Periportal Nerve Block Enabling Moderate Sedation During Microwave Ablation of Hepatocellular Carcinoma

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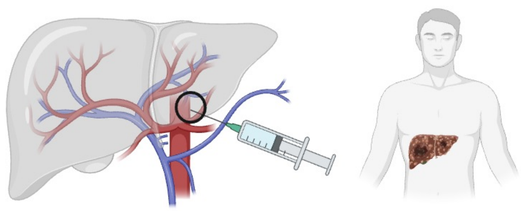
Objective

- To display how a periportal nerve block can be used as an adjuvant to moderate sedation for pain control in microwave ablation of liver lesions, especially hepatocellular carcinoma.

Introduction

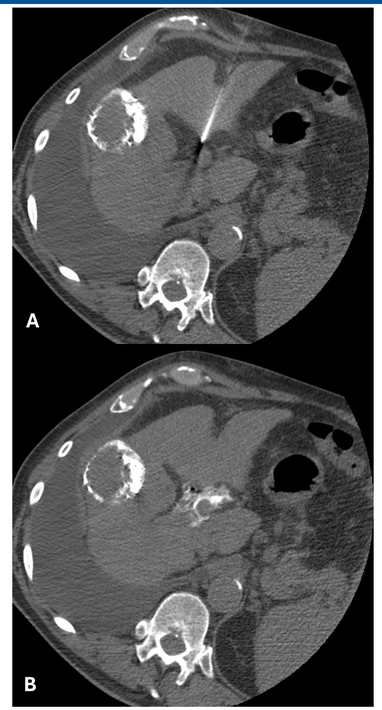
- **Thermal ablation (MWA/RFA)** is an established therapy for HCC and liver tumors but is associated with significant visceral pain.
- **General anesthesia (GA):** commonly required, but limited availability can delay care; in cirrhotic patients, GA adds risks of hemodynamic instability, respiratory compromise, and prolonged recovery.
- **Moderate sedation alone** often requires high doses of opioids/benzodiazepines, increasing risk of poor breath-holding, patient movement, and complications.
- **Regional anesthesia techniques** (celiac plexus, splanchnic nerve, paravertebral, TAP blocks) have been described to reduce pain and opioid requirements.
- **Periportal nerve block** is an efficient targeted technique anesthetizing the hepatic plexus at the portal vein bifurcation.



Schematic of periportal nerve block: A fine needle is advanced into the periportal space at the portal vein bifurcation to deliver local anesthetic around the hepatic plexus, providing targeted hepatic analgesia during ablation

Methods & Materials

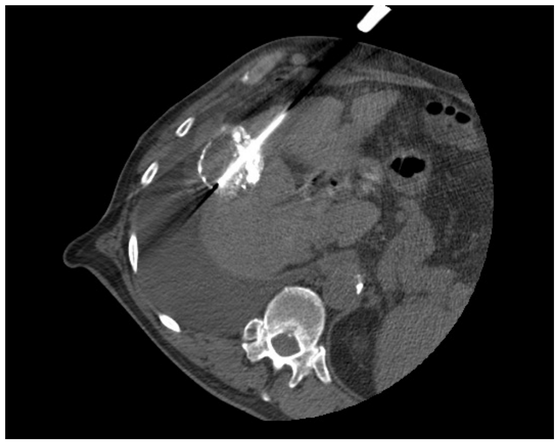
- **Patient**: 71-year-old male with hepatitis C cirrhosis, portal hypertension, and 5.0 cm LI-RADS 5 HCC (segment V) with small area of residual viable tumor post-TACE.
- **Sedation**: Moderate sedation with midazolam 4 mg + fentanyl 200 µg.
- **Periportal nerve block technique:**
- 22G needle advanced into periportal space under CT guidance.
- Safety checks: negative aspiration, contrast spread around portal bifurcation, 5 mL lidocaine + epinephrine test dose under heart rate monitoring to exclude intravascular injection.
- Nerve block: 20 mL of 0.5% ropivacaine injected into periportal space.
- **Ablation procedure:** Two PR15XT (NeuWave®) gauge microwave probes were inserted into the liver mass under CT guidance, achieving desired ablation zone after 10 min.



CT Scan of Periportal Nerve Block:

A) 22G needle placed in the periportal space.

B) Contrast and anesthetic spreading along the periportal space with no intravascular opacification.



CT Showing Probe Placement

Results

- **Intra-procedural:** Excellent analgesia; patient remained comfortable under moderate sedation.
- **Hemodynamics:** Stable throughout; no escalation for deep sedation required.
- **Technical success:** Ablation zone encompassed entire residual tumor on CT.
- **Recovery:** Minimal discomfort, same-day discharge.
- **Follow-up (1 week):** No significant post-procedural pain; no opioid requirement.
- **Complications:** None observed.

Discussion

- **Periportal block** provides targeted hepatic analgesia with minimal systemic effects, enabling ablation under moderate sedation.
- **Comparison to other blocks:**
  - *Celiac/splanchnic blocks* → effective but broader sympathetic blockade; higher risk of side effects.
  - *Paravertebral/TAP blocks* → cover somatic/capsular pain; best used in combination with visceral block.
- **Literature evidence:**
  - Hepatic hilar block lowers peak pain scores and reduces fentanyl use compared to sedation alone.
  - Combined hilar + TAP block provides best overall intra- and post-procedural analgesia.
  - Bilateral paravertebral blocks reduce hospital admissions for post-procedural pain.

Conclusion

- Periportal nerve block is a safe and effective adjunct to moderate sedation for liver tumor ablation.
- Provides excellent intra-procedural analgesia and reduces opioid requirements.
- Avoids the need for general anesthesia, especially important in high-risk cirrhotic patients.
- Offers targeted hepatic analgesia with fewer systemic effects than celiac plexus block.
- Broader adoption could improve safety, recovery, and access to ablation therapy.

References

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