

# Effect of Transcutaneous Electrical Nerve Stimulation on Post-Operative Pain Relief

Margaret Maki, PA-S



VALPARAISO  
UNIVERSITY

## Valparaiso University Physician Assistant Program

### Background & Purpose

Post-operative pain is a common reason that patients avoid getting procedures done. Pharmacologic therapy often includes opioids for pain control at home. This can lead down a path to addiction with just one single prescription. In opioid- naive surgical patients who were prescribed an opioid, dependence or overdose affected roughly 2 in 1000 people over five years post operatively.<sup>1</sup> This could be avoidable if non-pharmacological methods of pain control, such as TENS were used.

The goal of this research synthesis is to determine the effect of transcutaneous electrical nerve stimulation on pain relief compared to opioid analgesics within the postoperative period.

### PICOT

In post operative patients, what is the effect of transcutaneous electrical nerve stimulation on pain relief compared with opioid analgesics within the post operative period?

### Design & Methods

- Keywords:** post operative pain relief, TENS, transcutaneous electrical nerve stimulation, visual acuity scale, opioid, analgesia
- Inclusion Criteria:** must have undergone some sort of surgical procedure and the use of TENS in some aspect of the study within the postoperative period
- Exclusion Criteria:** age less than 18, need for an interpreter, history of chronic pain conditions or neuropathy in the affected dermatome

### Synthesis of Evidence

Level of Evidence	Included in Analysis
Prospective Comparative Study	1
Retrospective Case Control Study	1
Systematic Review	2
Meta-Analysis	2
Other	4

### Results:

- Following thoracotomy, the use of opioid analgesic tramadol was significantly less with supplemental TENS compared to placebo at 48, 72, and 96 hours post operative ( $p < .05$ ).<sup>2</sup> Tenoxicam, which is a non-addictive NSAID, usage for pain relief was similar between the treatment and placebo groups ( $p > .05$ ).<sup>2</sup>
- Compared to placebo, TENS use decreased pain perception ranking on the VAS immediately following surgery and up to 72 hours post operatively from hysteroscopy and cholecystectomy.<sup>3,4,5</sup>
- Additionally, TENS decreased the use of any additional NSAID or opioid pain medication following cholecystectomy or hysteroscopy.<sup>3,4,5</sup>
- The use of TENS decreased the time in PACU following hysteroscopy compared to opioid analgesic alone.<sup>3</sup>
- In patients who received TENS, mean systolic blood pressure and heart rate, both physiologic measures of pain, were lower compared to placebo.<sup>5</sup>
- TENS use increased walking distance on post-op day 5 following gamma-nail surgical fixation of extracapsular hip fractures ( $p.02$ ).<sup>6</sup>

### Abbreviation Key:

TENS- Transcutaneous Electrical Nerve Stimulation

VAS- Visual Analogue Scale

NSAID- non-steroidal anti-inflammatory drug

PACU- Post Anesthesia Care Unit

### Best Practice

#### Discussion:

TENS is effective as an adjunct to the standard of care for pain relief and decreases the amount of opioid analgesic needed in the postoperative period, therefore decreasing the risk of dependence, addiction, misuse, and side effects experienced by patients.

TENS use in the postoperative period is beneficial to the patient in several different types of surgical patients including orthopedic, cardiac, and gynecologic.

#### Limitations/Further study:

Due to ethical limitations, it is difficult to assess TENS alone as a method of pain control post operatively. The current research that has been done on TENS in the postoperative period includes at least some analgesic for pain control.

Further research is needed that includes longer follow up on postoperative patients who are using TENS throughout the recovery period. Additionally, more research could be done on the specific length of time TENS should be applied for based on different surgical procedures.

### Conclusion:

Adjunct TENS use is effective in decreasing opioid consumption in post operative pain relief.

As of now, TENS is only one piece of the puzzle for pain control post-operatively but can be a very big piece when used correctly.

#### References:

- Wylie JA, Kong L, Barth RJJ. Opioid Dependence and Overdose After Surgery: Rate, Risk Factors, and Reasons. *Annals of Surgery*. 2022;276(3):e192. doi:10.1097/SLA.0000000000005546
- Cardinali A, Celini D, Chaplik M, Grasso E, Nemec EC. Efficacy of Transcutaneous Electrical Nerve Stimulation for Postoperative Pain, Pulmonary Function, and Opioid Consumption Following Cardiothoracic Procedures: A Systematic Review. *Neuromodulation: Technology at the Neural Interface*. 2021;24(8):1439-1450. doi:10.1111/ner.13302
- Platon B, Thörn SE, Mannheimer C, Andréll P. Effects of high-frequency, high-intensity transcutaneous electrical nerve stimulation versus intravenous opioids for pain relief after hysteroscopy: a randomized controlled study. *Obstet Gynecol Sci*. 2020;63(5):660-669. doi:10.5468/ogs.20063
- Mehdizadehkashi A, Khodaverdi S, Govahi A, et al. Does transcutaneous electrical nerve stimulation (TENS) reduce the laparoscopic related shoulder pain? *Obstet Gynecol Sci*. Published online October 11, 2023. doi:10.5468/ogs.23101
- Tara S, Sharma S, Chandra A, Ram D. Evaluation of the role of transcutaneous electrical nerve stimulation for postoperative pain relief in laparoscopic cholecystectomy: a prospective comparative study. *Ain-Shams J Anesthesiol*. 2023;15(1):55. doi:10.1186/s42077-023-00352-4
- Elboim-Gabyzon M, Andravus Najjar S, Shtarker H. Effects of transcutaneous electrical nerve stimulation (TENS) on acute postoperative pain intensity and mobility after hip fracture: A double-blinded, randomized trial. *Clinical Interventions in Aging*. 2019;14:1841-1850. doi:10.2147/CIA.S203658

Database	Yielded	Reviewed	Included in Analysis
Google Scholar	269	10	2
Summon	153	5	3
Cochrane Library	43	2	0
PubMed	40	3	1
Total:	505	20	6