Tips and tricks on CABG

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Ευρωκλινικής Αθηνών

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Editorial

Why Did You Not Use Both Internal Thoracic Arteries?

John D. Puskas, MD, MSc

That is the question every cardiologist should ask if the patient he or she has referred for primary surgical coronary revascularization returns from the operating room with a single internal thoracic artery graft. There is a substantial body of evidence demonstrating that the majority of coronary bypass patients benefit more when coronary artery bypass graft (CABG) surgery is performed with both internal thoracic artery conduits rather than just one. However, only 4.4% of primary isolated CABG cases in the 2011 Society of Thoracic Surgeons National Adult Cardiac Surgery Database received bilateral internal thoracic artery (BITA) grafting. There are several putative reasons for this failure of adoption, but referring cardiologists and patients should demand better.
Long term goals of CABG

- improvement of survival
- improvement of quality of life
- no recurrent angina
- no need for reintervention
Coronary Artery Bypass Grafts

- Vein
- Arterial
Right internal thoracic artery, the "forgotten" bypass conduit, should be used more often

Use the RIMA:

- 5% of bypass procedures in the USA (Registry data)
- 11% in Australia


How many arterial grafts are enough? A population-based study of midterm outcomes

Syntax study

Only 18% of the cases with arterial grafts

Patrick W. Serruys, M.D., Ph.D., Marie-Claude Morice, M.D., A. Peter Kappetein, M.D., Ph.D., Antonio Colombo, M.D., David R. Holmer, M.D., Michael J. Mack, M.D., Elisabeth Stehle, M.D., Ted E. Feldman, M.D., Marcel van den Brand, M.D., Eric J. Rasmussen, M.D., Nic Van Dyck, B.A., Karen Leadley, M.D., Keith D. Denskus, M.D., Friedrich W. Mohr, M.D., Ph.D., for the SINTAX Investigators

Percutaneous Coronary Intervention versus Coronary-Artery Bypass Grafting for Severe Coronary Artery Disease NEJM 360:961–972, 2009
Coronary artery bypass graft surgery versus percutaneous coronary intervention in patients with three-vessel disease and left main coronary disease: 5-year follow-up of the randomised, clinical SYNTAX trial

MACCE by baseline SYNTAX score tercile (A) overall cohort; (B) left main coronary disease subgroup; and (C) three-vessel disease subgroup. Mohr et al. The Lancet Volume 381, Issue 9867 629 – 638, 2013.
Recurrent angina after CABG

- Primary: Degeneration and occlusion of the saphenous vein grafts
- Secondary: Worsening of atherosclerosis
VEIN GRAFT DEGENERATION

atheroma
ABSTRACT

Background Vein-graft harvesting with the use of endoscopy (endoscopic harvesting) is a technique that is widely used to reduce postoperative wound complications after coronary-artery bypass grafting (CABG), but the long-term effects on the rate of vein-graft failure and on clinical outcomes are unknown. Methods We studied the outcomes in patients who underwent endoscopic harvesting (1753 patients) as compared with those who underwent graft harvesting under direct vision, termed open harvesting (1247 patients), in a secondary analysis of 3000 patients undergoing CABG. The method of graft harvesting was determined by the surgeon. Vein-graft failure was defined as stenosis of at least 75% of the diameter of the graft on angiography 12 to 18 months after surgery (data were available in an angiographic subgroup of 1817 patients and 4290 grafts). Clinical outcomes included death, myocardial infarction, and repeat revascularization. Generalized estimating equations were used to adjust for baseline covariates associated with vein-graft failure and to account for the potential correlation between grafts within a patient. Cox proportional-hazards modeling was used to assess long-term clinical outcomes. Results The baseline characteristics were similar between patients who underwent endoscopic harvesting and those who underwent open harvesting. Patients who underwent endoscopic harvesting had higher rates of vein-graft failure at 12 to 18 months than patients who underwent open harvesting (46.7% vs. 38.0%, P<0.001).

Renato D. Lopes, M.D., Ph.D., Gail E. Hafley, M.S., Keith B. Allen, M.D., T. Bruce Ferguson, M.D., Eric D. Peterson, M.D., M.P.H., Robert A. Harrington, M.D., Rajendra H. Mehta, M.D., C. Michael Gibson, M.D., Michael J. Mack, M.D., Nicholas J. Kouchoukos, M.D., Robert M. Califf, M.D., and John H. Alexander, M.D., M.H.S.

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NEJM 361:235-244,3 2009
ΕΣΩ ΜΑΣΤΙΚΗ ΑΡΤΗΡΙΑ

Vineberg 1956

Kolessov 1964

Green et all 1968
Internal Mammary Artery
Internal Mammary Artery
Diastolic Blood Flow
Comparison Mammary vs Vein

- High endurance to atherosclerosis
- Functional endothelium
- Better tolerance of the endothelium to high systemic pressure
- Better tolerance of the endothelium to the pulsatile flow
- Increase production of nitric oxide and prostacycline
- Better matching
- Autoregulation of the blood flow in response to the shear stresses according to the myocardial needs
- Release of the restored systolic energy
ΕΜΜΙΣΧΕΣ

μαστικές αρτηρίες
ΧΕΙΡΟΥΡΓΙΚΗ ΠΑΡΑΣΚΕΥΗ ΕΜΜΙΣΧΩΝ ΜΑΣΤΙΚΩΝ

RIMA LIMA
Η μαστική κηρύξεις ως ελεύθερο μόσχευμα

Βατότητα: 77% σε 18 μήνες

ΕΣΟ ΜΑΣΤΙΚΗ ΑΡΤΗΡΙΑ
<<ΣΧΕΤΙΚΕΣ ΑΝΤΕΝΔΕΙΞΕΙΣ>>

• Νόσος Στελέχους
• Σακχαρώδης διαβήτης
• Ηλικία,
• Φύλο,
• Αναπνευστική ανεπάρκεια,
• Οστεοπόρωση
• Δεξιά Kocher,
• Απόφραξη υποκλειδίων
• Σύνδρομο Leriche κοιλιακής αορτής – λαγονίων
• Rx στέρνου
EXTRAPLEURAL HARVESTING OF MAMMARY ARTERY
HARVESTING OF MAMMARY ARTERY WITH RIBS
ΕΣΩ ΜΑΣΤΙΚΗ ΑΡΤΗΡΙΑ

Επιπλοκές

- Επούλωσης στέρνου (Τεχνικές),
- Σύνδρομο υποκλοπής,
- Ισχαιμίας,
- Αναπνευστικά προβλήματα (φρενικό)

Επιπλοκές παραγωγής στέρνου (Τεχνικές),
Σύνδρομο υποκλοπής,
Ισχαιμίας,
Αναπνευστικά προβλήματα (φρενικό)

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Επιπλοκές παραγωγής στέρνου (Τεχνικές),
Σύνδρομο υποκλοπής,
Ισχαιμίας,
Αναπνευστικά προβλήματα (φρενικό)
Comparison IMA-Vein on survival over a 15-Year Period

Coronary Bypass Surgery with Internal-Thoracic-Artery Grafts — Effects on Survival
Airlie Cameron, M.D., Kathryn B. Davis, Ph.D., George Green, M.D., and Hartzell V. Schaff, M.D.
### Σύγκριση μαστικών αρτηριών και σαφήνος φλέβας ως προς τη βατότητα

<table>
<thead>
<tr>
<th>Study [y] (n)</th>
<th>Methodology</th>
<th>Angiography No.</th>
<th>Mean Follow-Up</th>
<th>Angiographic Patency Rate (%)</th>
<th>Actuarial Patency Rate (%)</th>
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<tr>
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<td></td>
<td>LIMA</td>
<td>RIMA</td>
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<td>Boylan et al [1994]</td>
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<td></td>
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<td>&gt;10 y</td>
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<td>6.9 y</td>
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<td>51.6 mo</td>
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<td>(201)</td>
<td>BIMA with RIMA via transverse sinus</td>
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<td>5 y</td>
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<td></td>
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<td>71</td>
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<td>(1,454)</td>
<td>BIMA with free RIMA</td>
<td></td>
<td>5 y</td>
<td>96</td>
<td>89</td>
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</tbody>
</table>
Two internal thoracic artery grafts are better than one.

μαστική μετάσαφη νούς
φλέβας ως προς το
προσδόκιμο επιβίωσης

Σε σύνολο 10.074 ασθενών με μέση μεταγχειρητική
παρακολούθηση 15 έτη το προσδόκιμο
επιβίωσης των ασθενών με μία μαστική ήταν 91%,
79% και 64%, ενώ με δύο μαστικές ήταν 94%,
84%, και 67% στα 5, 10 και 15 χρόνια αντίστοιχα
(ρ<0,0001).

The Effect of Bilateral Internal Thoracic Artery Grafting on Survival During 20 Postoperative Years

Bruce W. Lytle, MD\textsuperscript{a, b}, Eugene H. Blackstone, MD\textsuperscript{a, b}, Joseph F. Sabik, MD\textsuperscript{a}, Penny Houghtaling, MS\textsuperscript{b}, Floyd D. Loop, MD\textsuperscript{a}, Delos M. Cosgrove, MD\textsuperscript{a}

\textsuperscript{a} Departments of Thoracic and Cardiovascular Surgery, Cleveland, OH, USA
\textsuperscript{b} Biostatistics and Epidemiology, The Cleveland Clinic Foundation, Cleveland, Ohio, USA

BACKGROUND: To compare survival of patients receiving bilateral internal thoracic artery grafts and single internal thoracic artery grafts more than 20 postoperative years, assess magnitude of benefit, and identify predictors of benefit.

METHODS: From cohorts of 8123 patients receiving single internal thoracic artery grafts and 2001 receiving bilateral internal thoracic artery grafts during primary isolated bypass operations for multivessel coronary disease between 1971 and 1989, we identified 1152 propensity-matched pairs. Mean follow-up of survivors was 16.5 years, with 51 patients followed for 20 years or more. Hazard function methodology was used to identify risk factors for mortality, compare survival, and assess magnitude of benefit.

RESULTS: Comparison of the matched pairs showed survival of the bilateral internal thoracic artery and single internal thoracic artery groups at 7, 10, 15, and 20 years was 89\% versus 87\%, 81\% versus 78\%, 67\% versus 58\%, and 50\% versus 37\%, respectively ($p < 0.0001$). Divergence of bilateral internal thoracic artery and single internal thoracic artery hazard function curves continued to widen through 20 postoperative years. At 20 years, bilateral internal thoracic artery grafting was predicted to produce worse survival in 2.8\% of patients, a survival advantage of less than 5\% in 12.9\%, greater than 10\% in 52\%, and greater than 15\% in 7.6\%. Combinations of cardiac and noncardiac descriptors were used to define higher and lower risk patient subsets. Advanced age, abnormal left ventricular function and noncardiac risk factors decreased overall survival but the incremental benefit of bilateral internal thoracic artery grafting persisted.

CONCLUSIONS: Bilateral internal thoracic artery grafting produces improved survival compared with single internal thoracic artery grafting during the second postoperative decade, and the magnitude of that benefit increases through 20 postoperative years.

Εζήσαν
26 %
Περισσότεροι
με δυο
Μαστικές
Αρτηρίες
Παραμεμέια
Bilateral Internal Mammary Artery Grafting Enhances Survival in Diabetic Patients

A 30-Year Follow-Up of Propensity Score–Matched Cohorts

1107 consecutive diabetic patients underwent coronary artery bypass grafting with either SIMA (n=646) or BIMA (n=461) grafting. There was no difference in operative mortality, sternal wound infection, or total complications between matched SIMA and BIMA groups (operative mortality, 10 of 414 [2.4%] versus 13 of 414 [3.1%]; P=0.279; sternal wound infection, 7 of 414 [1.7%] versus 13 of 414 [3.1%]; P=0.179); total complications, 71 of 414 [17.1%] versus 71 of 414 [17.1%]; P=1.000).

Late survival was significantly enhanced with the use of BIMA grafting (median survival: SIMA, 9.8 years versus BIMA, 13.1 years; P=0.001). Use of BIMA was found to be associated with late survival on Cox regression (P=0.003).

Conclusion—Compared with SIMA grafting, BIMA grafting in propensity score-matched patients provides diabetics with enhanced survival without any increase in perioperative morbidity or mortality.

Σύγκριση δύο μαστικών αρτηριών ως προς μαστική μετασταφήνοδος φλέβας ως προστημετεγχειρητική και θετική.
μετά σαφήνη φλέβας ως προς το προσδόκιμο επιβίωσης ασθενείς με καμπλό κλάσμα εξώθησης ΑΚ

La prospettiva della prevenzione e del trattamento delle malattie del sistema cardiovascolare è assai problematica. Pertanto, è fondamentale l'impiego di farmaci efficaci e sicuri, come quelli della classe dei mascheroni, per prevenire le complicazioni del diabete e migliorare la sopravvivenza.

Techniques and benefits of multiple internal mammary artery bypass at 20 years of follow-up.

Single IMA grafts were used in 490 and multiple IMA grafts in 377.

RESULTS: During a median follow-up of 20 years, the composite of mortality, myocardial infarction, percutaneous coronary intervention, and redo CABG was significantly reduced after BIMA versus SIMA (p = 0.013).

Κερκιδική αρτηρία
Ενδείξεις: Κερκιδική αρτηρία
dευτερεύων στεφανιαίος κλάδος με αιμοδυναμικά σημαντικά αθηροσκληρυντική πλάκα
Αντενδείξεις κερκιδικής αρτηρίας (1-5%)
Βατότης: 80% σε 7 έτη follow up

Κερκιδική αρτηρία vs φλέβας

Manapat 1994

Υπεροχή κερκιδικής vs φλέβας

NEJM Desai et all 351;2302-9, 2004
Actuarial freedom from events by group: Actuarial freedom from death or nonfatal late cardiac-related events (myocardial infarction, percutaneous transluminal coronary angioplasty, reoperation, cardiac-related readmission) at 36 months was significantly greater in the radial artery group (RA) than in the saphenous vein graft group (SVG).
Actuarial freedom from events by group: Actuarial freedom from death or nonfatal late cardiac-related events (myocardial infarction, percutaneous transluminal coronary angioplasty, reoperation, cardiac-related readmission) at 36 months was significantly greater in the radial artery group (RA) than in the saphenous vein graft group (SVG)
Radial artery and saphenous vein patency more than 5 years after coronary artery bypass surgery: results from RAPS (Radial Artery Patency Study).

Providing the first five-year data from a randomized, multicenter study examining the best conduit for coronary artery bypass graft (CABG) surgery, a Canadian research team found that the radial artery outperformed the saphenous vein, with the former leading to reduced rates of functional graft occlusion (partial closure) or complete graft occlusion (complete closure), according to research presented today at the 13 centers across Canada and enrolled 561 patients who underwent CABG surgery for three-vessel disease.

αναστομώσεων

En paral lambo (Y graft or T composite graft)

Sauvage 1986
πολλά
αναστομώσεων

Εν παράλληλω (T composite graft)
<table>
<thead>
<tr>
<th>Study</th>
<th>Method</th>
<th>Sample Size</th>
<th>Follow-Up</th>
<th>1-Year Survival</th>
<th>5-Year Survival</th>
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<tr>
<td>Chocron et al <a href="80">1994</a></td>
<td>Retrospective analysis, BIMA with Y procedure</td>
<td>80</td>
<td>16 mo</td>
<td>93.4</td>
<td>85.2</td>
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<td>Barra et al <a href="80">1995</a></td>
<td>Retrospective analysis, BIMA with Y procedure</td>
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<td>16 mo</td>
<td>93.4</td>
<td>85.2</td>
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<td>Tector et al <a href="486">1994</a></td>
<td>Retrospective analysis, RIMA with T graft</td>
<td>80</td>
<td>Perioperative</td>
<td>98.3</td>
<td>86.5</td>
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<td></td>
<td></td>
<td></td>
<td>(59 of 60)</td>
<td>(77 of 80)</td>
<td></td>
</tr>
</tbody>
</table>
Guidelines on myocardial revascularization

Complete revascularization with arterial grafting to non-LAD coronary systems is indicated in patients with reasonable life expectancy.

Class IA

Class I

If possible, the left internal mammary artery (LIMA) should be used to bypass the left anterior descending (LAD) artery when bypass of the LAD artery is indicated

(Level of Evidence: B)
SEQUENTIAL TECHNIQUE LIMA To OM1 and OM2
Bypass Graft Conduit

Class IIA

The **right** internal mammary artery is probably indicated to bypass the **LAD** artery when the **LIMA** is unavailable or unsuitable as a bypass conduit. (Level of Evidence: C)

When anatomically and clinically suitable, use of a second internal mammary artery to graft the left **circumflex** or **right** coronary artery (when critically stenosed and perfusing LV myocardium) is reasonable to improve the likelihood of survival and to decrease reintervention. (Level of Evidence: B)
Η δεξιά μαστική αρτηρία παρακάμπτει τους αμβλείς επιχείλιους κλάδους της περισπωμένης (Puig 1984)
αρτηρία παρακάμπτει τη δεξιά στεφανιαία αρτηρία

ΧΛΩΡΟΓΙΑΝΝΗΣ MD
Pedicled RIMA to LAD
In situ pedicled RIMA → OM graft
Pedicled RIMA to RCA PD
Sequential Pedicled LIMA to D1 and LAD
Complete arterial revascularization may be reasonable in patients less than or equal to 60 years of age with few or no comorbidities. (Level of Evidence: C)
Class IIb

Arterial grafting of the right coronary artery may be reasonable when a critical (≥90%) stenosis is present. (Level of Evidence: B)

Use of a radial artery graft may be reasonable when grafting left-sided coronary arteries with severe stenoses (>70%) and right-sided arteries with critical stenoses (≥90%) that perfuse LV myocardium. (Level of Evidence: B)
Class III: HARM
An arterial graft should not be used to bypass the right coronary artery with less than a critical stenosis (<90%).
(Level of Evidence: C)
αρτηρία έχει μικρότερο προσδόκιμο βατότητας σε σχέση με την έμμισχη ΑΜΑ πάνω στον πρόσθιο κατ ιόν τα κλάδο

- η δεξιά στεφανιαία αρτηρία είναι συνήθως πολύ βαριά από τα γωνιώμενα με παχύ τοίχωμα

- το εύρος της δεξιά στεφανιαίας αρτηρίας μπορεί να είναι πολύ μεγαλύτερο από το εύρος της ΔΜΑ (mismatch)

- η εξέλιξη της αθήρησης κληρονομικής νόσου είναι ταχύτερη στη δεξιά στεφανιαία αρτηρία και ιδιαίτερα στο τμήμα της μεταξύ της έκφυσης του οξέως επιχειρίου και του οπίσθιου κατ ιόν τα
Total Arterial Myocardial Revascularization

• 1825 consecutive patients undergone CABG using pedicled BIMA, combined or not with other procedures

• Total arterial revascularization was achieved in 1817 out of 1825 patients (99.5%)

• A vein graft was necessary in only 8 patients (0.5%)

• In situ pedicled BIMAs were used in 1820 cases (99.7%)

• In only 5 cases a length problem led us to convert pedicled IMA to a free graft

• Radial arteries were used in 1119 patients (61.3%)

Y. A. Chlorogiannis. Total arterial myocardial revascularization. Angiology 2008, 59,2,80s-82
BIMA From 2000 to 2013

- BIMA in 2560 consecutive patients. Total arterial revascularization was achieved in 2541 of 2560 consecutive patients (99.25%), with 8131 coronary anastomoses using only bilateral mammary arteries with or without a radial artery.

- Combined procedures were performed in 559 (21.99%)
INCIDENCE OF STERNAL WOUND COMPLICATIONS
1825 patients

• In our group:
  • SUPERFICIAL: n = 60, 3.2%
  • DEEP: n = 6, 0.3%

• In the literature
  • SUPERFICIAL: 2.2 – 22.2%
  • DEEP: 1.3 – 12%

Peterson et al, J Thorac Cardiovasc Surg 2003
Pevni et al, Ann Surg 2003
De Paulis et al, J Thorac Cardiovasc Surg 2005


653 ασθενείς με νόσο στελέχους υπεβλήθησαν σε bypass με
ολική αρτηριακή επαναιμάτωση και των δύο έμμισχωμαστικών αρτηριών
πρώιμη θνητότητα 1.9%

• πρώιμη θνητότητα τα 1.9%
• μέση θνητότητα επί συνόλου 2.6%

Δ. Α. Χλορογιάννης. Total arterial myocardial revascularization. Angiology 2008, 59,2,80s-82
WHAT NEW PROCEDURES ARE BEING PERFORMED NOW?

Newer techniques are being explored to improve the results and to minimize the discomfort patients feel during recovery from CABG. One technique to improve patient outcomes involves the use of multiple arterial grafts - doing all bypasses with arteries like the internal thoracic artery and not using the saphenous vein. Because of the positive experience with internal thoracic arteries staying open longer than veins, cardiothoracic surgeons are trying to do all of the bypasses with arteries with the aim of reducing the patient's risk of needing another operation.
**Right internal thoracic artery, the "forgotten" bypass conduit, should be used more often**

- Commenting on the study at the STS meeting, Dr Bruce Lytle (chairman in Cardiac surgery, Cleveland Clinic, OH) said, "Unfortunately, the superiority of bilateral internal thoracic artery grafting is, to use a current phrase, an inconvenient truth."

- "The operation takes longer and is harder to do . . . and teach."

- He added that there is no "external impetus" for surgeons to use this technique, since they are not reimbursed more for it and RITA grafting is not recognized as an indicator of quality by cardiac surgeons' own professional quality standards. "We haven't as a group chosen to elevate our pursuit of this operation, [even though] everyone in this room believes, in their heart of hearts, that this is the best operation to perform in terms of long-term survival and graft patency," Lytle said.

Society of Thoracic Surgeons (STS) 2011 Annual Meeting
Right internal thoracic artery, the "forgotten" bypass conduit, should be used more often

"A number of us have been doing this since the early 80s, but because it takes extra time to take out the second [right] mammary, it's been neglected. But it seems a shame—for the effort of putting in an extra 30 or 40 minutes—to deny patients," Tatoulis told heartwire. In addition to the extra time it takes to harvest and graft the RITA, "there's a feeling that there might be more complications with wound healing and also some insecurities on how to use it." The purpose of this study is to show that RITA grafts can be as reliable and durable as the more common LITA grafts and thereby "stimulate more confidence in its use," Tatoulis said.
The rate of BIMA use was 3.9%.

Department of Cardiothoracic Surgery, The Mount Sinai School of Medicine, New York, New York, USA

Shinobu Itagaki, Paul Cavallaro, David H Adams, Joanna Chikwe, Heart;99:849-853, June 13, 2013
<table>
<thead>
<tr>
<th>Variable</th>
<th>All patients (n=1526360)</th>
<th>SIMA (n=1466234)</th>
<th>BIMA (n=60126)</th>
<th>p Value</th>
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</thead>
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<tr>
<td>Inhospital mortality (%)</td>
<td>1.7</td>
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<td>Length of stay, days</td>
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<td>Total costs, $</td>
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Department of Cardiothoracic Surgery, The Mount Sinai School of Medicine, New York, New York, USA

Shinobu Itagaki, Paul Cavallaro, David H Adams, Joanna Chikwe, Heart;99:849-853, June 13, 2013
### BILATERAL INTERNAL MAMMARY ARTERY GRAFTS, MORTALITY AND MORBIDITY: AN ANALYSIS OF 1 526 360 CORONARY BYPASS OPERATIONS

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<tr>
<th>Variable</th>
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Department of Cardiothoracic Surgery, The Mount Sinai School of Medicine, New York, New York, USA

Shinobu Itagaki, Paul Cavallaro, David H Adams, Joanna Chikwe, Heart;99:849-853, June13, 2013
THE GOLD STANDARD

CORONARY ARTERY BY-PASS X 6
ΑΠΟΚΛΕΙΣΤΙΚΑ ΜΕ ΑΡΤΗΡΙΑΚΑ ΜΟΣΧΕΥΜΑΤΑ
ΤΙΣ ΔΥΟ ΕΜΜΙΣΧΕΣ ΜΑΣΤΙΚΕΣ ΑΡΤΗΡΙΕΣ
ΚΑΙ ΤΗΝ ΚΕΡΚΙΔΙΚΗ ΑΡΤΗΡΙΑ

Δεξιά μαστική αρτηρία

Αριστερή μαστική αρτηρία

Κερκιδική ή αρτηρία

Δεξιά στεφανιαία αρτηρία

Πρόσθιος κατιώνος

1ος διαγώνιος

Περισπωμένη j.a.c

ΧΛΩΡΟΓΙΑΝΝΗΣ MD

ΣΤΕΦΑΝΟΠΟΥΛΟΣ ΜΕΤΑΧΥΛΗ ΑΘΗΝΩΝ
CONCLUSION

- Total arterial revascularization with routine use of pedicled bilateral internal mammary arteries with or without the radial artery is a feasible technique with low postoperative morbidity and mortality rates for all subgroups of patients.

- Regular use of BIMA as a gold standard technique in all patients requiring revascularization is highly recommended.
9Y Follow up after CABG with Total Arterial Myocardial Revascularization using both pedicled Internal Mammary Arteries and Radial Artery.
Arterial Myocardial Revascularization using both pedicled Internal Mammary Arteries and Radial Artery
Arterial Myocardial Revascularization using both pedicled Internal Mammary Arteries and Radial Artery
Editorial

Why Did You Not Use Both Internal Thoracic Arteries?

John D. Puskas, MD, MSc

That is the question every cardiologist should ask if the patient he or she has referred for primary surgical coronary revascularization returns from the operating room with a single internal thoracic artery graft. There is a substantial body of evidence demonstrating that the majority of coronary bypass patients benefit more when coronary artery bypass graft (CABG) surgery is performed with both internal thoracic artery conduits rather than just one.1–4 However, only 4.4% of primary isolated CABG cases in the 2011 Society of Thoracic Surgeons National Adult Cardiac Surgery Database received bilateral internal thoracic artery
ΕΥΧΑΡΙΣΤΩ
Τι από τα παρακάτω είναι σωστό:

• Α. Αυξάνεται ο αριθμός των ηλικιωμένων ασθενών που υποβάλονται σε αυτό το στεφανιαία παράκαμψη.

• Β. Θεραπευτικές εξελίξεις έχουν οδηγήσει σε μείωση του αριθμού των ηλικιωμένων ατόμων με καρδιαγγειακά προβλήματα.

• Γ. Οι ηλικιωμένοι ασθενείς παρουσιάζουν εξαιρετικό λειτουργικό επίπεδο με ελάχιστα προβλήματα.

• Δ. Η ηλικία απομόνωση είναι ανεξάρτητος παράγοντας κινδύνου για κακή εκβασία μετά από CABG.

• Ε. Ο σημαντικότερος παράγοντας που παράγεται από
Τι από τα παρακάτω είναι σωστό:

- Α. Η χρονολογική ηλικία συμβαδίζει με την βιολογική ηλικία.
- Β. Διαστολική δυσλειτουργία αριστεράς κοιλίας μπορεί να παρατηρηθεί με την αύξηση ηλικίας.
- Γ. Τα αρτηριακά μοσχεύματα έχουν καλύτερα ποσοστά από τα φλεβικά μοσχεύματα.
- Δ. Μοσχεύματα κερκιδικής αρτηρίας είναι καλύτερα από αυτά της μαστικής αρτηρίας.
- Ε. Φλεβικά μοσχεύματα δεν πρέπει ποτέ να χρησιμοποιούνται.
Τι από τα παρακάτω είναι σωστό:

- Α. CABG σε ογδόνταρη δες σε σύγκριση με νεότερους ασθενείς έχει υψηλότερη νοσοκομειακή θνητότητα.
- Β. CABG έχει πολύ κακή πρόγνωση στην πλειονότητα των ασθενών ηλίκιας άνω των 75.
- Γ. Ασθενείς που υποβάλλονται σε CABG στο Ηνωμένο Βασίλειο έχουν χαμηλότερα ποσοστά προσδοκιμίας επιβίωσης σε σύγκριση με τον γενικό πληθυσμό ηλικίας άνω των 80 ετών.
- Δ. Η ποιότητα ζωής διατηρείται και βελτιώνεται στη πλειοψηφία των ηλικιωμένων ατόμων μετά από CABG.
- Ε. Η απόφαση να ασθενής υποβεί σε CABG δεν είναι δικαιολογημένη.
Ποια στεφανιαία αγγεία είναι περισσότερο επιρρεπή στην ισχαιμία;

- Α. ενδομυοκαρδιακές αρτηρίες.
- Β. επικαρδιακές αρτηρίες.
- Γ. περικαρδιακές αρτηρίες.
- Δ. επηρεάζουν τα εξίσου όλες οι αρτηρίες.