



FACTFINDERS FOR PATIENT SAFETY

RISK OF IODINATED CONTRAST AGENT USE FOR EPIDURALS IN PATIENTS WITH RENAL INSUFFICIENCY

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MYTH: There is a significant risk associated with iodinated contrast agent use for epidural procedures in patients with renal insufficiency.

FACT: The risk of iodinated contrast agent use for epidural procedures in patients with renal insufficiency is minimal to negligible, as epidural procedures typically involve non-intravascular administration of contrast agents.

Background

Contrast media are commonly used during fluoroscopically guided spinal procedures to confirm appropriate needle placement and reduce the risk of intravascular or intrathecal injection. The iodinated contrast medium volumes used during epidural steroid injections (ESIs) are typically small, approximately 1-3 mL, compared to intravenous volumes for CT of 80-120 mL [1-7]. Although there may be minimal inadvertent vascular uptake, most or all of the contrast medium administered for ESIs is delivered into the epidural space rather than intravascularly.

Concerns regarding contrast medium-associated nephrotoxicity largely derive from studies of intravascular (intravenous or intra-arterial) administration, such as during CT imaging or angiography) [1-7]. However, much of the earlier literature lacked appropriate control groups, limiting the ability to establish a causal relationship between iodinated contrast medium administration and acute kidney injury (AKI). More recent evidence suggests that the risk of contrast medium-associated AKI may have been overstated, especially for interventional pain procedures, particularly with modern low-osmolar agents, even among patients with chronic kidney disease [8,9].

Evidence Regarding Nephrotoxicity Risk

When contrast medium is injected during epidural procedures, the intended target is the epidural space rather than the bloodstream. This route results in moderate systemic absorption compared with intravenous injection and therefore lower renal exposure [10].

Contrast medium volume and nephrotoxicity have been studied in the setting of coronary angioplasty and percutaneous cardiac interventions. In patients with abnormal renal function, contrast medium dosage is independently associated with the risk of contrast medium-induced nephropathy, as is the dose relative to glomerular filtration rate (GFR) [11,12]. Typical volumes of contrast medium used for CT are 80-120 mL; for coronary angiograms, up to 200 mL; and with certain coronary interventions, up to 300 mL. These volumes are approaching 100-fold greater than those used for ESI. The nephrotoxic effect may be dose-dependent for cardiac angiography, though there is no evidence of a dose-toxicity relationship following intravenous administration at usual diagnostic doses [1].

Importantly, a review of the literature reveals no published studies or case reports documenting contrast medium-associated AKI following epidural administration, including in patients with severe renal insufficiency or those undergoing dialysis. The absence of reported contrast medium-associated AKI with epidural administration is most likely due to the small volumes of systemically-absorbed contrast medium.

Context From Radiology and Nephrology Literature

American College of Radiology (ACR) guidelines emphasize that the risk of contrast medium-associated AKI is primarily relevant to intravascular iodinated contrast medium administration.

The ACR states that intravenous iodinated contrast media are not an independent nephrotoxic risk factor in patients with stable renal function and an estimated $GFR \geq 30$ mL/min/1.73 m². Even in patients with more advanced kidney disease, the risk is considered relative rather than an absolute contraindication [1].

Because epidural contrast medium administration typically does not involve direct intravascular injection, the mechanisms associated with contrast-associated AKI are unlikely to occur in this setting.

Conclusions/Recommendations

- The literature evaluating iodinated contrast-associated nephrotoxicity primarily concerns intravascular contrast medium administration, not epidural administration.
- Available evidence reveals no reported cases of nephrotoxicity following epidural contrast medium administration, including in patients with severe renal insufficiency or dialysis dependence.
- The limited systemic absorption and small contrast medium volumes used during epidural procedures suggest that clinically significant renal toxicity is highly unlikely, even if unintended vascular injection occurs.
- Decisions regarding spinal interventions in patients with severe or end-stage renal insufficiency should involve individualized risk-benefit assessment and shared decision-making.

References

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