Supplementary Text

Methods

Study patients and selection criteria for the arteriovenous I-graft use

Based on the reported data and performed analyses, the I-graft technique was used not only (albeit more frequently) in the presence of a pathological aorta, in the case of two or more vessels to bypass onto the inferolateral cardiac wall (sequential anastomoses), or during off-pump surgery, but also during on-pump surgery to avoid of carrying out the proximal aortic anastomosis in the course of cross-clamping. Between the two groups, there were no significant differences as to the rates of some preoperative variables that increase significantly the operative risk such as urgent priority, recent myocardial infarction, congestive heart failure, and left ventricular dysfunction; actually, “critical preoperative state”, which was defined as preoperative ventricular tachycardia/fibrillation or aborted sudden death, cardiac massage, mechanical ventilation, inotropes or intra-aortic balloon pumping, and acute renal failure was, unexpectedly, a more frequent variable among the I-patients. Everyone agrees that, in surgery as well as in any medical discipline, novel techniques and treatments have to be validated in a sufficiently large series of patients before being introduced into current clinical practice. Since to date there was only an "how to do it" paper on the use of the proximal stump of the right ITA as inflow for the saphenous vein graft [12], the present original article aims to be the clinical validation study of this novel technique of coronary revascularization. (Tables 1 and 2; Suppl. Table S1)

Surgery and perioperative management

To evaluate the suitability of both ITAs, all patients had undergone bilateral selective angiography of the subclavian artery during preoperative coronary angiography. Both ITAs were dissected with low-intensity bipolar coagulation forceps, from the inferior border of the subclavian vein distally to their bifurcation. The ITA harvesting technique did not change during the study period. [15]

Although no particular skill set is required for sewing a vein graft to the proximal right ITA stump (in the present authors' opinion this anastomosis would be as simple as the traditional, worldwide used Y-anastomosis between two ITA grafts), there are some recommendations that deserve being respected: (1) the proximal right ITA stump should be as long as 3-5 cm. While a shorter stump would cause a suboptimal exposure for making the Y-anastomosis, a longer stump would prevent a too short right ITA free graft (from the in situ left ITA) from getting to the coronary target; (2) only optimal matching between the two grafts should be accepted and the vein graft should be obtained preferably from the distal leg; (3) to prevent stenosis, a 7-0 or 8-0 polypropylene, narrow step running suture should be used for sewing the I-anastomosis, which should be completed and tightened under tension, after having removed the clamp from the stump; (4) in the case of failure, the anastomosis should not be unstitched but cut away and redone; finally, (5) the venous component of the new composite graft will be dilated gradually and softly by the blood pressure. (Suppl. Table S1)

Statistical methods

A multivariable analysis was carried out using the backward stepwise logistic regression. The area under the receiver-operating characteristic curve, with 95% confidence interval, was used to represent the regression probabilities. To estimate the probability of being assigned either to the one or the other group, a propensity score was calculated in a non-parsimonious way including every baseline variable. One-to-one propensity score-matching was performed employing the nearest neighbour method and a caliper of 0.2 of the standard deviation of the logit of the propensity score. To evaluate the balance between the matched groups, the Wilcoxon or the Student's *t*-test for paired samples for continuous variables, the McNemar test for dichotomous variables, and the analysis of the standardized differences after matching were used. Standardized difference <10% was considered an acceptable imbalance between the treatment groups. The same tests were adopted to evaluate differences in operative data and postoperative complications of matched groups.

Supplementary Tables

Suppl. Table S1: The I-graft technique: Advantages and drawbacks*

Advantages	Drawbacks
Avoiding aortic clamping in atherosclerotic aorta	Lack of a suitable saphenous vein graft (optimal match with the proximal
Avoiding proximal aortic anastomoses	right ITA stump)
Boosting bilateral ITA use	Significantly stenotic (>50%) or occluded right subclavian artery
Graft flow testable before performing coronary anastomosis	Right ITA disease or injury (harvesting)
Reducing risk of air embolism into the coronary tree	Risk of kinking/torsion of the I-graft
Avoiding the right ITA crossing anterior to the heart†	Right upper limb arteriovenous fistula (relative)
Generating a new double-inflow for the coronary tree	Increased risk of bleeding from the I-anastomosis (speculative)
Good long-term I-graft patency (speculative)	
Rapid learning curve (easy to learn)	
Good training ground for microvascular anastomoses‡	
Noninvasive assessment (with transthoracic ultrasonography scan) of the	
main stem of the two (I and Y) composite coronary grafts (speculative)	

*_Ref_. 11,12.

†That is important in the case of repeat sternotomy.

‡The I-anastomosis may be repeat in the case of failure.

ITA=internal thoracic artery

Suppl. Table S2: I vs. C-group. Survival and MACCEs during the follow-up period*,†

Variable	Overall series	Matched pairs	
	I-group n=203‡	I-group n=182‡	C-group n=182‡
Death	11	9	16
MACCEs	35	29	52
Cardiac or cerebrovascular death§	5	5	11
Recurrent angina	3	3	0
Myocardial infarction	4	3	2
Congestive heart failure‖	16	12	21
Percutaneous coronary intervention	6	5	11
Repeat coronary operation	1	1	0
Pulmonary embolism	0	-	1
Cerebrovascular accident	5	4	4

*The values are the number of patients with the percentage in brackets, or the mean ± standard deviation.

†The follow-up period was longer for C-group (median, 4.1 vs. 3.0 years, $p<0.0001$).

‡The hospital discharged patients.

§Including sudden death.

‖Needing hospital readmission.

MACCEs=major adverse cardiac and cerebrovascular accidents

Supplementary Figure Legends

Suppl. Fig. S1: The CONSORT diagram demonstrating how many patients had isolated CABG, how many had multiple CABG, how many had bilateral ITA grafting, and how many had I vs. C-grafting during the study period.

CABG=coronary artery bypass grafting; ITA=internal thoracic artery; LAD=left anterior descending coronary artery

Suppl. Fig. S2: I -group, the overall series. Non-parametric curves and estimates of freedom from all-cause death (A), cardiac or CV deaths (B), and MACCEs. The three-year freedom from all-cause death, cardiac or CV deaths, and MACCEs was 93.5% (95% CI, 91.7%–95.3%), 96.2% (95% CI, 94.8%−97.6%), and 81.2% (95% CI, 78.3%−84.1%), respectively.

CI=confidence interval; CV=cerebrovascular; MACCEs=major adverse cardiac and cerebrovascular events