocaine
- Herbal supplements (licorice)

### Other

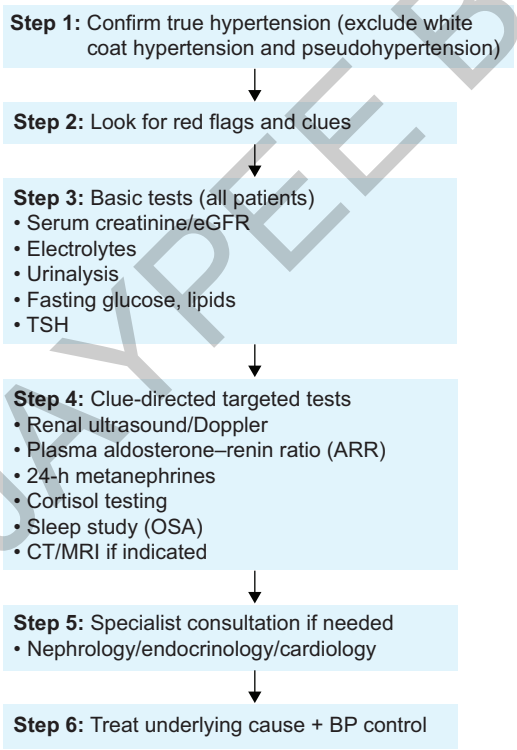
- OSA (most common in adults)
- Pregnancy-related causes (preeclampsia)
- Increased ICP
- Neurologic disorders (Guillain–Barré autonomic dysfunction)

## WHEN TO SUSPECT SECONDARY HYPERTENSION

### Clinical Clues

The typical history and/or clinical signs that necessitate further investigation for a secondary cause of hypertension may consist of **(Flowchart 1)**:

- Resistant hypertension refers to sustained blood pressure exceeding 140/90 mm Hg even when optimal doses of at least three antihypertensives from different classes are used, including a diuretic.
- A sudden increase in blood pressure in a patient who previously had stable readings.
- Hypertension occurs in non-black individuals under 30 years of age who lack additional hypertension risk factors, such as obesity or a family history.
- Individuals with severe hypertension (blood pressure exceeding 180/110 mm Hg) and those experiencing end-organ damage, such as acute kidney injury, neurological symptoms, flash pulmonary edema, hypertensive retinopathy, left ventricular hypertrophy, etc.
- Hypertension linked to electrolyte imbalances, such as hypokalemia or metabolic alkalosis.
- Hypertension onset age occurring prior to puberty.
- Non-dipping or inverted dipping patterns observed during 24-hour ambulatory blood pressure monitoring. Typically, nighttime blood pressure is reduced compared to daytime blood pressure, meaning there is a 'drop' in blood pressure at night.
- Presence of renal bruit, BP discrepancy in limbs (coarctation)
- OSA symptoms (snoring, daytime sleepiness)




**FLOWCHART 1:** Approach to secondary hypertension.

**Table 1** summarizes the major etiologies of secondary hypertension along with their characteristic clinical clues and recommended initial and confirmatory diagnostic tests. It provides a structured, clue-directed approach to efficiently identify underlying causes.

## TREATMENT PRINCIPLES

### General

- Treat the underlying cause when feasible.
- Use standard antihypertensives but tailor to etiology.

**TABLE 1: Key causes and their diagnostic tests.**

| Cause | Key clues | Primary tests | Confirmatory tests |
|---|---|---|---|
| Renal parenchymal | CKD, proteinuria | Creatinine, USG | Renal biopsy (select cases) |
| Renovascular | Renal bruit, ↑Cr with ACEI | Doppler USG | CT/MR angiography |
| Aldosteronism | Hypokalemia | Plasma ARR | AVS, CT |
| Pheochromocytoma | Paroxysms | Metanephrines | MRI/MIBG |
| Cushing's | Striae, obesity | DST | ACTH, imaging |
| Thyroid | Heat/cold intolerance | TSH | T3/T4 |
| Coarctation | BP difference | Echo | CT/MR |
| OSA | Snoring | Sleep study | — |

- Avoid ACEI/ARB in bilateral RAS or solitary kidney RAS until clarified.
- Correct electrolytes (especially $K^+$ in aldosteronism).

**Table 2** outlines targeted treatment strategies for common causes of secondary hypertension, emphasizing correction of the underlying pathology along with blood pressure control. It highlights condition-specific interventions that may lead to cure or significant improvement.

**TABLE 2: Etiology-specific management.**

| Condition | Key treatment |
|---|---|
| Renal parenchymal HTN | ACEI/ARB, BP <130/80 mm Hg; treat CKD cause |
| Renovascular HTN | Medical therapy; angioplasty in FMD; selective revascularization in RAS |
| Primary aldosteronism | Surgery (unilateral); spironolactone/eplerenone (bilateral) |
| Pheochromocytoma | α-blockade → surgery |
| Cushing's | Surgery/medical therapy |
| Thyroid disorders | Thyroid-specific treatment |
| Coarctation | Stentvsurgery |
| OSA | CPAP, weight loss |
| Drug-induced | Stop offending drug |

## CONCLUSION

Screening must to be conducted exclusively on patients who have a high level of clinical suspicion for secondary hypertension. Furthermore, blood pressure hardly ever returns to normal even after a secondary cause of hypertension has been identified and effectively treated. This suggests that either vascular remodeling has occurred and advanced to the point of no return, or some individuals with secondary hypertension also have concurrent essential hypertension.

In order to reduce or prevent irreversible alterations in the systemic vasculature that could result in persistent hypertension with an unfavorable long-term prognosis, early identification and treatment are crucial for individuals with potentially reversible causes of hypertension.

## SUGGESTED READINGS

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***Salient Features***

- This book "*Ready Reckoner in Medicine*" is designed and published with the aim to serve as a quick-reference guide in Internal Medicine, enabling healthcare professionals to make timely, evidence-based clinical decisions in routine and emergency practice.
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- Contributors of the book are reputed experts of their respective fields with great academic and clinical acumen.

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