How-to-do-it

New technique for implantation of the inflow canula of Berlin Heart INCOR system

Alexander Tschirkova, Dimitar Nikolov, Vassil Papantcheva,*

*Department of Cardiac Surgery, 'St. Ekaterina' University Hospital, 52A 'P. Slaveikov' Street, 1431 Sofia, Bulgaria

Received 26 June 2006; received in revised form 10 July 2006; accepted 13 July 2006

Abstract

Berlin Heart INCOR system is a left ventricle assist device (LVAD), which generates a laminar blood flow. Its inflow canula is implanted in the heart apex, while its outflow canula—in the ascending aorta. In the present work a new alternative technique for implantation of the device’s inflow canula is reported. The suggested technique is quicker and easier than the conventional one. It saves time and gives excellent results. After the implantation no unusual events like thrombosis, anastomosis malfunction, etc., are observed.

© 2006 Elsevier B.V. All rights reserved.

Keywords: Prosthesis; LVAD; Suture

1. Introduction

In the end-stage of heart failure, when donor heart is not available, the implantation of ventricular assist devices is the only life sustaining method [1]. Berlin Heart INCOR system (Berlin Heart AG, Germany) is a novel left ventricle assist device (LVAD), which had been used in our institution [2]. This device generates a laminar blood flow. Its inflow canula is implanted in the heart apex, while its outflow canula—in the ascending aorta [3].

Here we report a new alternative technique for implantation of the inflow canula of Berlin Heart INCOR system.

2. Patients

Berlin Heart INCOR system was implanted in 11 patients (10 male and 1 female) in our institution. In two of them the reported here technique was used.

Patient 1 (J.B.T.) was a 40-year-old male who was suffering from dilated cardiomyopathy. Before the operation, continuous dopamine infusion was started and the patient was supported with IABP. The implantation was performed under emergency conditions because of the acute and life threatening progression of the disease (Operation protocol No. 1262/October 31, 2005).

Patient 2 (H.S.H.) was a 27-year-old male who was also suffering from dilated cardiomyopathy. Continuous dopamine infusion was started before the operation. The latter was performed in emergency circumstances, because of the disease progression (Operation protocol No. 69/January 21, 2006).

3. Technique

In both patients the extracorporeal circulation was started in conventional way and a fibrilator was used. The heart apex incision was made with apex coring knife supplied with the system. The incision was checked for free trabecular ends, which were removed. The apex suture ring was implanted with eight felt-backed, double-reinforced Prolene sutures placed in circular pattern around the apex incision. Four of these Prolene sutures were 3/0 and they alternated with other four, which were 2/0. The 3/0 Prolene threads were tied on the suture ring and free ends were removed (Fig. 1A). The 2/0 Prolene sutures were passed through the inflow canula ring and then tied (Fig. 1B and C). One needle was removed. With the other needle of each 2/0 Prolene thread a continuous running suture, through both the suture ring and the inflow canula ring, was made. With each 2/0 Prolene threads one-fourth of the ring’s circumference was sutured and it was tied to the next thread in the row (Fig. 1D). In both patients the outflow canula was implanted by use of the conventional technique1 [4]. Immediately after the implantation, in both patients, the anticoagulation...
protocol used in our clinic for VAD implanted patients was applied. It includes continuous Heparin infusion, started as soon as possible after the operation (target APTT values 40—80 s). This continues until the patient is extubated and then Sintrom, Aspirin (100 mg) and/or Clopidogrel are given daily. The target INR values were 3.5—4.5. Either 5000 U heparin SC or two administrations of low molecular weight heparin were performed whenever the INR dropped under 2.5. After the implantation no unusual events like thrombosis, anastomosis malfunction, etc., were observed.

Until June 20, 2006 both patient were alive and discharged from the hospital. The first patient had been supported for 232 days, while the second for 151 days. In comparison, the average support period for our INCOR patients, in whom the implantation of device's inflow canula was performed in standard fashion, was 217 days (calculated until June 20, 2006).

4. Comments

Briefly the conventional implantation of the Berlin Heart INCOR system inflow canula is as follows: the suture ring is implanted with 12—14 single felt-backed, double-reinforced Prolene sutures. These are tied and then passed through the ring of the inflow canula and tied again. One continuous running suture is then placed through both suture ring and the ring of the inflow canula [4].

Our implantation technique has a number of advantages compared to the conventional one. First, we use a low number of sutures. Next, with the conventional technique at least two or three sutures are located under the inflow canula angle section which makes tying of these sutures difficult and could prolong the operation. Such problem does not occur with the suggested technique. Finally, the suggested here technique is simple and time saving, it is mainly useful in uncomplicated cases.

We would like to emphasize that the patient’s specific anatomy, like thin LV walls, LV aneurysms, calcifications of the LV muscle, etc., is the one that determine the actual operative technique. This has to be taken into consideration during assist device implantation so that surgeons should adopt appropriate technique for every particular case.

In conclusion, the suggested technique is quicker and easier compared with the conventional one. It saves time, simplifies the operation, and gives excellent results. Furthermore, after the implantation no unusual events like thrombosis, anastomosis malfunction, etc., are observed.

Acknowledgement

The authors would like to express their special gratitude to L. Venkova for her considerable help in preparing the English version of the present report.

References