

LONG-TERM TAPENTADOL USE FOR NEUROPATHIC PAIN IN A HEMODIALYSIS PATIENT WITH END-STAGE RENAL DISEASE: A CASE REPORT

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Background: Tapentadol is generally not recommended in patients with end-stage renal disease on hemodialysis due to concerns about metabolite accumulation and limited safety data. Evidence in this population is scarce, with no major trials to date.

Case Report: A 58-year-old man with end-stage renal disease on hemodialysis developed ischemic monomelic neuropathy after fistula surgery. Previous opioids and tramadol were ineffective; pregabalin, gabapentin, and oxcarbazepine caused intolerable side effects. Due to ongoing citalopram therapy, serotonin-norepinephrine reuptake inhibitor changes were avoided. Tapentadol 75 mg three times daily was started and continued for 20 months, resulting in sustained pain control without observed adverse effects or clinical signs suggestive of drug accumulation; pharmacokinetic drug accumulation could not be assessed because blood and urine drug levels were unavailable.

Conclusions: This case suggests long-term tapentadol may be a safe and effective pain management option in selected patients with end-stage renal disease on hemodialysis, though further study is needed.

Key words: Tapentadol, end-stage renal disease, hemodialysis

BACKGROUND

Ischemic monomelic neuropathy (IMN) is an uncommon but serious complication that can occur after vascular procedures such as arteriovenous fistula creation for hemodialysis access (1-3). IMN typically presents with sudden onset of pain, numbness, and sometimes weakness in a single limb, often without the usual signs of ischemia such as pallor or absent pulses, which can delay diagnosis (1-3). This atypical presentation increases the risk of permanent nerve injury and significant functional impairment if not recognized and treated promptly. Early diagnosis and intervention are critical, but the subtle clinical features of IMN often lead to underdiagnosis (2,3).

Neuropathic pain associated with IMN is difficult to manage. First-line treatments generally include gabapentinoids, antidepressants, and anticonvulsants, though their efficacy and tolerability vary (4,5). Tapentadol, a dual-acting analgesic with mu-opioid receptor agonism and noradrenaline reuptake inhibition, may be considered when conventional therapies fail (6). Tapentadol is primarily metabolized via phase 2 glucuronidation, with about 99% of the drug and its metabolites excreted renally and only a small fraction eliminated unchanged in urine (7). However, its use in patients with advanced kidney disease, particularly those on hemodialysis, is limited due to concerns about drug accumulation and insufficient safety data (6). This

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case report describes the long-term use of tapentadol in a hemodialysis patient with IMN after unsuccessful trials of first-line therapies.

CASE REPORT

A 58-year-old man with a medical history of end-stage renal disease (ESRD) on hemodialysis, type 2 diabetes mellitus, and IMN following arteriovenous (AV) fistula creation in August 2023 presented to the pain pharmacy clinic in August 2024 after being transferred to a new provider for evaluation and opioid tapering. The patient described persistent neuropathic pain in the left arm, characterized by a “shocking” or “pins-and-needles” sensation, typically rated 3–4/10 in the morning and worsening throughout the day. He reported partial relief with massage and exercise and had also attempted acupuncture. Previous trials of pregabalin caused severe muscle spasms, while oxcarbazepine led to syncope episodes. Other opioids (per patient report) were discontinued due to cognitive side effects described as “brain fog.” Although serotonin-norepinephrine reuptake inhibitors (SNRIs) had not been trialed, the patient declined changes due to ongoing stable citalopram therapy. Topiramate was offered but refused due to prior poor tolerance of similar medications. He was actively participating in physical therapy for hand strengthening.

On physical examination, the patient’s left hand was clenched in a claw-like posture, with taut, erythematous skin. Nerve conduction studies and electromyography performed in 2023 revealed findings consistent with IMN. The interpreting provider noted that, given the symptom onset following AV fistula placement, IMN was a likely diagnosis. Tapentadol was initiated in October 2023 at 75 mg 3 times daily (90 mg morphine equivalents) (8). Although the nephrology team recommended discontinuation due to concerns about drug accumulation in the setting of hemodialysis, the patient remained on the same dose due to ongoing functional benefit and limited alternatives.

Upon transition to a new hospital and provider, the patient also expressed a desire to taper to avoid long-term dependence on medication. The patient was able to taper tapentadol to 50 mg 3 times daily, but the pain became intolerable at this lower dose. As of follow-up approximately 20 months after initiation, the patient continues to take tapentadol at the same dose (75 mg three times daily) and reports improved daily functioning without reported adverse effects.

Drug accumulation was not assessed because blood and urine drug concentrations were unavailable.

DISCUSSION

This case highlights the successful long-term use of tapentadol in a patient with IMN on hemodialysis, a clinical scenario with limited evidence and guidance. IMN is a rare but serious complication of vascular access surgery, particularly AV fistula creation, which can lead to neuropathic pain due to nerve damage (1-3). In this case, the patient developed IMN after AV fistula placement and experienced persistent neuropathic symptoms despite multiple standard treatments.

Managing neuropathic pain in IMN is especially challenging in patients with ESRD on hemodialysis. First-line agents such as gabapentinoids, tricyclic antidepressants, and SNRIs may be poorly tolerated or contraindicated in this population, necessitating alternative options (4). In this case, the patient experienced severe adverse effects with pregabalin and oxcarbazepine, declined SNRI therapy due to concurrent use of citalopram for mental health treatment, and refused topiramate due to prior intolerance to similar medications. Other opioids were discontinued due to cognitive side effects described as “brain fog.” Treatment selection was further complicated by the limitations of certain medications in the setting of ESRD. Tapentadol was ultimately initiated and provided sustained symptom relief, despite limited data on its use in renal failure.

Tapentadol is a centrally acting analgesic with dual mechanisms of action: mu-opioid receptor agonism and norepinephrine reuptake inhibition (6). This combination allows it to modulate both ascending and descending pain pathways, making it effective in various types of neuropathic pain. Unlike traditional opioids, tapentadol has a lower affinity for the mu-opioid receptor, which may reduce the risk of typical opioid-related side effects such as sedation and constipation (6). However, its use in patients with severe renal impairment or those on hemodialysis is generally not recommended. While tapentadol does not require dose adjustment in mild-to-moderate renal impairment, no clinical data are available on its use in ESRD or hemodialysis patients (6,9). Pharmacokinetic considerations suggest that tapentadol is likely to be dialyzed to some extent because of its low protein binding, low molecular weight, and moderate water solubility, but the extent of removal during dialysis is unknown (9). This uncertainty, along with concerns about accumulation of inactive metabolites, warrants

caution because of the limited information available in this population.

Despite these concerns, the patient in this case remained on a stable dose of tapentadol, 75 mg 3 times daily, for approximately 20 months at the time of data collection, with good success. He reported consistent functional improvement and no evidence of drug accumulation or adverse effects. The initial goal was to taper the medication due to both nephrology recommendations and the patient's desire to avoid long-term dependence. However, multiple tapering attempts were unsuccessful due to worsening pain symptoms, and the patient elected to continue therapy at the current dose. This case suggests that, in select patients with limited alternatives, tapentadol may be a viable option under close monitoring.

Further research is needed to better understand the role of tapentadol in patients with ESRD on hemodialysis. Randomized controlled trials and pharmacokinetic studies should evaluate its safety, efficacy, and appropriate dosing in this population. It would also be valuable

to identify patient characteristics that may predict safe and effective use of tapentadol in renal impairment. Until such data are available, clinicians must make individualized decisions, balancing the risks of opioid therapy with the need for adequate pain control in complex cases like this one.

CONCLUSIONS

This is one of the first case reports to describe the long-term use of tapentadol for neuropathic pain in a patient with end-stage renal disease on hemodialysis, without reported adverse effects; drug accumulation could not be assessed because blood and urine drug levels were unavailable. This case suggests that tapentadol may be a viable treatment option for neuropathic pain related to ischemic monomelic neuropathy (IMN) in select hemodialysis patients under close provider supervision. Further clinical and pharmacokinetic studies are needed to better understand the safety, efficacy, and clearance of tapentadol in this population.

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