DOI: https://doi.org/10.32345/2664-4738.3.2020.08
UDC 616.12-005.4:616.132.2]-089

OPERATIVE TECHNIQUES AND APPROACHES IN COMPLETE ARTERIAL REVASCULARIZATION IN MULTIVESSEL CORONARY ARTERY DISEASE. Review

Stukov Yu. Yu. (https://orcid.org/0000-0002-5791-4554)
Amosov National institute of cardiovascular surgery, NAMS of Ukraine, Kyiv, Ukraine
amosov.surgery@gmail.com

Relevance. Multi arterial bypass surgery comprises nearly 10% of the overall operations for ischemic heart disease. Multiple studies proved the superiority of arterial grafts for multivessel coronary artery disease. Nevertheless, the vast majority of conduits utilized for multiple bypasses are saphenous vein grafts. With the increasing popularity of radial artery utilization, the gastroepiploic artery remains a faded option. So more studies should be conducted for evaluation of the benefits from the gastroepiploic artery in the setting of the multi-arterial revascularization.

Objective. Presentation of approaches and operative techniques for complete arterial revascularization in patients with multivessel coronary artery disease.

Methods. Analytical review of literature on keywords in international scientometric databases Pub Med, Scopus, Web of Science. Search depth 12 years: from 2007 to 2018.

Results. Current paper presents operative techniques and approaches to complete arterial revascularization in patients with multivessel coronary artery disease. Internal mammary artery remains the "gold standard" for left anterior descending artery anastomosis site. Multiple arterial grafting is superior in terms of overall and cardiac survival. Emerging evidence of radial artery high term patency suggest the use of this arterial graft. Bilateral internal artery utilization provides long-term survival. Supplemental radial artery grafting to bilateral internal mammary provides complete arterial revascularization and can be safely used in routine cardiac surgery practice. Gastroepiploic artery proved superior patency rates, compared to saphenous vein grafts. Right coronary artery territory is ideal anastomotic site for gastroepiploic artery grafting. Inferior epigastric artery may be used in addition to others arterial grafts as free graft or as y- or t-graft in setting of multivessel coronary atherosclerotic lesions.

Conclusion. Complete arterial revascularization provides symptomatic relief from coronary artery disease provides superior patency rates and lowers incidence of major adverse cardiac events.

Key words: coronary artery bypass grafting, multivessel coronary disease, surgical revascularization, atherosclerosis, ischemic heart disease, radial artery, left internal mammary artery, right internal mammary artery, bilateral internal mammary artery, multiarterial coronary artery bypass grafting, gastroepiploic artery, inferior epigastric artery.

Relevance. Cardiovascular mortality in Ukraine remains the prevalent cause of death. Unpromising statistics of mortality from cardiovascular diseases illustrates the need for implementing effective treatment strategies and solutions. Coronary revascularization provides symptomatic relief from coronary artery disease and improves short and long-term outcomes.

Multi arterial bypass surgery comprises nearly 10% of the overall operations for ischemic heart disease. Multiple studies proved the superiority of arterial grafts for multivessel coronary artery disease. Nevertheless, the vast majority of conduits utilized for multiple bypasses are saphenous vein grafts. With the increasing popularity of radial artery utilization, the gastroepiploic artery remains a faded option. More studies should be conducted for evaluation of the benefits from the gastroepiploic artery in the setting of the multi-arterial revascularization.

Objective. Presentation of approaches and operative techniques for complete arterial revascularization in patients with multi-vessel coronary artery disease.

METHODS

Analytical review of literature on keywords in international scientometric databases Pub Med, Scopus, Web of Science. Search depth 12 years: from 2007 to 2018.

RESULTS AND DISCUSSION

Long-standing high-grade stenosis multivessel coronary artery disease eventually leads to heart failure with systolic dysfunction. Surgical revascularization may restore ejection fraction by elimination of myocardial hibernation. Despite common use of saphenous vein grafts, recent scientific publications recommends utilization of multiple arterial grafts in patients of all age groups [15]. Internal mammary artery (IMA) has patency rates in the region of 90-95% ten to fifteen years after CABG [16]. Based on superior long-term results of the internal mammary artery (IMA), other arteries are being used in CABG.

Complete arterial revascularization usually achieved using the following arterial grafts: left internal mammary artery (LIMA), right internal mammary artery (RIMA), bilateral internal mammary arteries (BIMA), radial artery (RA), gastroepiploic artery (GEA) and inferior epigastric artery (IEA) (Fig. 1). Multiple arterial grafts should be utilized in setting of diffuse varicose vein disease during complex cardiac surgery procedures, where PCI option

is failed, as well as ascending aorta calcification with diffuse atherosclerotic plaques. Different locations of arteries harvesting also have potential benefit in high-risk patients in terms of deep sternal wound infection (DSWI).

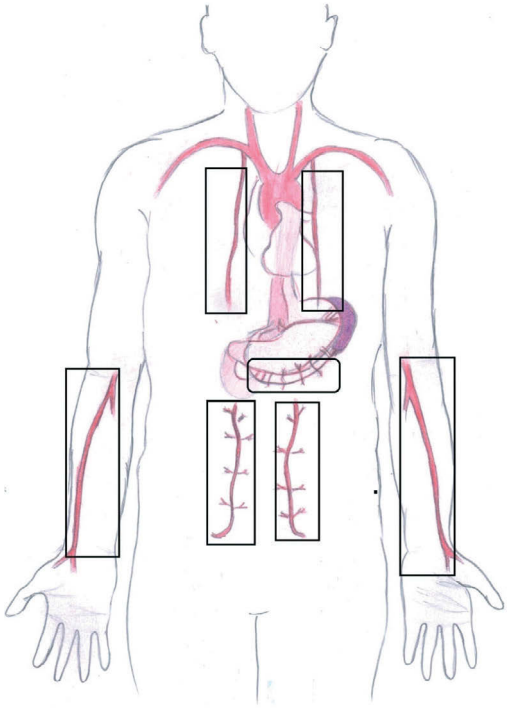

Fig. 1. Arteries commonly used for complete arterial revascularization

IMA harvesting technique:

Internal mammary artery (IMA) runs bilaterally from subclavian arteries medially to the anterior scalenus muscle and is accompanied by two veins. The free margin of IMA bifurcates at the level of sixth intercostal space into superior epigastric and musculophrenic arteries. The main blood supply to the sternum, derived from sternal and perforating branches of IMA. There are two techniques of IMA harvesting for CABG: pedicled and skeletonized. Dissection of the IMA as a pedicle includes harvesting with its surrounding fascia and both veins. It has been proposed that such preservation of its surrounding tissues provides a homeostatic milieu for the IMA, helping it retain its function once harvested [1]. The skeletonized technique was developed to preserve sternal perfusion and minimize trauma from pedicled IMA harvesting [4]. This involves dissection of the IMA from its accompanying venous drainage, innervation, lymphatics, muscle, and fascia from the top of the first rib to its bifurcation with branches of the IMA clipped and divided [2] (Fig. 2).

The wall of the IMA has the same 3 wall layer, which composed of intima, media and adventitia. It has a discontinuous internal elastic lamina and is less prone to spasm and arteriosclerosis [3]. Nitric oxide

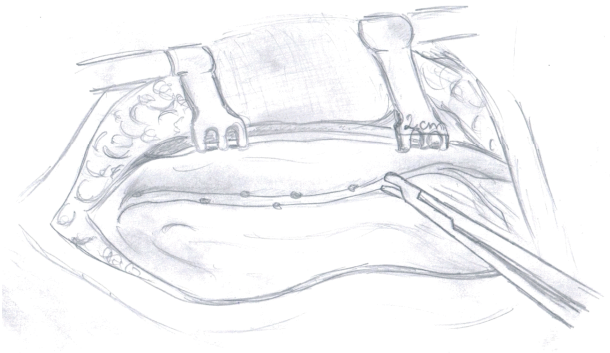

Fig. 2. Skeletonized left internal mammary artery with clipped perforating branches. Distal portion of IMA divides into superior epigastric and musculophrenic arteries

production is greater in the IMA than in the radial artery and long saphenous vein, and is associated with reduced smooth muscle proliferation, less intimal thickening, and improved long-term patency [4]. According to case-control study of 1526 patients, RIMA as a second conduit did not increase the operative risk including sternal wound complications and improved long term outcomes including overall survival when compared to RA [5]. The advantage of utilizing the RA in patients with diabetes mellitus and obesity in this cohort is straightforward. These findings strongly support RIMA as the first choice second arterial conduit in CABG [5].

Radial artery (RA) became important arterial conduit for coronary bypass grafting. Five-year patency rates in more recent studies are similar to IMA [18]. RA patency rates are superior to those of the saphenous vein grafts, particularly in the midterm and long term [6]. RA grafting has fewer major adverse events, similar patency to RITA, and improves survival in older and COPD patients [7]. Appropriate patient selection, coronary arteries target territory and high-grade stenosis are key parameters that influence RA patency rates.

RA harvesting technique

After collateral hand circulation assessment using modified Allen test a linear skin incision from the midpoint of elbow crease to the lateral margin of wrist crease is made. Skin incision line may be differentiated by palpating the radial pulse distally on the wrist and proximally by identifying aponeurosis of biceps brachii on the flexion. The fascia overlying the RA is incised distally as the RA emerges to become a subcutaneous structure. The fascia is divided more proximally with cautery, separating the muscle bellies of the brachioradialis muscle and the flexor carpi radialis muscle. Distally, the fascia is carefully divided with scissors due to the close proximity of the underlying RA [8]. There are two nerves that should be avoided during the RA harvest: the lateral antebrachial cutaneous nerve

and the superficial radial nerve. These nerves provide cutaneous innervation to the volar forearm, portions of the thumb and the dorsum of the hand [8]. Based on own experience RA harvesting with both veins that run along the artery is safer than skeletization (Fig. 3). Once the RA mobilized we apply clamp proximally for confirmation a retrograde flow from the ulnar artery supply, the vessel is ligated and transected. Similar actions provided to distal portion of RA. After the vessel is flushed with vasodilating solution, proximal and distal stumps are sewed with 5.0 polypropylene sutures. The arm is closed with cosmetic skin suture. Subcutaneous tissue and deeper fascia layers are left unapproximated to minimize the risk of compartment syndrome and nerve injury. Early career surgeons should be aware that patients with long-standing diabetes are prone to arterial calcification and occasionally, intraluminal calcium cannot be palpated during initial evaluation of RA graft.

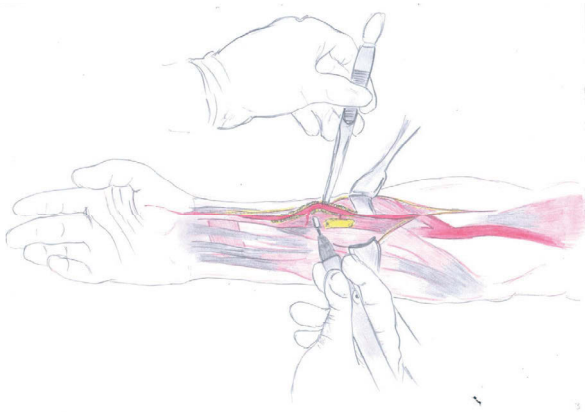

Fig. 3. Radial artery exposed and is harvesting with cautery

The right gastroepiploic artery (GEA) was used for indirect myocardial revascularization (Vineberg's procedure) for the posterior or inferior wall of the heart in the late 1960s by Bailey et al. [9] and its angiographic patency was demonstrated in 1969 by Hirose et al. With the development of coronary artery bypass grafting procedures, direct anastomosis of GEA to the right coronary artery was attempted by Sterling Edwards in early 1970s, but there was no exact documentation of the procedure. The GEA graft already has a 27-year history in CABG, and its clinical results are excellent, without an increase in perioperative risk. The reported cumulative patency rate of the GEA graft was 98.5% at 1 month, 93.7% at 1 year, 86.2% at 5 years, and 70.2% at 10 years [10].

Gastroepiploic artery harvesting technique

There are two gastroepiploic arteries: right and left:

- Left gastroepiploic arises from splenic artery;
- Right gastroepiploic artery, arises from gastroduodenal branch of proper hepatic artery.

It can be easily found between the layers of the greater omentum. For gastroepiploic artery harvesting the median sternotomy is extended just few centimeters below to the umbilicus with peritoneum opening. The part of stomach is delivered into the margin between thorax and abdomen by fenestrated atraumatic clamp, and the GEA is palpated along its greater curvature. GEA and surrounding tissue is detached from the greater curvature as a pedicled graft with no risk of subsequent gastric ischemia. GEA is delivered into the pericardial cavity by small incision in the diaphragm and is carefully placed on the anterior surface of the stomach (Fig. 4). The GEA is skeletonized and divided distally with intraluminal papaverine injection.

Fig. 4. GEA is detached from the greater curvature as a pedicled graft

Arterial grafts and target coronary arteries:

LIMA, RIMA patency are similar for most coronary artery territories. In setting of multivessel CAD: triple-vessel disease, with major stenosis in right coronary artery (RCA), left main coronary artery (left main LCA), proximal to distal left anterior descending artery (LAD), including diagonal branch and hemodynamically significant stenosis in the circumflex coronary artery (Cx) territory the following approaches may be recommended:

- LIMA – LAD, RIMA – RCA (including terminal divisions, if sufficient graft length, if insufficient - for distal RCA: RIMA may be anastomosed end – to end with RA), LIMA – RA (y- graft) – Cx. (Fig. 5)
- RIMA – LAD, RIMA – RA (y – graft) – RCA, LIMA – Cx.
- LIMA – LAD, GEA – RCA, LIMA – RIMA (y-graft) – Cx.
- LIMA – LAD, GEA – RCA, LIMA – IEA (y - graft) – Cx.
- RIMA – LAD, LIMA – Cx, aorta – RA (free graft) – RCA (Fig. 6)
- Aorta – RA – LAD, GEA – RCA, aorta – IEA – Cx.

- LIMA – LAD, LIMA – RIMA (y – graft) – Cx – RCA (sequential graft).
- LIMA – LAD, GEA – RCA, LIMA – RA (y – graft) – Cx.
- LIMA – LAD, LIMA – RA (proximal y- graft) to RCA and Cx (sequential, distal grafting)
- GEA – LAD, GEA – RA (y – graft) – RCA, GEA – RA (y – graft) – Cx.

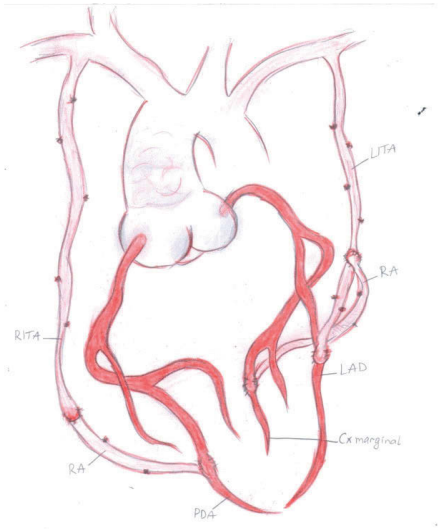

Fig. 5. Proposed method of revascularization in setting of triple-vessel CAD, right internal mammary artery anastomosed with posterior descending artery (RCA), using end to end anastomosis with radial artery; left internal mammary artery anastomosed with left anterior descending artery, radial artery anastomosed as y- graft with left internal mammary artery to obtuse marginal artery of Cx system.

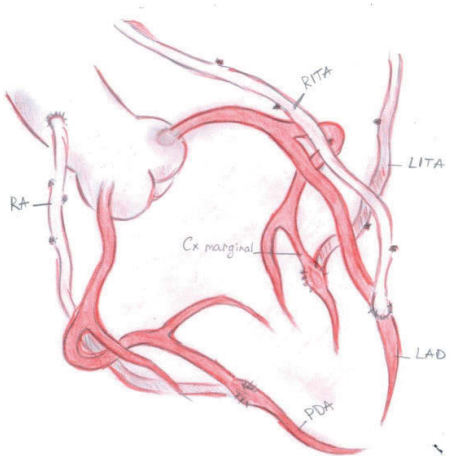

Fig. 6. Proposed method of revascularization in setting of triple-vessel CAD, right internal mammary artery anastomosed with left anterior descending artery; left internal mammary artery anastomosed with obtuse marginal artert of Cx system; radial artery anastomosed as free graft, proximally with aorta, distally with posterior descending artery (RCA).

Coronary revascularization in complex cardiac surgery procedures

In setting of complex cardiac surgery procedures (valve replacement/valve reconstruction, aortic procedures) and concomitant hemodynamically significant coronary artery stenosis, arterial grafting remains preferred option for revascularization [18]. Nevertheless, high grade stenosis for RCA > 90 % and for left-main with major distributions of LCA > 70% of stenosis are the key parameters for long-term arterial graft patency.

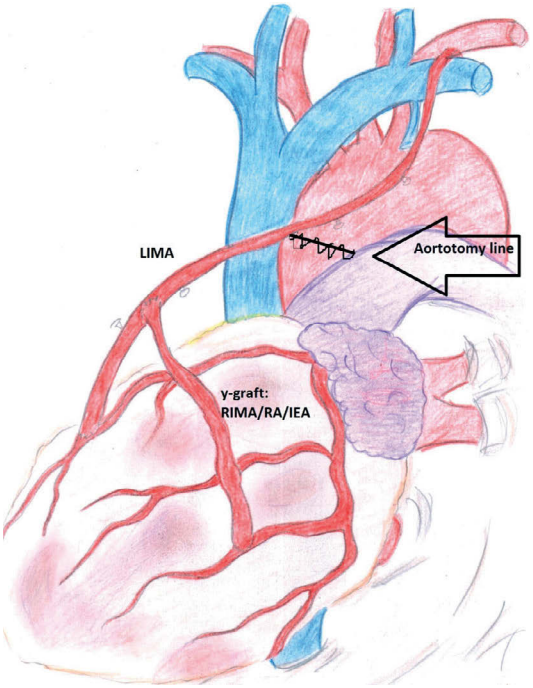

Fig. 7. Proposed method of revascularization in complex cardiac surgery procedures: aortic valve replacement with high-grade stenosis of left-main coronary artery: left internal mammary artery anastomosed with left anterior descending artery, for arterial y-graft, the following arteries may be utilized: right internal mammary artery/ radial artery/inferior epigastric artery anastamosed with obtuse marginal artery of Cx system

Pharmacological agents used for spasm prevention

Many surgeons are reluctant utilizing multiple arterial grafts in their routine practice for higher harvesting precision, longer duration and properties of arterial grafts, which are prone to spasm. However, there are numerous pharmacologic agents, used for this particular issue. All pharmacologic vasodilator drugs relax the vessel through specific mechanisms, and therefore, there is no perfect, single best vasodilator to prevent or treat spasm of the arterial graft against all mechanisms of contraction [14]. The standard papaverine solution, used for spasm prevention, may be supplemented by calcium channel blockers – verapamil. Decision on intraluminal injection or gentle external irrigation left for surgeon

competency. However free grafts, such as RA, GEA and IEA are highly recommended for intraluminal injection for resting blood flushing. Phosphodiesterase inhibitors – milrinone, are highly effective in spasm prevention [19]. According to own experience, patients who underwent complete arterial revascularization should receive calcium – channel blockers (dosage, calculated according to patient's blood pressure) on the first postoperative day and subsequently next six month after operation.

CONCLUSIONS

The superiority of arterial grafts for myocardial revascularization led surgeons to commonly use both internal thoracic arteries and increasingly frequent use the gastroepiploic artery to graft (reach) coronary arteries on the inferior ventricular wall. The radial artery has been assuming an increasingly prominent role in arterial revascularization, often being used when additional arterial conduits are desired in conjunction with the internal mammary arteries. Inferior epigastric artery graft is good alternative arterial graft for patients, who previously underwent chest radiotherapy or blunt thoracic trauma. IEA graft may serve as a complement of the myocardial revascularization in patients over 70 years old for better clinical results because of intact IMAs without comprising sternal blood supply. Preferential non aortic (no – touch aorta) manipulation is highly recommended, however there are no statistically significant data on risk in long-term results of such method.

Complete arterial revascularization provides symptomatic relief from coronary artery disease provides superior patency rates and lowers incidence of major adverse cardiac events.

Acknowledgments: I express my gratitude to the staff of Department of congenital and acquired heart defects of Center for pediatric cardiology and cardiac surgery – Kyiv, Ukraine for invaluable contribution during article preparation and Alina Lozovitskaya, who kindly supported present paper with original drawings.

REFERENCES

1. Boodhwani M., Nathan H.J., Lam B. Kh., Rubens F.D. The internal thoracic artery skeletonization study: A paired, within-patient comparison. Trials. 2006 Jan 5; 7: 1. PMID: 16542027. DOI: 10.1186/1745-6215-7-1
2. Sá M.P., Cavalcanti P.E., Santos H.J., Soares A.F., Miranda R.G.A., Araújo M.L., Lima R.C. Flow capacity of skeletonized versus pedicled internal thoracic artery in coronary artery bypass graft surgery: systematic review, meta-analysis and meta-regression. Eur J Cardiothorac Surg. 2015 Jul; 48 (1): 25-31. PMID: 25228742. DOI: https://doi.org/10.1093/ejcts/ezu344
3. Ruengsakulrach P., Sinclair R., Komeda M., Raman J., Gordon I., and Buxton B. Comparative histopathology of radial artery versus internal thoracic artery and risk factors for development of intimal hyperplasia and atherosclerosis. Circulation. 1999 Nov 9; 100 (19 Suppl): II139-44. PMID: 10567293. DOI: https://doi.org/10.1161/01.cir.100.suppl_2.ii-139
4. Cheng K., Rehman S.M., Taggart D.P. A Review of Differing Techniques of Mammary Artery Harvesting on Sternal Perfusion: Time for a Randomized Study? The Annals of Thoracic Surgery. 2015 Nov; 100 (Issue 5): 1942-53. PMID: 26410160. DOI: https://doi.org/10.1016/j.athoracsur.2015.06.087
5. Raja S.G., Benedetto U., Jothidasan A., Jujjavarapu R.K., Ukwu U.F., Robertis F., Bahrami T., Gaer J.A., Amrani M. for the Harefield Cardiac Outcomes Research Group, Right internal mammary artery versus radial artery as second arterial conduit in coronary artery bypass grafting: a case-control study of 1526 patients. Int J Surg. 2015 Apr; 16 (Pt B): 183-9. PMID: 25153938. DOI: https://doi.org/10.1016/j.ijsu.2014.08.342
6. Dragasis S., Liakos Ch.I., Kafkas N. Radial artery as a graft for coronary artery bypass surgery in the era of transradial catheterization. Hellenic Journal of Cardiology. 2018 May-June; 59 (Issue 3): 150-4. PMID: 29374579. DOI: https://doi.org/10.1016/j.hjc.2018.01.009
7. Tranbaugh R.F., Dimitrova K.R., Lucido D.J., Hoffman D.M., Dincheva G.R., Geller Ch.M., Balaram S.K., Ko W., Swistel D.G. The second best arterial graft: a propensity analysis of the radial artery versus the free right internal thoracic artery to bypass the circumflex coronary artery. J Thorac Cardiovasc Surg. 2014 Jan; 147(1): 133-40. PMID: 24100104. DOI: https://doi.org/10.1016/j.jtcvs.2013.08.040
8. Blitz A., Osterday R.M., Brodman R.F. Harvesting the radial artery. Ann Cardiothorac Surg. 2013 Jul; 2 (4): 533-42. PMID: 23977633. DOI: https://doi.org/10.3978/j.issn.2225-319x.2013.07.10
9. Bailey C.P., Hirose T., Brancato R., Aventura A., Yamamoto N. Revascularization of the posterior (diaphragmatic) portion of the heart. Ann Thorac Surg. 1966; 2: 791-805. DOI: https://doi.org/10.1016/S0003-4975(10)66658-1
10. Suma H. Gastroepiploic artery graft in coronary artery bypass grafting. Ann Cardiothorac Surg. 2013; 2 (4): 493-8. PMID: 23977628. DOI: https://doi.org/10.3978/j.issn.2225-319x.2013.06.04
11. Puig L.B. Ciongolli W. Cividanes G.L., Dontos A., Kopel L., Bittencourt D., Assis R.V.C., Jatene A.D. Inferior epigastric artery as free graft for myocardial revascularization. J Thorac Cardiovasc. Surg. 1990. 99 (2): 251-5. DOI: https://doi.org/10.1016/S0022-5223(19)37008-4
12. Van Son JA, Smedts F., Vincent J.G., Van Lier H J, Kubat K. Comparative anatomic studies of various arterial conduits for myocardial revascularization. J Thorar Cardiovasr Surg. 1990. 99 (4): 703-7. PMID: 2319794. URL: https://pubmed.ncbi.nlm.nih.gov/2319794/
13 Suma H. Gastroepiploic artery graft in coronary artery bypass grafting. Ann Cardiothorac Surg. 2013; 2 (4): 493-8. PMID: 23977628. DOI: https://dx.doi.org/10.3978%2Fj.issn.2225-319X.2013.06.04

14. He G.-W., Taggart D.P. Antispastic Management in Arterial Grafts in Coronary Artery Bypass Grafting Surgery. Ann Thorac Surg. 2016 Aug; 102: 659-68. PMID: 27319987. DOI: https://doi.org/10.1016/j.athoracsur.2016.03.017
15. Glineur D. Importance of the third arterial graft in multiple arterial grafting strategies. Ann Cardiothorac Surg. 2013 Jul; 2(4): 475-80. PMID: 23977625. DOI: https://dx.doi.org/10.3978%2Fj.issn.2225-319X.2013.07.01
16. Taggart D.P. Current status of arterial grafts for coronary artery bypass grafting. Ann Cardiothorac Surg. 2013; 2 (4): 427-30. PMID: 23977618. DOI: https://dx.doi.org/10.3978%2Fj.issn.2225-319X.2013.07.21
17. Sarwar U., Chetty G., and P. Sarkar. The Short Saphenous Vein: A Viable Alternative Conduit for Coronary Artery Bypass Grafts Harvested Using a Novel Technical Approach. J Surg Tech Case Rep. 2012; 4(1): 61-3. PMID: 23066469. DOI: https://dx.doi.org/10.4103%2F2006-8808.100359
18. Shrestha M., Khaladj N., Kamiya H., Maringka M., Haverich A., Hagl Ch. Total Arterial Revascularization and Concomitant Aortic Valve Replacement. Asian Cardiovasc Thorac Ann. 2007 Oct; 15(5): 381-5. PMID: 17911064. DOI: https://doi.org/10.1177/021849230701500505
19. He G.-W., Taggart D.P. Antispastic Management in Arterial Grafts in Coronary Artery Bypass Grafting Surgery. Ann Thorac Surg. 2016; 102(2): 659-68. PMID: 27319987. DOI: https://doi.org/10.1016/j.athoracsur.2016.03.017

Конфлікт інтересів: відсутній /
Conflicts of interest: authors have no conflict of interest to declare.
Надійшла до редакції / Received: 11.09.2020
Після доопрацювання / Revised: 15.09.2020
Прийнято до друку / Accepted: 21.09.2020

ПОВНА АРТЕРІАЛЬНА РЕВАСКУЛЯРИЗАЦІЯ МІОКАРДУ: ОПЕРАТИВНІ ПРИЙОМИ У ПАЦІЄНТІВ З МУЛЬТИСУДИННИМ УРАЖЕННЯМ КОРОНАРНИХ АРТЕРІЙ. Огляд

Стуков Ю. Ю.

Національний інститут серцево-судинної хірургії ім. М. Амосова НАМН України, Київ, Україна
amosov.surgery@gmail.com

Актуальність. Мультиартеріальне шунтування складає майже 10% загальних операцій при ішемічній хворобі серця. Мультицентрові дослідження довели перевагу артеріальних трансплантатів при мультисудинному ураженні коронарних артерій. Тим не менше, переважна більшість шунтів, що використовуються при операції шунтування коронарних артерій, є трансплантатами підшкірних вен. Зі збільшенням популярності використання променевої артерії артерія gastroepiploica залишається невизначеним варіантом. Саме тому необхідно провести більше досліджень для оцінки переваг артерії gastroepiploica при мультиартеріальній реваскуляризації.

Мета: презентація підходів та оперативних методів для повної артеріальної реваскуляризації у хворих з мультисудинним ураженням коронарних артерій.

Методи. Аналітичний огляд літератури за ключовими словами у міжнародних наукометричних базах Pub Med, Scopus, Web of Science. Глибина пошуку 12 років: з 2007 р. до 2018 р.

Результати. У даній роботі представлені методи виділення артеріальних кондуїтів та підходи до повної артеріальної реваскуляризації у хворих при мультисудинному враженні коронарних артерій. Внутрішня грудна артерія залишається «золотим стандартом» для анастомозу з передньою міжшлуночковою гілкою лівої коронарної артерії. У пацієнтів молодого віку рекомендується мультиартеріальне шунтування. Останні літературні дані вказують на високі показники прохідності променевої артерії. Білатеральне використання внутрішніх грудних артерій забезпечує тривалий термін життя пацієнтів після коронарного шунтування. Використання променевої артерії, у- або t-графтом, доповнене білатеральними внутрішніми грудними артеріями, забезпечить повну артеріальну реваскуляризацію і може бути безпечно використано в рутинній практиці серцево-судинної хірургії. Arteria gastroepiploica має вищі показники прохідності, порівняно з аутовенозними трансплантатами. Територія правої коронарної артерії є ідеальним місцем анастомозу для шунтування артерією gastroepiploica. Arteria epigastrica inferior може бути використана в додаток до інших артеріальних трансплантатів у вигляді вільного трансплантата або як у- або t-графта при мультисудинних коронарних атеросклеротичних ураженнях.

Висновок: повна артеріальна реваскуляризація міокарду, окрім усунення симптомів ішемічної хвороби серця, забезпечує тривалий час функціонування шунтів, а також знижує частоту значних серцевих ускладнень.

Ключові слова: аортокоронарне шунтування, мультисудинна ураження коронарних артерій, хірургічна реваскуляризація, атеросклероз, ішемічна хвороба серця, променева артерія, ліва внутрішня грудна артерія, *arteria gastroepiploica, arteria epigastrica inferior*

ПОЛНАЯ АРТЕРИАЛЬНАЯ РЕВАСКУЛЯРИЗАЦИИ МИОКАРДА: ОПЕРАТИВНЫЕ ПРИЕМА У ПАЦИЕНТОВ С МУЛЬТИСОСУДИСТЫМ ПОРАЖЕНИЕМ КОРОНАРНЫХ АРТЕРИЙ. Обзор

Стуков Ю.Ю.

Национальный институт сердечно-сосудистой хирургии им. М. Амосова АМН Украины, Киев, Украина
amosov.surgery@gmail.com

Актуальность. Мультиартериальное шунтирование составляет почти 10% общих операций при ишемической болезни сердца. Мультицентровые исследования доказали преимущество артериальных трансплантатов при мультисосудистом поражении коронарных артерий. Тем не менее, подавляющее большинство шунтов, используемых при операции шунтирования коронарных артерий, является трансплантатами подкожных вен. С увеличением популярности использования лучевой артерии артерия gastroepiploica остается неопределенным вариантом. Поэтому необходимо провести больше исследований для оценки преимуществ артерии gastroepiploica при мультиартериальной реваскуляризации.

Цель: презентация подходов и оперативных методов для полной артериальной реваскуляризации у больных с мультисосудистым поражением коронарных артерий.

Методы. Аналитический обзор литературы по ключевым словам в международных наукометрических базах Pub Med, Scopus, Web of Science. Глубина поиска 12 лет: с 2007 г. до 2018 г.

Результаты. В данной работе представлены методы выделения веществ артериальных кондуитов и подходы к полной артериальной реваскуляризации у больных при мультисосудистом поражении коронарных артерий. Внутренняя грудная артерия остается «золотым стандартом» для анастомоза с передней межжелудочковой ветвью левой коронарной артерии. У пациентов молодого возраста рекомендуется мультиартериальное шунтирование. Последние литературные данные указывают на высокие показатели проходимости лучевой артерии. Билатеральное использование внутренних грудных артерий обеспечивает длительный срок жизни пациентов после коронарного шунтирования. Использование лучевой артерии, y- либо t-графт, дополненное билатеральными внутренними грудными артериями, обеспечит полную артериальную реваскуляризацию и может быть безопасно использовано в рутинной практике сердечно-сосудистой хирургии. Arteria gastroepiploica имеет высокие показатели проходимости по сравнению с аутовенозными трансплантатами. Территория правой коронарной артерии является идеальным местом анастомоза для шунтирования артерией gastroepiploica. Arteria epigastrica inferior может быть использована в дополнение к другим артериальным трансплантатам в виде свободного трансплантата или как y- или t-графты при мультисосудистых коронарных атеросклеротических поражениях.

Вывод: полная артериальная реваскуляризация миокарда, кроме устранения симптомов ишемической болезни сердца, обеспечивает длительное время функционирования шунтов, а также снижает частоту значительных сердечных осложнений.

Ключевые слова: аортокоронарное шунтирование, мультисосудистые поражения коронарных артерий, хирургическая реваскуляризация, атеросклероз, ишемическая болезнь сердца, лучевая артерия, левая внутренняя грудная артерия, *arteria gastroepiploica, arteria epigastrica inferior*