Evaluation of 56 Cases of Long Segment Anastomosis of Left Internal Thoracic Artery to Left Anterior Descending Artery in Rajaei Heart Center

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Abstract:

Background: Long segment reconstruction of the diffusely diseased Left Anterior Descending Artery (LAD) with Left Internal Thoracic Artery (LITA) has been shown to be beneficial for patients that have complicated, multiple and long segment lesions in LAD. In this prospective study we analyzed the results obtained with this technique.

Methods: From Feb. 2007 to Feb. 2009, 56 patients were operated by this technique. LITA was used as a patch along the opened narrow segment of LAD from 2 to 8 centimeter. Data from all patients were collected and all patients worked up for post operative complications, like post operative MI, ECG changes, NIHA class, enzymatic changes, post operative bleeding and CT-Angiography were done between 6 to 18 months after operation in some cases.

Results: 56 cases,42 male (75%)and 14 female (25%), from 43 to78 years with mean age of 59.8+_9.3 years with multiple and long segment lesions in LAD were included in this satudy. Preoperative risk factors were Hypertension (66.1%), Diabetes (57.1%), Hyperlipidemia (50%), cigarette smoking (50%), renal failure (1.8%) and positive family history (7.1%). 23 patients (41.1%) have had remote MI and 9 patients (16.1%) have had recent MI.Significant left main lesion were found in7 patients (12.5%), peripheral vascular disease in 3 patients (5.3%) and preoperative arrhythmias in 2 patients (3.6%). Mean number of grafts that were used in operations was 2.85 +_1.5 and other concomitant operations were done in 5 patients. Post operative complications were arrhythmias in 10 (17.8%), postoperative MI in 1 (1.8%), surgical bleeding in 7 (12.5%), infections in 3 (5.3%), plural effusion in 3(5.3%), tamponade in 2(3.6%), pericardial effusion in 1 (1.8%) and hemiparesia in 1 patient (1.8%). there was no mortality in these patients.

Conclusion: Long segment and multiple lesions in LAD are difficult challenges for cardiac surgeons and in these situations; results of long-segment LAD reconstruction are very encouraging.

Key words: Left Anterior Descending artery (LAD), Left Internal Thoracic Artery (LITA), Long segment anastomosis.

ntroduction:

CABG is an approved cardiac operation and it seems that this operation can increase life expectancy and the most important graft that can prolong the survival of the patient is the LITA to LAD anastomosis (1,2). Today, because of improvement in percutaneous techniques and more comfortable stents that can be use by interventional cardiologists, more complicated cases are referring to cardiac surgeons for coronary bypass surgery. Endarterectomy is a good solution in more complicated cases of long segment anas-

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tomosis and use of sequential (jump) graft are a resolution in multiple stenosis(3-5), also the use of vein patch for reconstruction of LAD was reported by some authors (6) but there are some reasons that endarterectomy in LAD is not as good as endarterectomy in other coronary tributaries because the origin of the rectangular septal branches that feed anterior and middle parts of ventricular septum are in risk of closure after endarterectomy and it can induce a septal MI and can jeopardize the patients' life, also it needs patient anticoagulation therapy for 6 to 8 weeks that itself it can induce more risk for hemorrhage and pericardial blood collection after CABG(7) on its owen.We decided to evaluate our technique in management of complicate LAD lesions in this study. We use LITA as a patch for reconstruction of long segment of LAD as an alternative for LAD endarterectomy, vein patch reconstruction and sequential anastomosis.

Material and methods:

From Feb 2008 to Feb 2009 in a retrospective analysis we collected data from 56 patients that we used the technique of Long segment LITA to LAD anastomosis for long segment lesion of LAD. We used our technique for patients whom have had long segment and multiple lesions on LAD especially those that have at least one patent septal artery in this region with good distal run off and usually there were at least one athromatose downstream plaque after the first stenosis in LAD. Pump circulation and standard technique for CABG were used for all patients and because of diffuse lesions in all three coronary vessels, we didnt use off pump technique in these patients. The length of long segment anastomosis should be at least 2 cm, LAD was opened and unroofed for long length where the proximal and distal point of anastomosis had good run off, then we opened the LITA for the same length and anastomosis this together with two 7-0 prolene suture one from heel and the other from the toe. Preoperative data like risk factors, sex, age and history of remote and recent preoperative MI and postoperative data like postoperative complications where collected, inserted in sheets and multivariate analysis were done in regress models with the use of chi-square and mixed model ANOVA.

Results:

From Feb 2008 to Feb 2009, 56 cases, 42 male (75%) and 14 female (25%), from 43 to 78 years with the mean age of 59.8+_9.3 years with multiple and long segment lesions in LAD were included in this study. Preoperative risk factors were Hypertension in 37 patients (66.1%), Diabetes in 32 patients (57.1%), Hyperlipidemia in 28 patients (50%), cigarette smoking in 28 patients (50%), renal failure in one patient, long term corticosteroid usage in one patient (1.8%) and positive family history in 4 patients (7.1%) (Table-1). Twenty three patients (41.1%) have had remote MI and 9 patients (16.1%) have had recent MI. Significant left main lesions were found in 7 patients (12.5%), peripheral vascular disease in 3 patients (5.3%) and preoperative arrhythmias in 2 patients (3.6%) (Table-2). Mean number of grafts that were used in operations was 2.85 +_1.5 and other concomitant operations were done in 5 patients that was VSD closure in one case and mitral valve repair in three cases and mitral valve replacement in one case. Post operative complications were arrhythmias in 10 (17.8%), postoperative MI (approved by cardiac enzyme analysis, echocardiography and ECG changes) in 1 (1.8%), surgical bleeding in 7 (12.5%), infections in 3(5.3%), plural effusion in 3(5.3%), tamponade in 2(3.6%), pericardial effusion in 1(1.8%) and hemiparesia in 1 patient (1.8%) (Table-3).

There was no mortality in these patients. Mean clamp time was 35.9+_14 and mean pump time was 70+_22 minutes. Mean length of LIMA to LAD anastomosis was 4+_1.2 cm the longest was 8 cm and the shortest was 2 cm, We don't say long segment anastomosis to grafts length shorter than 2 cm.Mean ICU stay was 2.57+_0.9 days in females and 2.33+_0.48 days in males and mean hospital stay was 6.8 +_2.5 days in females and 6.3+_1.9 days in males. Follow up period was 1.4 |+_0.4 months (Table-4). Mean NYHA class preoperative was 2.3 and it reduced to 1.5 that p_value<0.001 is significant. We didn't use Balloon pump in this group of patients.

Table-1: Classic preoperative risk factors

Hypertension	37	66.1%
Diabetes	32	57.1%
Hyperlipidemia	28	50%
Cigarette smoking	28	50%
Positive family history	4	7.1%
Renal failure	1	1.8%
Chronic corticosteroid usage	1	1.8%

Table-2: Preoperative variants

Remote MI	23 (41.1%)
Recent MI	9 (16.1%)
LM lesion	7 (12.5%)
Peripheral Vascular Disease	3 (5.3%)
Preoperative Arrhythmias	2 (3.6%)
Cerebro vascular accident	0 (0%)

Discussion:

Today, cardiac surgeons have different number of patients with diffuse lesions in LAD .With new interventional techniques simple lesions can be corrected with stents, and more diffuse lesions with long segment LAD lesions and multiple lesions are going for CABG. Endarterectomy in LAD is a known method and different authors have controversial ideas about it (4, 5, 6, and 7).some authors report good results but other are still reluctant to use this technique because of its high rate of perioperative and postoperative mortality (7,8). The origin of the rectangular septal branches that feed anterior and middle parts of ventricular septum are in risk of closure after endarterectomy and it can induce a septal MI and can jeopardize the patients life, also denuded endothelium after endarterectomy enhances the development of myofibrointimal proliferation that can produce new thrombus formation and decrease the long term survival of the graft, then it needs patient anticoagulation therapy for at least 6 to 8 weeks that itself can induce more risk for hemorrhage and pericardial blood collection after CABG (7,8). Also the use of vein as onlay patch is an alternative technique. Its use is more difficult and the athromatouse process can progress in vein portion of graft.(6,9). The main goal of this study is to introduce an alternative technique that we use in our surgical ward that may be useful in some situations for other surgeons. With the creation of a long opening in the roof of LAD until a good distal and proximal run off point can be accessed, we can see all side and septal branches and a secure anastomosis can be reconstructed. We think reconstruction of LAD with LITA can destroy all plaques and the plaque can not create stenosis circumferentially, neointimal proliferation doesn't exist any more and a wide lumen for this part of LAD can be reconstructed. in this series of 56 patients that all have had long segment or multiple lesions on LAD we reconstructed LAD with LITA for above 2 cm and we collect all the data from patients. Results shown that, mean pump time was 70+_22 minutes and mean clamp time was 35.9+_14 minutes it means that the time of clamp and pump time doesn't increase from other CABG operations. the mean ICU stay was 2.57+_0.9 days in females and 2.33+_0.48 days in males and the mean hospital stay was 6.8+_2.5 days in females and 6.3+_1.9 days in males this is in the range of simple uncomplicated CABG operations. Post operative complications in our group was surgical bleeding needs reoperation in 7 cases (12.5%) that is more than simple on pump CABG.Other complications were not more than other CABG operations(Table-3). Postoperative MI was seen in one case (1.8%) that is very low and we didn't have had any mortality in this study. Mean NYHA class preoperative was 2.3 and it reduced to 1.5 that p_value<0.001 is significant and this mean that the quality of life is better with this kind of CABG operation. We didn't use Balloon pump in this group of patients and this is valuable in our study. After all we didn't use long term anticoagulation therapy after operation in this study except for prophylaxis against deep vein thrombosis and pulmonary emboli, that was Heparin at the doses of 500 unit per hour started 6 hours after operation and discontinued after patient ambolization.We think that this technique is a good alternative for endarterectomy, sequential anastomosis and onlay vein patch technique that is simple and we can use it in all complicated situations. Limitation of our study is lake of long term postoperative follow-up and lake of postoperative angiography.

Table-3: Postoperative Complications

Surgical bleeding	7	12.5%
Arrhythmia	4	7.1%
Infection	3	5.3%
Plural effusion	3	5.3%
Thrombosis	2	3.6%
Tamponade	2	3.6%
pneumothorax	1	1.8%
Pericardial effusion	1	1.8%
Hemiplesia	1	1.8%

Table-4: Mean ICU and hospital stay and mean follow-up time

ICU stay	Female	2.57+_0.9 Days	0.219
	Male	2.33+_0.48 Days	
Hospital stay	Female	6.8+_2.5 Days	0.437
	Male	6.3+_1.9 Days	
Follow up	Female	1.8+_0.4 Days	0.69
	Male	1.9+_0.6 Days	
	Sex	Mean+_SD	P_value

Conclusion:

Long segment and multiple lesions in LAD are difficult challenges for cardiac surgeons and in these situations; results of long-segment LAD reconstruction are very encouraging and in this era could be comparing with endarterectomy and multiple sequential anastomosis.

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