SHUNT PATENCY AND EVALUATION METHODS IN PATIENTS WITH RECURRENT STENOCARDIA AFTER SURGICAL CORRECTION OF CHD AT THE HOSPITAL STAGE

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Aitkozhin G.K., Israilova V.K., Sandybai B.M., Baydildaev A.A.
NJSC “National Medical University named after S.D. Asfendiyarov”, Almaty, Kazakhstan

ABOUT THE AUTHORS

Aitkozhin Galym Kalelovch *– Doctor of Medical Sciences, Professor of the Department of Surgical Diseases No. 3, KazNMU named after S.D. Asfendiyarov,*

Israilova Venera Karypbekovna *– MD, professor, head of the course of anesthesiology and intensive care, Kaz.NMU named after S.D. Asfendiyarov,*

Sandybai Bakhyt Muratovich *– Surgeon*

Baydildaev Abay Aitbaevich *– Therapist*

Abstract

Coronary shuntography represents the “gold standard” of evaluating the coronary bypass grafting results. Today it is practically the only method allowing: detailed analysis of complications; the possibility of direct visualization of shunts of all types and localizations; the detection of occlusion and stenosis, their localization, severity and extension; the possibility of simultaneous direct reliable assessment of the proximal and distal coronary bed state; determination of progression degree and localization of atherosclerosis – which in turn helps to increase the effectiveness of direct revascularizing operations in patients with coronary artery disease.

Keywords
CA - coronary arteries, CABG – coronary artery bypass grafting, MCA - mammary-coronary anastomosis, LITA - left internal thoracic artery, RITA - right internal thoracic artery, RA - radial artery

Госпитальдық кезеңде ЖИА-ны хирургиялық түзетуден кейінгі қайталама стенокардиясы бар науқастардағы шунттың өтімділігі және оны бағалау әдістері

Айткожин Г.К., Исраилова В.К., Сандыбай Б.М., Байдилдаев А.А.
С.Д. Асфендияров ат. Қазақ Ұлттық Медицина Университеті, Алматы, Казақстан

АВТОРЛАР ТУРАЛЫ

Айткожин Галым Калелович *– медицина ғылымдарының докторы, С.Д. Асфендияров ат. ҚазҰМУ-дың № 3 хирургиялық аурулар кафедрасының профессоры.*

Исраилова Венера Карыпбековна *– медицина ғылымдарының докторы, С.Д. Асфендияров ат. ҚазҰМУ-дың анестезиология және реанимация курсының мең. Профессоры.*

Сандыбай Бахыт Муратович *– Хирург дәрігер*

Байдилдаев Абай Айтбаевич *– Терапевт дәрігер*

Аңдатпа

Шунтокоронарография – коронарлы шунттаудың нәтижелерін бағалауға арналған «алтын стандарт». Бүгінгі таңда ол асқынуларды толық тексеруді жүргізуге, түрлі типтегі және локализациядағы шунттардың барлығын тікелей визуализациялауға, окклюзиялар мен стеноздарды анықтауға, көрінім мен ұзындық деңгейін айқындауға, бір мезертте проксимальды және дистальды коронарлы арнаны тікелей, нақты бағалауға, өз кезегінде ЖИА-сы бар науқастардағы тіке реваскуляризациялық оталардың тиімділігін арттыруға ықпал ететін, атеросклероздың асқыну локализациясын және деңгейін анықтауға мүмкіндік беретін бірден бір әдіс.

Түйін сөздер
КА – коронарлы артериялар, МКШ – маммаро – коронарлы шунттау, СЖІКА – сол жақ ішкі кеуде артериясы, ОЖІКА - оң жақ ішкі кеуде артериясы, КА – көріжілік артериясы

Проходимость шунтов и методы ее оценки у больных с возвратной стенокардией после хирургической коррекции ИБС на госпитальном этапе

ОБ АВТОРАХ

Айткожин Галым Калелович –
доктор медицинских наук, профессор кафедры хирургических болезней № 3 Каз.НМУ им. С.Д. Асфендиярова

Исраилова Венера Карыпбековна –
доктор медицинских наук, профессор зав. курсом анестезиологии и реанимации Каз. НМУ им. С.Д. Асфендиярова

Сандыбай Бахыт Муратович –
Врач-хирург

Байдилдаев Абай Айтбаевич –
Врач терапевт

Айткожин Г.К., Исраилова В.К., Сандыбай Б.М., Байдилдаев А.А.
Казахский Национальный Медицинский Университет им. С.Д. Асфендиярова, Алматы, Казахстан

Ключевые слова
КА – коронарные артерии, МКШ – маммаро – коронарное шунтирование, ЛВГА- левая внутренняя грудная артерия, ПВГА – правая внутренняя грудная артерия, ЛА – лучевая артерия

Аннотация

Шунтокоронарогрфия представляет собой "золотой стандарт" для оценки результатов коронарного шунтирования. На сегодняшний день она практически единственная позволяет проводить детальный анализ осложнений, возможность прямой визуализации шунтов всех типов и локализаций, выявление окклюзии и стенозов, их локализации, степени выраженности и протяженности, возможность одновременной прямой достоверной оценки состояния проксимального и дистального коронарного русла, определение степени и локализации прогрессирования атеросклероза, что в свою очередь способствует повышению эффективности прямых реваскуляризирующих операций у больных ИБС.

In coronary surgery, the question of shunt patency is an important aspect of assessing the results of direct myocardial revascularization, since only with passable shunts and their high-quality functioning we can talk about successful coronary bypass surgery. The completeness of myocardial revascularization and the functional state of coronary artery bypass grafts largely determine the prognosis of surgical intervention. The problem of occlusion of shunts remains unresolved. Most often the shunts closing during the first year after operation. Occlusion of venous shunts during the first year after surgery is observed in 25-30% of patients, then for 5-7 years the frequency of occlusion is about 2% per year, after this period - 5% per year. The main reasons that can lead to shunt dysfunction are: 1-technical (damage to the endothelial layer and walls of the autovenous graft when it is taken, excessive length and bend of the shunt, tension of the shunt due to its insufficient length, improper choice of the location of the distal anastomosis); 2- anatomical factors; 3 - general factors (low volumetric blood flow velocity by shunt, instability of general hemodynamics, massive adhesions in the pericardial cavity, hypercoagulation, purulent mediastinitis, and, according to Rabotnikov V.S. [13], a prolonged febrile condition and inadequate intake of anticoagulants.

Shunt patency and evaluation methods

There are several methods for determining the patency of shunts. These methods can be divided into direct, allowing to explore shunts directly, and indirect. Direct methods include 1-electromagnetic flowmetry, 2 - radiopaque shuntography. 3-computed tomography. The basic principles of modern treatment of patients with coronary artery disease are to restore blood supply to the coronary arteries and improve the function of ischemic myocardium [1, 5, 6, 7, 13, 16, 17, 18, 21]. Currently, achievements of reconstructive coronary surgery require a review of treatment outcomes for patients with CHD. Maintaining myocardial function in satisfactory condition without a full main blood supply is not always considered as optimal. At the present stage, the possibilities of direct vascularizing operations on the spacecraft allow striving to restore adequate blood supply in the ischemic myocardium in patients with coronary artery disease in most cases [2]. One of the main reasons for unsuccessful outcomes is thrombosis of the operated vascular segment (graft + coronary artery) in the immediate postoperative period. An analysis of the causes of thrombosis at the hospital stage, as well as the frequency of their occurrence and the prevention of these complications, occupy one of the leading places in the study of the problem of surgical treatment in patients with CHD [1, 10, 11, 12, 14, 17, 20].

Shuntography is the "gold standard" for evaluating CABG results. Today it is practically the only method allowing to perform detailed analysis of complications, which in turn helps to increase the effectiveness of direct revascularizing operations in patients with CHD. The advantages of this method include the following: the possibility of direct visu-

alization of shunts of all types and localizations; the detection of occlusion and stenosis, their localization, severity and extension; the possibility of simultaneous direct reliable assessment of the proximal and distal coronary bed state; the determination of degree and localization of the progression of atherosclerosis [2 , 3, 4, 8, 9, 15, 17, 19, 22].

The results of coronary shuntography at the hospital stage

In research, 66 patients underwent repeated coronary angiography and shuntography at the hospital stage, in the period from 9 to 30 days after CABG. Depending on the method of myocardial revascularization, they were divided into 3 groups.

Group 1 - patients with autovenous shunts only, group 2 – with one ITA used in combination with venous bypass grafting, and group 3 - with two or more autoarterial conduits in combination with venous shunts. A total of 52 autovenous shunts were placed in 1 study group (the average number of distal anastomoses was 2,9).

In the 2 study group, 28 patients underwent CABG using one arterial conduit in combination with autovenous bypass grafting. A total of 78 shunts were placed (the average number of distal anastomoses was 2,8 per patient). The number of autovenous grafts was 50 (64.0%), the number of autoarterial conduits was 28 (36.0%), of which 24 - LITA, 2 - RITA, 2 - RA.

In the 3 study group, 20 patients underwent CABG using two or more arterial conduits in combination with autovenous bypass grafting. A total of 56 shunts were placed (an average of 2,8). The number of autovenous grafts was 16 (28.6%), the number of autoarterial grafts was 40 (71.4%), of which 18 - LITA, 4 - RITA and 18 - RA. In this group, LITA and RITA were in all cases excreting skeletalized without opening the pleural cavities. RA was isolated along with concomitant veins and used as a free autotranspant. The multivariate analysis became the main research method in this work. The results of shuntography in groups of patients at the hospital stage were studied depending on: 1 - the type of transplant used; 2 - the number of shunted arteries; 3 - the anatomical name of the arteries; 4 - diameter of shunted arteries; 5 - severity of stenosis of shunted arteries; 6 – mediastinitis in anamnesis.

A total of 186 shuntographs were analyzed. Shunt thrombosis was detected in 16 cases (8.6%). In 15 cases out of 118 (12.7%) thrombosis of venous shunts was revealed, in one (1.5%) (out of 68) - autoarterial graft dysfunction.

The dependence of transplant thrombosis on the number of shunted arteries is presented in table 1.

As can be seen from table 1, all shunts are passable when 1 CA is shunted. When bypassing 2 CA, 1 (2.6%) graft was thrombosed. Of 84 conduits, when 3 CA were bypassed, 6 (7.1%) were thrombosed. When shunting 4 CA, 9 (15.0%) shunts were thrombosed.

Thus, when determining the dependence of transplant thrombosis on the quantity of bypassed arteries, a clear relationship between the transplant thrombosis frequency increase and the quantity of bypassed arteries was revealed.

The dependence of venous graft thrombosis on the stenosis degree of shunted CA is presented in Fig. 1

Coronary arteries	Operations quantity	Shunt thrombosis quantity	Percentage
1 CA	4	- 0 (of 4 shunts)	0%
2 CA	19	- 1 (of 38)	2,6%
3 CA	28	- 6 (of 84)	7,1%
4 CA	15	- 9 (of 60)	15,0%

Table 1.
The dependence of transplant thrombosis on the number of shunted arteries is presented

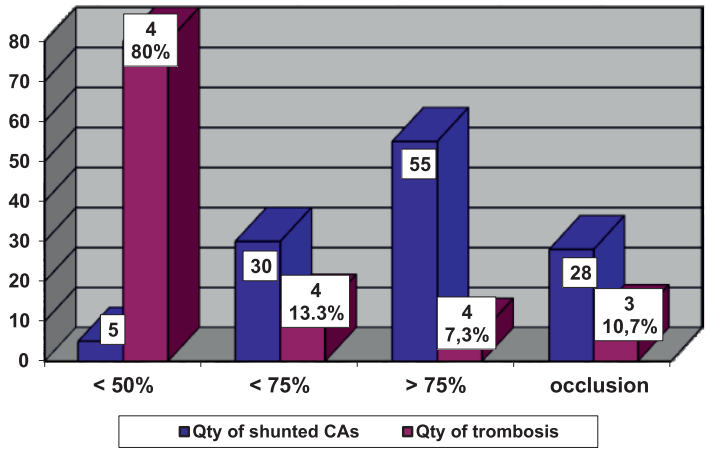


Fig. 1.
The dependence of venous graft thrombosis on the stenosis degree of CA

Table 2.
Description in text

Shunted CA diameter	Quantity of thrombosed shunts	Percentage %
1.0 mm	8 (of 20)	40
1.5 mm	5 (of 36)	13.8
2.0 mm	2 (of 76)	2.6
2.5 mm	1 (of 57)	1.8

Table 3.
Shuntography data in patients after mediastinitis

Operation type	Shuntography data
CABG-2	Thrombosis of a single venous graft
CABG-1, MCA-1	Thrombosis of a single venous graft
CABG-2, MCA-2	Thrombosis of two venous grafts

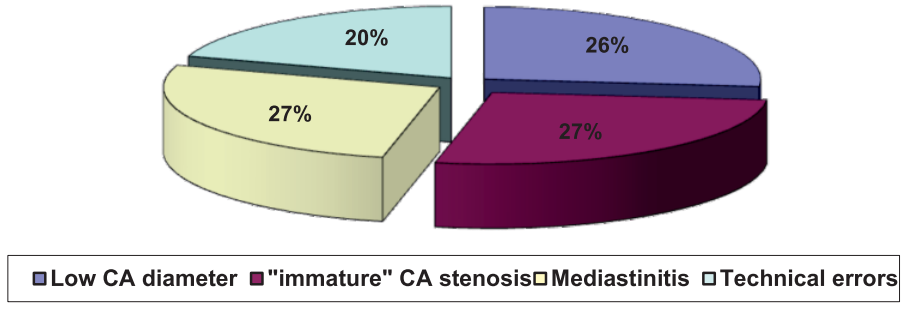
Thus, one of the leading factors causing thrombosis of autovenous grafts is CABG in patients with hemodynamically insignificant stenoses (<50%). As shown by the data presented in table 2, the patency of venous shunts directly depends on the caliber of the shunted CA. So, in shunted CA with a diameter of 1.0 mm, 40% of the shunts were thrombosed, and in shunted CA with a diameter of 1.5 mm – 13,8%. In cases of shunting of CA with a diameter of 2.0 mm and 2.5 mm, thrombosed were respectively: 2.6% and 1.8% of transplants. Consequently, the probability of anastomosed shunts thrombosis in CA with a diameter of less than 1.5 mm is 4 times higher than in shunted CA of a larger caliber. Dependence of graft thrombosis on the diameter of shunted CA.

The immediate postoperative period was complicated by anterior purulent mediastinitis in three patients (one from each group of Table 3).

As expected, in all three patients with immediate postoperative period complicated by anterior purulent mediastinitis, thrombosis of one or two autovenous shunts was revealed. Moreover, all three autoarterial shunts were passable. In the analysis, other causes of graft thrombosis in these three patients were not found. Figure 2 presents the causes of thrombosis of autovenous grafts at the hospital stage. As can be seen from fig. 2, in 4 cases the cause of thrombosis of autovenous grafts was a poor distal bed. Thrombosis developed as a result of poor shunt flow due to the small capacity of the vascular bed. Technical errors in the collection and implantation of shunts that caused thrombosis of autovenous grafts were identified in 3 cases. In 4 cases, mediastinitis was the cause of shunt thrombosis. In 4 cases, thrombosis of autovenous grafts as a result of exceeding indications for surgery and shunting of CA with “immature” stenoses (<50%) was revealed.

Thus, the only reason for an autoarterial graft (MCA) occlusion was the technical error in performing the distal anastomosis. All autoarterial grafts from RA were passable. At the same time, in 2 observations, conduits from RA turned out to be spastic arterial transplants which were eliminated after antispastic therapy. The causes of thrombosis of autovenous grafts were a poor distal bed, technical errors in the collection and implantation of shunts, which led to thrombosis of autovenous grafts and mediastinitis, and also an excess of indications for operation and shunting of CAs with immature stenoses (<50%).

Fig. 2.
Causes of autovenous graft trombosis on hospital stage



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