Temporary spinal cord stimulation to prevent postoperative atrial fibrillation after coronary surgery.
First results of the feasibility study

Authors:
A Romanov¹, A Chemyavskiy¹, V Lomivorotov¹, D Ponomarev¹, V Murtazin¹, K Orlov¹, E Kliver¹, V Shabanov¹, D Losik¹, I Mikheenko¹, A Ponomarenko¹, JS Steinberg², ¹E. Meshalkin National Medical Research Center of the Ministry of Health - Novosibirsk - Russian Federation , ²Heart Research Follow-up Program, University of Rochester School of Medicine & Dentistry - Rochester - United States of America ,

Topic(s):
Rhythm Control, Atrial Fibrillation Surgery

Background: Atrial fibrillation (AF) is the most common arrhythmia after cardiac surgery with typical appearance at early days after operation and leads to increase morbidity and mortality in the short and long term follow up. Spinal cord stimulation (SCS) was proven to be effective in chronic pain and intractable angina pectoris treatment. Recently, animal studies demonstrated that spinal cord stimulation could suppress AF and reduce AF burden.

Aim: To test safety and efficacy of the temporary SCS in early postoperative period in patients undergoing coronary artery bypass grafting

Methods: Fifteen patients (10 men, mean age 61±7.5 years) with indications for coronary artery bypass grafting (CABG) and history of paroxysmal AF underwent percutaneous lead placement for temporary SCS. Under local anesthesia and fluoroscopic guidance, the leads were placed at C7-Th4 level according to patient’s sense of paresthesia and connected with spinal cord stimulator externally fixed on patient’s chest. Temporary SCS was performed 3 days before CABG and turned off during surgery. At the end of CABG, the SCS was turned on in the intensive care unit and continued for 7 days. After that the temporary leads were removed. The primary safety objective was to test safety of the temporary SCS in early postoperative period, including 30 days occurrence of MACE (Death, stroke or TIA, myocardial infarction), acute spinal cord and kidney injury. The efficacy endpoint included occurrence of AF or any atrial tachyarrhythmias lasting ≥ 30 seconds during 30 days after surgery. All patients had continuous external ECG monitoring for 30 days after surgery.

Results: In all (100%) patients temporary leads for SCS were implanted successfully and standard on-pump elective CABG was performed thereafter. There were no any adverse events related to temporary SCS in either patient till the end of follow up. There were no significant differences in CK-MB and creatinine levels as compared with baseline data (p=0.2 and 0.3, respectively). No patients developed AF or atrial tachyarrhythmias during follow up according 30-days ECG monitoring.

Conclusions: The first results of the temporary spinal cord stimulation to prevent AF after coronary surgery demonstrated safety and efficacy of this therapy. The parallel group randomizes study is under way (NCT 03539354)