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High frequency TENS as a complement for pain relief in postoperative transition from epidural to general analgesia after pancreatic resection

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A B S T R A C T

Aim: This study investigated the effect of high frequency transcutaneous electric nerve stimulation (TENS) as a pain relieving complementary therapy at the transition from epidural (EDA) to general analgesia after pancreatic surgery by horizontal, abdominal incision.
Method: Fifty-five consecutive patients undergoing pancreatic resection were enrolled in the study and randomly assigned to active or sham TENS treatment. Twenty subjects were included in the analysis. Pain, quality of recovery and additional analgesia consumption were measured during the 24 h of transition from EDA to general analgesia.
Results: Additional analgesic consumption and pain estimations at 24 h after EDA termination differed between the two groups, but was not statistically significant.
Conclusion: This study did not find support to reject use of high frequency TENS as complement during transition from EDA to general analgesia after major abdominal surgery with horizontal incision.
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1. Introduction

Effective postoperative pain relief is a crucial factor for a successful recovery process after surgery. A good postoperative analgesic administration regime after abdominal surgery is epidural analgesia (EDA) [1,2], where analgesic infusion is given via a catheter in the epidural cavity and controlled by a pump. EDA is a feasible analgesia technique as concerns compliance and side effects if the catheter is correctly located corresponding to the origin of pain. However, EDA is not a predictor of faster and easier recovery [3].

During the postoperative phase, the analgesic regime will be changed from EDA to general, often per oral, analgesia combined with morphine injections when needed. Breivik [4] suggests that the transition from EDA to general analgesia is performed during the fourth to the fifth postoperative day after upper abdominal surgery. To our knowledge, there are no studies that have explored patients' experience of this transition, even though the change in analgesic regime often clinically results in increased pain for the patient during the 24 h after EDA termination.

A non-invasive, complementary therapy against postoperative pain is transcutaneous electrical nerve stimulation (TENS). By placing electrodes on the skin in the area or the representative area (e.g. dermatome) of the pain, and applying a light electric voltage between the pads with a high frequency (80–100 Hz), it has been demonstrated that TENS, via stimulating A-beta fibres, activates the so called gate control in the dorsal horn at the same segmental level as the pain [5]. The clinical effect of TENS is disputed, due to a lack of high quality studies [6–12]. However, if TENS is applied with strong intensity against postoperative pain, it seems to result in better pain relief [13]. The effects of TENS after abdominal surgery are also contradictory, but some studies report TENS to be a feasible complement to pharmacological analgesia in the postoperative phase [14–16]. Use of TENS has reported very few side effects [17,18], which makes it useable even in fragile patients.

A study by Chandra et al. [19] advises the use of TENS as a complement to EDA after thoracotomy to decrease patients' pain intensity. Hence, to our knowledge, no previous study has investigated the benefit of TENS in postoperative termination of EDA. The aim of this study was therefore to investigate the effectiveness of TENS as a pain relieving complement at the transition from EDA to general analgesia after surgery by horizontal, abdominal incision.

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2. Method

2.1. Design

This study was conducted as a prospective, randomized, single-blinded study. All patients scheduled for pancreas resection Ad Modum Whipple (pancreaticoduodenectomy) from October 2008 to June 2011, consecutively except for the summer months, were recruited to the study. Surgery and postoperative care were given at a university hospital in the west of Sweden. Inclusion criteria were pancreas resection with Peustow incision due to pancreatic cancer, postoperative analgesia as EDA, and that the patient should be TENS naïve. Exclusion criteria were pacemaker, not having Swedish as the native language, cognitive or psychiatric diagnosis, active abuse of alcohol or drugs, and additional or unexpected surgery after the primary operation. Patients were consecutively recruited and randomized into one of two groups, active TENS with high frequency, strong intensity, and sham TENS with high frequency, barely noticeable intensity, before termination of the EDA infusion. Randomization was done by a person from an independent institution, not involved in the study. The assistant randomly put information about allocation to the two groups in opaque sealed envelopes. Each subject was randomized by taking the prepared envelops consecutively. The patients were blinded to the group to which they were randomized. A total of 55 subjects were included, and 20 of these completed the full study protocol (see Fig. 1).

2.2. Treatment

All patients were treated according to a standard care protocol and postoperatively given thoracal epidural analgesia with an infusion of Bupivacain 1 mg/ml, Fentanyl 2 μg/ml and Adrenaline 2 μg/ml [4,20]. When EDA infusion was terminated, analgesia were given per os as 400 mg/day tramadol hydrochloride (Tradolan retard® 200 mg morning and evening) and 4 g/day paracetamol (Pamol® 500 mg two tablets morning, lunch, supper and evening).

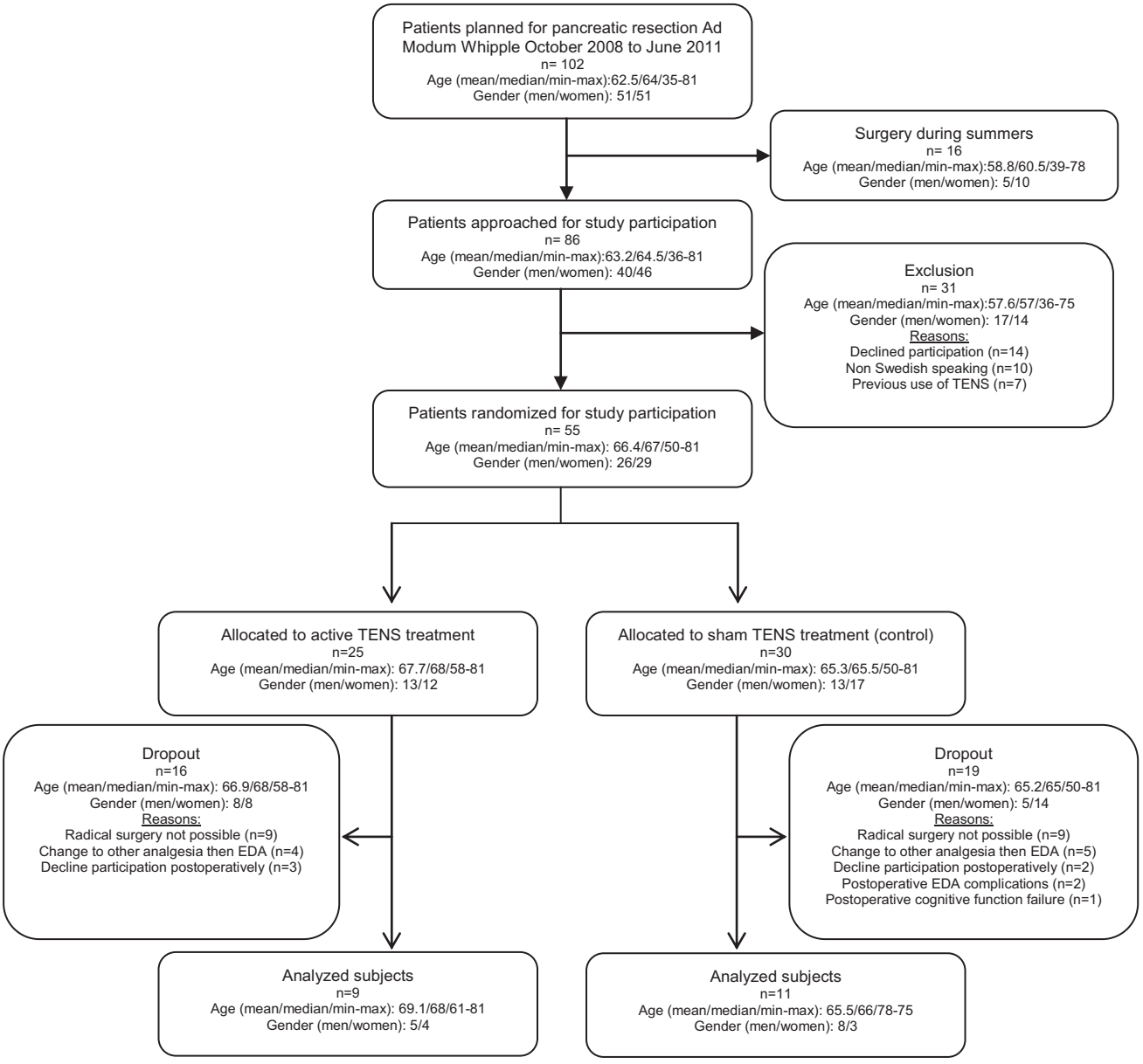

Fig. 1. Flow chart of study subject, exclusion and dropouts.

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