FACTFINDERS FOR PATIENT SAFETY

IS THERE A SAFE UPPER LIMIT FOR PRE-PROCEDURAL BLOOD PRESSURE BEFORE INTERVENTIONAL SPINE PROCEDURES?

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MYTH: Interventional spine procedures cannot be safely performed in asymptomatic patients with severe hypertension (systolic ≥ 180 mmHg and/or diastolic ≥ 120 mmHg).

FACT: Current evidence does not demonstrate increased risk of complications in asymptomatic patients with severe hypertension (systolic blood pressure ≥ 180 mmHg and/or diastolic ≥ 120 mmHg) following interventional spine procedures. Regardless, given the potentially catastrophic nature of hypertensive-related complications, providers should carefully weigh the risks and benefits of each case before proceeding. Patients with severely elevated blood pressure who also present with symptoms concerning for hypertensive emergency, such as shortness of breath, neurologic symptoms, chest pain, or headache, should be transferred for emergent medical care.

Interventional pain physicians frequently encounter patients who present with elevated blood pressure (BP) on the day of elective spine procedures. The clinical context often varies. Patients may have a documented history of chronic hypertension with poorly controlled blood pressure at baseline and present with an elevated blood pressure within their typical range. Alternatively, a well-controlled chronic hypertensive or normotensive patient may present with situationally induced acutely elevated blood pressure. There are theoretical risks in either scenario, depending on the severity of blood pressure elevation and the patient's comorbidities.

As defined by the American College of Cardiology/ American Heart Association Joint Committee 2025 Clinical Practice Guidelines, blood pressure is classified as follows [1]:

BP Category	Systolic BP		Diastolic BP
Normal	<120 mmHg	and	<80 mmHg
Elevated	120 to 129 mmHg	and	<80 mmHg
Hypertension Stage 1	130 to 139 mmHg	or	80 to 89 mmHg
Hypertension Stage 2	≥ 140 mmHg	or	≥ 90 mmHg

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Hypertensive urgency is typically defined as systolic BP ≥ 180 mmHg or diastolic BP ≥ 120 mmHg [2,3]. Hypertensive emergency is characterized by elevated blood pressure, often but not necessarily exceeding 220/110 mmHg, in combination with secondary end-organ damage [2,4]. Potential end-organ complications include encephalopathy, intracerebral hemorrhage, acute ischemic stroke, acute myocardial infarction, acute left ventricular failure with pulmonary edema, unstable angina pectoris, dissecting aortic aneurysm, acute renal failure, and eclampsia [5]. Hypertensive emergency requires treatment with intravenous (IV) antihypertensive medication, which should occur in an ED or hospital setting [5]. Patients with coexisting diabetes, hyperlipidemia, and chronic kidney disease are at higher risk for developing hypertensive emergency [1]. The clinical presentation of hypertensive emergency varies by the organ system involved and may be nonspecific [6]. The most commonly reported symptoms include shortness of breath (31-67%), neurological symptoms (8-35%), chest pain (25-30%), and headache (7-10%) [6].

Periprocedural and Perioperative Hypertension and Its Implications

Evidence regarding blood pressure elevation in the perioperative (surgical) setting is not directly translatable to interventional spine procedures but provides some insight. Both patients with and without preexisting hypertension are at risk for perioperative hypertension [3,7]. One potential mechanism is that acute pain may provoke vasoconstriction and heightened sympathetic stimulation [3]. Situational stress may also contribute [8].

Chronic hypertension is associated with increased postsurgical complications and mortality, particularly when preoperative blood pressure exceeds 180/110 mmHg [3,9,10]. A systematic review and meta-analysis of 30 observational studies found that a preoperative diagnosis of hypertension was associated with a 35% higher risk of cardiovascular complications [9]. Uncontrolled perioperative hypertension also increases the risk of cerebrovascular events and bleeding [11]. Importantly, however, no high-quality randomized controlled trials have demonstrated that lowering perioperative blood pressure reduces cardiovascular events or mortality; in some cases, aggressive reduction may be detrimental [11,12]. Management should instead be individualized, taking into account cardiovascular risk, age, clinical comorbidities, type of surgery, and anesthetic approach [11].

Evidence from the general orthopedic literature demonstrated an increased risk of acute coronary syndrome within seven days following a corticosteroid injection [13]. Results were similar when adjusted for age, sex, and when restricted to patients with cardiovascular risk factors such as hypertension.

Existing Recommendations for Interventional Spine Periprocedural BP Management

According to safety practices published in *Interventional Pain Medicine* in 2025 and determined by expert opinion, hypertensive urgency or emergency is considered an absolute contraindication for epidural access and injection, sacroiliac joint access and injection, sacral lateral branch blocks, facet joint injections, medial branch blocks, and medial branch radiofrequency neurotomy [14,15]. A definition for what the authors consider to be hypertensive urgency/emergency is not provided in this publication. Uncontrolled blood pressure is also listed as an absolute contraindication for medial branch and sacral lateral branch radiofrequency neurotomy [14,15]. The same guidelines list asymptomatic blood pressure readings greater than 180/110 mmHg as a relative contraindication for the aforementioned procedures.

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Risks of Interventional Spine Procedures

It is typical practice to measure a patient's blood pressure before, during, and/or after interventional spine procedures [16]. Elevations may be observed at any time during the periprocedural period. In addition to a history of hypertension, contributing factors may include pre-procedural anxiety, baseline pain, positioning, and procedural pain or discomfort [17,18]. However, standard blood pressure measurements are designed for a seated, resting position with minimal conversation, which differs from the environment of many spine interventions. This mismatch adds another layer of uncertainty when interpreting changes in intra-procedural blood pressure.

Although hypertension is common in patients presenting for interventional spine procedures, available evidence suggests that complication rates are very low. A retrospective cohort study designed to assess the risks of hypertension during interventional pain procedures evaluated 16,667 consecutive procedures in 7,014 patients [19]. These included epidural steroid injection (ESI), radiofrequency neurotomy, medial branch blocks, peripheral nerve blocks, and joint injections. None of the procedures were performed with sedation. Cardiovascular events were assessed within 24 hours of the procedure. For the 1,258 patients with preprocedural blood pressure greater than 210 mmHg systolic or greater than 120 mmHg diastolic, follow-up was extended to 7 days. No myocardial infarction, cerebrovascular event, neurological deficit, or death occurred during the study timeframe. One hypertensive patient experienced chest tightness, which resolved without further complication. In summary, the study reported zero adverse events attributable to asymptomatic hypertension in the analyzed cohort.

Several other studies have investigated complication rates related to interventional spine procedures.

A retrospective cohort study of 26,061 procedures from three academic interventional pain management practices found no major complications [20]. The overall complication rate was 1.9% (493/26061), including 19 patients (<0.1%) transferred to the emergency department for symptomatic hypertension, all without sequelae related to the procedure. A total of four cases were aborted due to hypertension: three lumbar transforaminal epidural steroid injections (TFESI) and one medial branch block. The blood pressure was not listed in any of these cases.

In a study of 2,025 lumbosacral TFESIs in 1,295 patients, one patient (<0.1%) experienced immediate symptomatic hypertension and four patients (0.3%) had delayed hypertension [21]. No patients required emergency department visits or hospitalization, and no serious complications occurred. The degree of blood pressure elevation and the presence of preexisting hypertension were not specified for these patients. This study compared the demographics of patients who experienced immediate or delayed adverse events and those who did not and found no significant difference in mean systolic or diastolic blood pressure between the groups.

A prospective observational study of 960 epidural steroid injections in 885 patients assessed post-procedure complications via phone call two weeks after the procedure [22]. Cardiovascular symptoms were observed in 55 (9.9%) patients, including palpitations (33), increased blood pressure (13), and chest pain (9). No major complications requiring hospitalization or intensive medical treatment were observed. Of note, a history of hypertension was not significantly associated with the incidence of systemic reactions, though pre-procedural blood pressure control and BP on the day of the procedure were not specified.

In a smaller retrospective review of 322 fluoroscopically guided lumbar TFESIs in 207 patients, there was one case (0.3%) of severe hypertension [23]. The blood pressure was 189/105 mmHg and was treated with IV medication after the procedure; blood pressure normalized by the time of discharge.

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Finally, steroid administration itself may contribute to blood pressure changes. A prospective study of 29 patients who received epidural or intra-articular steroid injection demonstrated a modest but statistically significant increase in systolic blood pressure at 1 and 7 days post-procedure, to 127 ± 10 mmHg and 128 ± 10 mmHg, respectively, compared to 123 ± 10 mmHg at baseline [24]. These results may not be broadly applicable, as the study included a relatively normotensive, young patient population with a mean age of 38 years old.

Conclusions

It is reasonable to expect that many patients will have elevated blood pressure before or during interventional spine procedures.

Patients with severely elevated blood pressure (systolic ≥ 180 mmHg and/or diastolic ≥ 120 mmHg) accompanied by symptoms worrisome for hypertensive emergency, such as shortness of breath, neurologic symptoms, or chest pain, should be transferred for urgent medical care.

In some publications, asymptomatic severe hypertension (systolic ≥ 180 mmHg and/or diastolic ≥ 120 mmHg) is considered a relative contraindication to interventional spine procedures. However, current interventional spine evidence does not demonstrate an increased risk of hypertension-related complications in either the acute or delayed setting. Orthopedic evidence suggests a generalized increased risk of acute coronary syndrome following the administration of corticosteroid. Therefore, corticosteroids should be used with appropriate caution in patients with cardiovascular risk factors such as hypertension.

For patients with severely elevated blood pressure, the physician should communicate these findings to the patient. While immediate treatment is not necessary for most asymptomatic patients, these individuals should be advised to follow up with their primary care provider to receive further evaluation. That said, clinical judgement is essential. Patients with high-risk co-morbidities, such as a history of hemorrhagic stroke, may warrant more caution than simple reassurance.

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