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Targeting deep areas of the skeletal muscles effectively alleviates postoperative pain

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Postoperative pain can pose a number of challenges for surgical patients and their care providers. A common method to treat pain has been to administer opioids. However, opioids come with a number of different,

often intolerable, side effects, and surgeons have been actively looking for other, safer, pain-relieving options. To address postoperative muscle pain in patients undergoing abdominal surgery, researchers from Yonsei University College of Medicine, Seoul, South Korea, developed a new method of effective pain control called needle electrical twitch obtaining intramuscular stimulation (NETOIMS). The research team's findings appear as an 'article in press' on the website of the *Journal of the American College of Surgeons* ahead of print.

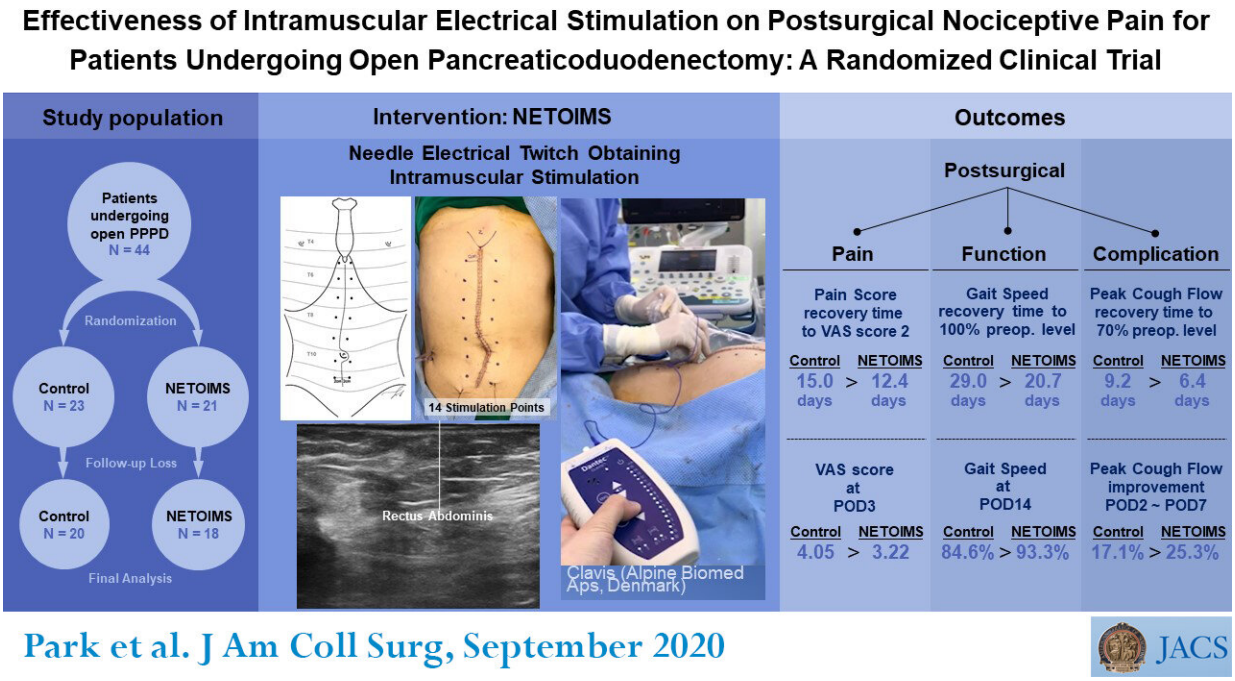
According to study authors, surgical manipulation, such as retraction and suture, shortens skeletal muscle fibers, contributing to postoperative pain. The NETOIMS method effectively alleviates this pain by inserting a needle in the muscle and electrically eliciting twitch responses. NETOIMS targets the deep motor endplate zones of the skeletal muscles, targeting strained muscle fibers. This technique results in the stretching of the shortened muscle fiber and improving circulation, relaxing the muscle and alleviating postoperative pain.

The researchers said their study is one of the first to investigate the effects of NETOIMS on postoperative pain, functional indicators, and postoperative complications after open abdominal surgery.

"The major goal of postoperative care is to reduce the postoperative complication and to restore function as soon as possible," said corresponding study author Joon Seong Park, MD, Ph.D., FACS, of the pancreatobiliary cancer clinic, department of surgery, Gangnam Severance Hospital, Yonsei University. "NETOIMS not only reduced postoperative muscular pain, but also reduced the time it takes for gait speed and peak cough flow to recover to the preoperative state."

To study the NETOIMS method, a double-blind, randomized controlled clinical trial was developed that included 44 patients scheduled for open pylorus-preserving pancreaticoduodenectomy (PPPD), a surgical

procedure performed to remove pancreatic tumors where a portion of the duodenum is removed and the pylorus—the part of the stomach that connects to the duodenum—is kept. The patients were randomly allocated to the NETOIMS group or the control group.



Effectiveness of Intramuscular Electrical Stimulation on Postsurgical Nociceptive Pain for Patients Undergoing Open Pancreaticoduodenectomy: A Randomized Clinical Trial. Credit: American College of Surgeons

Once the operating surgeon left the operating room after completing the procedure, another surgeon who did not participate in the operation conducted the NETOIMS procedure. The treatment site was covered and markings on the NETOIMS sites were erased, making it impossible to identify the patients who received NETOIMS.

Pain was measured using a visual analog scale (VAS) that utilizes a measure on a scale from 1-10 of how much pain a patient is experiencing. Patients in the NETOIMS group returned to a VAS score of 2—a very tolerable level of pain—in an average of 2.6 fewer days after surgery than the control group. Further, on the third day after surgery, the VAS score of the NETOIMS group was 20 percent lower than that of the control group.

"Not only was the reduction in pain intensity greater, but the rate of pain relief was also faster in the NETOIMS group," study authors write. "Patients are unlikely to require hospitalization for pain management. Thus, NETOIMS is expected to reduce the length of hospital stay after surgery."

Dr. Park said that NETOIMS is a convenient and safe intervention that can be implemented in other medical centers. "Any experienced professional can safely perform the procedure without an image guide such as ultrasound while monitoring the tissue resistance felt at the fingertip during needle insertion and monitoring the regular twitching responses obtained by the intramuscular stimulation," he said.

The researchers report that in this study, NETOIMS was performed only once after the operation. Future studies will address whether there is cumulative effect of this type of treatment.

"NETOIMS helps in rapid reduction of somatic pain resulting from open abdominal surgery," the researchers concluded. "We suggest that NETOIMS is an effective new treatment modality for postoperative pain control and rapid functional restoration following open abdominal surgery such as PPPD."

More information: Jinyoung Park et al. Effectiveness of Intramuscular Electrical Stimulation on Postsurgical Nociceptive Pain

for Patients Undergoing Open Pancreaticoduodenectomy: A Randomized Clinical Trial, *Journal of the American College of Surgeons* (2020). DOI: 10.1016/j.jamcollsurg.2020.06.008