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CT-Guided Renal Hilar Block for Loin Pain Syndrome: Larger Trocar and Contrast Utilization

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ABSTRACT

We present a case of a patient with chronic flank pain undergoing CT-guided renal hilar block (RHB) as part of diagnostic evaluation and therapeutic management, modeled on a previously described RHB technique for loin pain hematuria syndrome (LPHS) [1]. The procedure was adapted with two key modifications: use of a19-gauge trocar blunt needle with a 20-gauge stylet and administration of iodinated contrast prior to local anesthetic injection. The blunt needle assembly was selected to reduce the risk of renal artery puncture [2] and allow safe abutment against the renal artery nerve complex. Contrast was utilized to improve efficacy by identifying the fat filled space between the renal artery and psoas muscle prior to anesthetic delivery [3]. The procedure was technically successful, achieving substantial pain without complications. This case highlights a practical modification to standard RHB technique aimed at improving efficacy and procedural safety [1].

Keywords

Loin pain hematuria syndrome (LPHS), Interventional radiology, CT-guided Renal Hilar Block, Pain relief, Efficacy, Safety.

Introduction

Loin pain hematuria syndrome (LPHS) is a rare clinical condition characterized by recurrent or persistent severe flank pain accompanied by microscopic or gross hematuria, remaining a diagnosis of exclusion once structural, infectious, and vascular or glomerular causes have been ruled out [4-6]. Renal hilar block (RHB) is a percutaneous CT-guided technique that targets the renal nerve plexus at the renal hilum using local anesthetic, serving as a diagnostic and predictive tool in patients with LPHS undergoing evaluation for renal autotransplantation [1]. Campsen et al. demonstrated that response to RHB, defined as at least 50% pain reduction after block, correlates with long-term pain relief after renal autotransplantation, supporting RHB as a useful selection tool for surgery in this population [1].

In their original series, the RHB technique employed CT guidance to position a fine needle adjacent to the renal artery at the hilum, followed by injection of a 50/50 mixture of 2% lidocaine and 0.5% bupivacaine, without intraprocedural contrast verification [1]. Although their reported outcomes showed high rates of meaningful pain relief without major complications, the proximity of the needle to the renal artery inherently raises concern for potential arterial puncture or inadvertent intravascular injection and the risk of vascular side effects from the anesthetic injection [7].

Drawing from these principles, we describe a CT-guided RHB that follows the Campsen protocol in overall concept and injectate composition but incorporates two safety-oriented modifications: utilization of a 19-gauge needle trocar blunt needle assembly when approaching the renal artery [2] and the use of iodinated contrast to identify the space posterior to the renal artery and anterior to the psoas muscle prior to anesthetic injection [3].

Case Report

A 44-year-old female with a history of chronic bilateral flank pain was referred to interventional radiology for consideration of right renal hilar block. The patient reported multiple years of bilateral sharp flank pain (right greater than left) rated 8/10 on the Numeric Rating Scale (NRS) requiring chronic opioid use. The patient had extensive outside evaluation with a diagnosis consistent with features similar to the LPHS cohorts undergoing RHB in the study by Campsen et al. [1]. Prior urologic evaluation and cross-sectional imaging had excluded obstructing urolithiasis, mass lesion, or other surgically correctable pathology. Renal function was normal and coagulation parameters were within normal limits.

After multidisciplinary discussion, RHB was requested as part of further diagnostic evaluation and as a predictive tool prior to renal autotransplantation [1]. The risks, benefits, and alternatives were thoroughly reviewed with the patient, including potential bleeding, vascular injury, infection and cardiovascular instability due to the anesthetic. Written and verbal informed consent was obtained.

The procedure was performed in the CT suite with the patient in the left lateral decubitus position under continuous mild sedation monitored by dedicated anesthesia personnel. The right flank region was prepped and draped in a sterile fashion. Initial non-contrast CT images of the abdomen were acquired to localize the right renal artery (Figure 1), similar to the localization approach reported by Campsen et al. [1]. A skin entry site and needle trajectory were planned to establish a direct path to the posterior aspect of the right renal artery while avoiding adjacent nerves and major vascular structures.



Figure 1: Unenhanced CT image of the abdomen demonstrates the right renal artery which is localized for injection (white arrow).

Following a universal time out was, local anesthesia was achieved with subcutaneous infiltration of 1% lidocaine (approximately 3mL) at the planned entry site. A 19-gauge trocar needle with a 20-gauge stylet was then advanced toward the right renal artery from a posterior approach under fluoroscopic CT guidance. This needle configuration was chosen to provide a blunter leading edge while maintaining adequate rigidity and control for a deep retroperitoneal approach near the renal artery. The intent of this modification was to minimize the risk of penetrating the renal artery compared to a standard sharp needle, given the close anatomic relationship required for an effective hilar block [2].

Sequential fluoroscopic CT images were obtained to confirm trajectory and adjust course as needed until the needle tip was positioned immediately posterior to the renal artery in a perpendicular configuration and anterior to the psoas muscle (Figure 2). Once a satisfactory position was achieved, the stylet was removed and gentle aspiration was performed with no blood return. Subsequently, 10 mL of 2% lidocaine mixed with 0.1mL of Isovue-300 contrast was administered through the trocar needle.

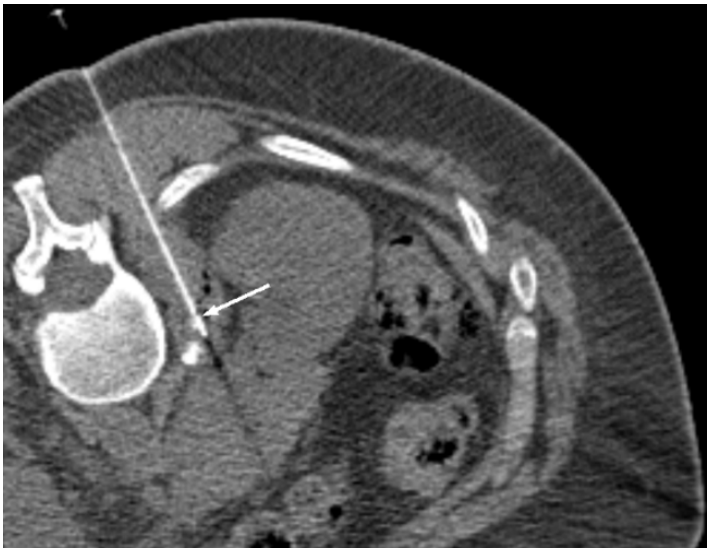


Figure 2: Unenhanced CT fluoroscopic image demonstrates a 19-guage blunt trocar needle abutting the renal artery injecting 10 mL of 2% lidocaine mixed with 0.1mL of contrast to make sure the fluid is localized in appropriate region (white arrow).

Limited CT images centered on the needle tip were obtained immediately post-injection. Contrast was seen localized to the posterior periarterial space without opacification of the renal artery or other venous structures, confirming extravascular needle positioning and clearly defining the required space anterior to the psoas muscle. This contrast-confirmation step was added to improve targeted efficacy while avoiding intravascular or intramuscular injection analogous to other CT-guided nerve and injection procedures, although such use was not included in the original RHB description [3].

After confirmation of extravascular position, the 2 % lidocaine/contrast syringe was exchanged for a syringe containing therapeutic 0.5% bupivocaine [1]. After repeat aspiration and no blood return, the anesthetic solution was injected slowly while monitoring for resistance or patient hemodynamic changes. The needle was then withdrawn, and hemostasis at the skin entry site was achieved with light manual compression.

The patient was monitored in the recovery area for two hours. At 10 minutes post-injection, in keeping with the time point used by Campsen et al. to assess immediate response, the patient reported a decrease in flank pain from 8/10 to 3-4/10, corresponding to approximately >60% reduction in pain [1]. No immediate procedural complications were observed, including no flank swelling, hemodynamic instability, neurologic symptoms, or signs of intravascular anesthetic injection. The patient was discharged after an uneventful observation period and reported relief of pain for 5 days after the procedure. More importantly, the patient reported her first multi-day period in several years without requiring opioid pain medication.

Discussion

Loin pain hematuria syndrome is a challenging clinical entity requiring comprehensive diagnostic exclusion [4,5]. This case describes a CT-guided renal hilar block performed using the overall conceptual framework and anesthetic regimen reported by Campsen et al., with two deliberate technical modifications aimed at enhancing efficacy and safety: use of a blunt 19-gauge trocar needle assembly and incorporation of intraprocedural contrast injection for space localization [1].

Campsen et al. demonstrated that RHB can predict long-term success of renal autotransplantation in LPHS, with the block performed under CT guidance using a 21-gauge fine needle positioned adjacent to the renal artery and injection of a 50/50 lidocaine-bupivacaine mixture [1]. Their series reported substantial rates of pain reduction after RHB and subsequent durable pain control after autotransplantation in responders, with no major procedural complications noted [1]. However, the required proximity of the needle tip to the renal artery inherently carries risk of arterial puncture or inadvertent intra-arterial injection [7], especially when relying solely on CT localization and aspiration.

In our case, 2% lidocaine and 0.5% bupivacaine were injected separately. A small-volume (0.1mL) of Isovue IV contrast was added to the 2% lidocaine to better visualize the space between the right renal artery and psoas muscle before 0.5% bupivacaine anesthetic delivery. By confirming that contrast remained confined to the periarterial space and without vascular opacification, the operator gains added confidence that the anesthetic is delivered to the appropriate location.

The second modification, the choice of a 19-gauge blunt trocar needle with a 20-gauge stylet, was driven by potential of intravascular injection. The original RHB description mentions using a 21-gauge needle positioned immediately adjacent to the renal artery, highlighting the importance of precise needle control in a vascularly dense area [1]. The blunt needle in this case was intended to lessen risk of arterial puncture of the artery wall while being able to apply pressure and target the nerve plexus around the renal artery [2]. This is a technical rationale based on operator experience rather than outcome data, and larger studies would be required to evaluate whether this modification confers a measurable safety benefit. In this case, the combination of meticulous CT-based trajectory planning, preinjection aspiration, contrast-assisted confirmation, and the modified needle assembly resulted in a technically successful block with significant pain reduction and no complications. This is consistent with the favorable safety profile of RHB reported by Campsen et al. [1]. However, unlike the Campsen cohort, this report focuses on a single patient and on technical aspects rather than long-term surgical outcomes and therefore cannot address predictive value for autotransplantation.

Overall, this case suggests that incorporating intraprocedural contrast injection and blunt trocar needle selection into RHB are feasible strategies to reduce risks and increase efficacy [1]. Future work comparing standard RHB with contrast-augmented and needle-modified approaches could help clarify whether these changes improve safety or diagnostic performance.

Conclusion

CT-guided renal hilar block performed according to the conceptual framework and anesthetic regimen described by Campsen et al. can be modified by using a 18-gauge blunt trocar needle and small-volume of iodinated contrast injection to better assist in 0.5 % bupivacaine anesthetic delivery [1]. In this case, these technical adjustments were associated with successful pain reduction, confirmation of needle position, and absence of complications. The contrast confirmation step, in particular, can improve accurate space localization and minimize the risk of inadvertent intravascular injection when working in close proximity to the renal artery. Further experience and larger series can help in adoption of these modifications.

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