

Epicardial Cardioverter-defibrillator Implantation Concomitant With Coronary Artery Bypass In Low Ejection Fraction Patients

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ABSTRACT

Patients with severe left ventricular failure are directed to surgical revascularization due to improved survival and functional status postoperatively. However, if unlikely to have an ejection fraction > 35% postoperatively, patients are still at increased risk for sudden cardiac death due to malignant arrhythmias. We documented our results on patients with an ejection fraction of < 35% who are concomitantly implanted cardioverter-defibrillator with surgical revascularization. We believe that simultaneous surgery is advantageous in terms of preventing sudden cardiac death in early postoperative period and lacks a necessity for the second intervention.

Keywords: Heart failure;coronary artery bypass;defibrillators, implantable;death, sudden, cardiac;

Düşük Ejeksiyon Fraksiyonlu Hastalarda Koroner Baypas Cerrahisi ile Eşzamanlı Epikardial Cardioverter-defibrilatör İmplantasyonu

ÖZET

Ciddi sol ventrikül disfonksiyonu olan hastalar postoperatif artmış yaşam süresi ve düzelmiş fonksiyonel durum sebebiyle cerrahi revaskülarizasyona yönlendirilmektedir. Ancak, eğer postoperatif ejeksiyon fraksiyonu > %35 olacak gibi değilse, hastalar halen malign aritmiler sebebiyle ani kardiyak ölüm için risk altındadır. Biz burada ejeksiyon fraksiyonu <%35 olan, cerrahi revaskülarizasyon ile eşzamanlı cardioverter-defibrilatör implantasyonu yapılan hasta sonuçlarımızı dökümanete ettik. Biz bu hastalarda erken postoperatif dönemde ani kardiyak ölümün önlenmesi ve ikinci girişime ihtiyaç olmaması sebebiyle simültane cerrahinin avantajlı olduğunu düşünüyoruz.

Anahtar Kelimeler: Kalp yetmezliği; koroner arter baypas; implante edilebilir defibrilatör; ani kardiyak ölüm

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Introduction

With the advents in surgical revascularization techniques, innovative pharmacologic strategies and anesthesia, the number of patients undergoing surgical revascularization with severe left ventricular failure has increased, outcomes has improved and caused a decrease in performance of available operative risk scores (1). However, mortality is still higher compared to normal left ventricular ejection fraction (LVEF) patients; an analysis comprising 700,000 patients of STS Adult Cardiac Surgery Database has concluded that a 10% decrease in LVEF resulted in 19% increase in odds of death (2). Surgery improves survival and functional status, controls ischemic symptoms and decrease sudden cardiac death (SCD) caused by malignant arrhythmias (3). Besides the well-known perioperative low cardiac output syndrome (LCOS) which is the main determinant of perioperative mortality, survivors are still at increased risk for SCD caused by malignant arrhythmias and therefore benefit from implantable cardioverter-defibrillator (ICD) therapy (1,3,4).

In this study, we aimed to share our results on 4 patients with LVEF<35% (who are eligible for ICD implantation) undergoing CABG surgery concomitant with ICD implantation and the rationale behind this approach.

Case Series

Four patients with LVEF<35% were operated and epicardial dual-chamber ICD implantation (Medtronic, Minneapolis, MN, USA) concomitant with CABG was performed. Mean age of the patients was 66.25 ± 2.5 (min:65-max:75). There was only one female patient. The mean LVEF was $26.25 \pm 2.5\%$ (min:25-max:30). The mean number of grafts performed was 3.5 ± 1.29 (min:2-max:5). All patients had anginal symptoms, were on guideline directed medical therapy, were more than 40 days post-MI and heart team concluded that none of them were likely to have LVEF>35% following revascularization based on echocardiography and myocardial scintigraphy. There was one postoperative mortality on day 2 due to LCOS. All patients were weaned from cardiopulmonary bypass with intra-aortic balloon counter pulsation (IABP). The IABP was released after inotropic support was ceased. The main aim was to re-employ inotropic support if the hemodynamic parameters was not satisfactory after IABP cessation. The mean IABP time was 24 ± 5.3 hours. Mean follow-up time was 3.6 ± 0.6 months (min: 3-max: 4). Only one patient experienced VF on postoperative first month and survived. The other patients did not experience any attacks of VT or VF on controls. Monthly echocardiography was performed and none of the patients had LVEF > 35% ($30.6 \pm 1.3\%$; min: 30-max:32). There was no ICD related complication.

Discussion

The ratio of patients with LVEF<35% undergoing surgical revascularization makes up more than 10% of total CABG population (1). Patients with severe left ventricular failure benefit more from CABG if symptoms of angina are predominant rather than heart failure. Surgical revascularization preserves viable myocardium, prevents further deterioration and improves hibernated myocardium (3). Despite the increased perioperative risk, patients have increased survival rates and improved functional status revealing benefits overcome increased operative mortality (1,3). The perioperative mortality is affected predominantly by LCOS leading to renal failure, respiratory failure and neurologic complications (1). Among the survivors, the most important issue is the SCD caused by malignant arrhythmias. The incidence of VT/VF varies between 0.415 and 1.4% following CABG (5). Current ACC/AHA guidelines for management of heart failure recommend ICD implantation in ischemic cardiomyopathy patients > 40 days post-MI, LVEF≤35% and NYHA Class II-III or LVEF<30% and NYHA I, on chronic guideline directed medical therapy and have >1 year expected survival. For patients who have undergone revascularization, if qualified for ICD implantation for prevention of SCD, and are unlikely to have LVEF>35% after revascularization, and are not within 40 days post-MI, it is stated that ICD implantation can be useful (4). We have employed ICD implantation concomitant with CABG in 4 patients with LVEF<35%. None of the patients were within 40 days post-MI and heart team had a consensus that neither of them were likely to have LVEF>35% after surgical revascularization.

For primary prevention of SCD, ICD implantation has become a standardized first line therapy and is widely employed (6). However, patients undergoing surgical revascularization but are unlikely to have LVEF>35% following revascularization are at increased risk for SCD in postoperative period and the time interval for decision of percutaneous ICD implantation is unclear requiring a second intervention. Therefore, we believe that patients outlined above are eligible for ICD implantation concomitant with CABG to decrease the incidence of SCD. This approach also does not require a second intervention. One patient in our population experienced VF one month postoperatively and survived which supports this approach. However, randomized controlled trials should be designed in order to document objective benefits of this approach.

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