

THE USE OF TRANSCUTANEOUS ELECTRICAL STIMULATION OF THE CALF IN PATIENTS UNDERGOING INFRAINGUINAL BYPASS SURGERY

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Background: Infrainguinal bypass surgery is frequently associated with postoperative reperfusion edema of the limb. The etiology is thought to be multifactorial, and there is as yet no standardized treatment protocol for this problem. The primary aim of this study was to assess whether the use of intermittent electrical stimulation of the calf muscles after infrainguinal bypass surgery was effective in reducing the incidence of edema, and the secondary aims to determine the effect of calf muscle stimulation on arterial and venous flow in the operated leg.

Methods: Forty patients due to undergo infrainguinal bypass surgery for critical lower-limb ischemia (Fontaine grading IIIeIV or Rutherford grading IIeIII) were recruited prospectively and randomly divided into the control group, who received the current standard of care, and study group, who received electrical calf muscle stimulation for a 1 hour session twice daily for the first postoperative week. Preoperatively and postoperatively, the leg was measured at 3 predetermined points and a duplex ultrasound scan performed.

Results: The groups were well matched for all parameters. At 1 week, the below knee and calf girth were less in the study group ($P = 0.025$ and $P = 0.043$, respectively). Venous flow volumes at rest and on stimulation were higher in the study group ($P = 0.010$ and $P = 0.029$, respectively). At 6 weeks, the below knee girth and amount of pitting edema were less in the study group ($P = 0.011$ and $P = 0.014$, respectively).

Conclusions:

We conclude that transcutaneous electrical stimulation of the calf decreased lower-limb swelling at 1 and 6 weeks, and increased the venous flow volume at rest and on stimulation at 1 week in patients undergoing infrainguinal bypass surgery for critical ischemia regardless of patient factors or the type of bypass surgery performed or graft used.