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Transcutaneous electrical nerve stimulation on ST36 and SP6 acupoints prevents hyperglycaemic response during anaesthesia: a randomized controlled trial.

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Abstract

Background: Hyperglycemia is a common result of stress signals caused by pain and surgical procedure. Volatile anesthetics also directly manipulate glucose homeostasis by affecting pancreatic insulin release and induce hyperglycemia without surgical stress. We determined the preoperative application of transcutaneous electrical nerve stimulation (TENS) to the Chinese acupoints Zusanli (ST36) as a complementary therapy for controlling plasma glucose and increase the sensitivity of insulin.

Methods: We designed a single blind, randomized control clinical study of 60 female patients, scheduled for elective low abdominal surgery. The 52 patients consented to enrollment and were assigned to receive either TENS (n = 26) on bilateral ST36 acupoints with continuous mode at a frequency of 15 Hz and the intensity of 10 mA synchronously for 30 minutes or non-stimulation (placebo group, n = 26) preoperatively. Hemodynamics, blood glucose, and plasma insulin were measured during general anesthesia.

Results: After TENS on bilateral Zusanli acupoints before induction of general anesthesia, the statistically significant plasma glucose lowering effects were obtained during 30, 60, and 90 minutes of general anesthesia in TENS group ($P<0.05$). The hypoglycemic activity was also obtained 13.2±2.5% and 11.4±2.7% after 30 minutes and 60 minutes of TENS respectively. No further hypoglycemic activities were noted after 90 and 120 minutes of general anesthesia in TENS group. The lower homeostasis model assessment index were obtained in the TENS group ($P<0.05$) than the placebo group during general anesthesia.

Conclusion: We recommend TENS at bilateral Zusanli acupoints as an alternative management for diabetic patients to control plasma glucose level and to improve IR perioperatively.