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Case Report

High-Intensity Laser Therapy as an Adjunct for Pain Control in Acute Pancreatitis.

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Abstract

Pancreatitis is an inflammatory condition of the pancreas. Pain management is a critical component of treatment, as severe abdominal pain is a hallmark of the disease. High-intensity laser therapy (HILT) has emerged as a non-invasive technique that can be combined with conventional pain management strategies to enhance analgesic effects. A 27-year-old woman with severe pancreatitis of mixed etiology was admitted to the ICU with intense abdominal pain. HILT (ND-YAG, 1064 nm, BTL 6000 with Robotic Scanning System, 30W, Czech Republic) was introduced as an adjunct to pharmacological treatment, providing effective and sustained pain relief with reduced opioid use. This case highlights the potential benefits of incorporating HILT into the pain management regimen for acute pancreatitis, suggesting a novel approach to improving patient outcomes and reducing reliance on opioids.

Keywords : acute pancreatitis; high-intensity laser therapy; pain management; adjuvant analgesic therapy.

INTRODUCTION

Pancreatitis is an inflammatory condition of the pancreas characterized by acute abdominal pain, often radiating to the back, along with nausea, vomiting, and elevated serum levels of pancreatic enzymes. The global incidence of acute pancreatitis varies, with reported rates ranging from 13 to 45 per 100,000 people (Yadav & Lowenfels, 2006), and increase in occurrence of about 3% per year (Iannuzzi et al, 2022). Approximately 20-30% of patients with acute pancreatitis require admission to an intensive care unit (ICU) with severe cases reaching mortality rates as high as 30% (Quinlan, 2014). The predominant causes of pancreatitis include gallstones and chronic alcohol consumption, followed by endoscopic retrograde cholangiopancreatography, medications and others such as hypertriglyceridemia (Quinlan, 2014). Diagnosis is primarily clinical, supported by elevated serum amylase or lipase levels and imaging studies such as contrast-enhanced computed tomography (CT) (Quinlan, 2014).

Pain management is a critical component of treatment, as severe abdominal pain is a hallmark of the disease. There are no guidelines for best managing pain in this population. Pain management typically involves a multimodal approach, including analgesics, anti-inflammatory medications, and supportive care. Epidural analgesia offers a relief in the first 24-hour period, but its efficacy is comparable with opioids after (Thavanesan et al.,2022). Achieving adequate pain control can be challenging, particularly in cases of severe pain.

High-intensity laser therapy (HILT) has emerged as a promising adjunct for pain management in various clinical settings. It utilizes focused light energy to penetrate deep tissues, activating cell metabolism, modulating pain pathways, and producing morphine-mimetic substances (Stiglić-Rogoznica et al.,2011). This non-invasive technique can be combined with conventional pain management strategies to enhance analgesic effects, potentially reducing the need for opioid medications and their associated side effects.

There are currently no studies that evaluate the use of HILT for pain management in acute pancreatitis. This article aims to explore its potential benefits and justify the need for further clinical research.

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CASE

A 27-year-old woman was referred to the ICU of Samel Hospital in Manaus due to intense abdominal pain and distension. She had previously been admitted to another facility for severe abdominal pain radiating to the back. During that admission, she was diagnosed with idiopathic pancreatitis and was treated with morphine for 3 days before being discharged. Post-discharge, she followed a low-fat diet. However, 1 month later, her abdominal pain recurred, and she was readmitted with pancreatitis of metabolic etiology, presenting a triglyceride level of 9300 mg/dL. Her medical history includes gastritis and inguinal hernia surgery. Upon arrival at our hospital, she was hemodynamically stable, with a heart rate of 109 bpm and blood pressure of 112/64 mmHg, with no abnormalities detected on respiratory or cardiac auscultation. The abdomen was rounded, tympanic, non-tender on palpation, with an abdominal circumference measuring 123 cm. The extremities were normal. A CT scan revealed an enlarged pancreas without signs of necrosis, along with peripancreatic collections. During hospitalization, microgallstones were identified, leading to the reclassification of her pancreatitis as having a mixed etiology.

At admission, her pain score was 9 on the Visual Analog Scale (VAS). When systemic analgesics and fentanyl were administered via an infusion pump, the pain scale varied between 2 and 4 on the VAS. At this time, a HILT (ND-YAG, 1064 nm, BTL 6000 with Robotic Scanning System, 30W, Czech Republic) was applied to the mesogastric, hypogastric, and iliac regions. The laser parameters used in this session were fluence of 59 J/cm², an average power of 7.8 W, and a total duration of 31 minutes and 32 seconds. Following the initial session, the patient experienced complete pain relief without the need for opioids. After 3 days, still without opioid use, the pain recurred mildly (VAS 2/10). Subsequently, a second HILT session was performed with a fluence of 80 J/cm², an average power of 9.9 W, and a total duration of 26 minutes and 50 seconds, resulting in complete pain relief. Opioid use was required only twice following this intervention: once before percutaneous drainage of peripancreatic retroperitoneal collections, performed 5 days after the last HILT session, and once during the immediate postoperative period after exploratory laparotomy for intestinal obstruction, conducted 11 days later. Following this, the patient remained opioid-free until discharge. No additional HILT sessions were necessary due to the absence of significant pain.

DISCUSSION

Abdominal pain is the most prevalent gastrointestinal symptom leading patients to seek medical consultation and acute pancreatitis accounts for approximately 2.6 billion dollars annually in inpatient costs (Peery et al., 2012). HILT can be particularly beneficial in this context by providing targeted pain relief and reducing the reliance on systemic analgesics and opioids. Opioids are commonly used for their potent analgesic effects, but are associated with side effects including respiratory depression, bowel dysfunction, cognitive impairment, urinary retention, and potential for dependency and abuse (Labianca et al.,2012). Non-opioid systemic analgesics can cause adverse effects such as gastrointestinal bleeding, cardiovascular effects, and hepatotoxicity when used in high doses (Labianca et al., 2012).

Given the side effects of traditional pharmacological treatments, there is growing interest in alternative pain management strategies that minimize their use. HILT presents a promising non-invasive option for pain control, although studies on its exact mechanisms are currently limited. It can stimulate cellular activity, regeneration and induces an anti-inflammatory effect through photobiomodulation and alterations in inflammatory markers (Monici et al.,2009). Furthermore, HILT reduces pain perception through an anti-nociceptive effect, decreasing the amplitude of action potentials in small-diameter nerve fibers and suppressing conduction velocity (Chow et al., 2011). Additionally, HILT promotes the release of endorphins, which bind to opioid receptors in the nervous system, producing analgesia via a central pathway (Laakso et al., 1994). Compared to low-level laser therapy (LLLT), the increased dosage of irradiation is thought to enhance anti-inflammatory, anti-nociceptive, and muscle-relaxation effects (Monici et al.,2009). HILT is believed to have superior penetration capabilities for treating deeper tissues due to its increased power and diverse wavelengths (Monici et al.,2009).

Incorporating HILT into the pain management regimen for hospitalized patients with pancreatitis offers a promising approach to improving patient comfort and outcomes. Further research is needed to explore the long-term benefits and potential applications of HILT in managing acute pancreatitis.

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