

02 2018

BOLETIM CIENTÍFICO
SBCCV

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Revisão Sistemática de 11 Estudos Randomizados Reafirma Menor Mortalidade com a Cirurgia de Revascularização Miocárdica Sobre o Implante de Stents, em Pacientes com Doença Coronária Estável

Mortality after Coronary Artery Bypass Grafting *versus* Percutaneous Coronary Intervention with Stenting for Coronary Artery Disease: a Pooled Analysis of Individual Patient Data

BACKGROUND

Numerous randomised trials have compared coronary artery bypass grafting (CABG) with percutaneous coronary intervention (PCI) for patients with coronary artery disease. However, no studies have been powered to detect a difference in mortality between the revascularization strategies.

METHODS

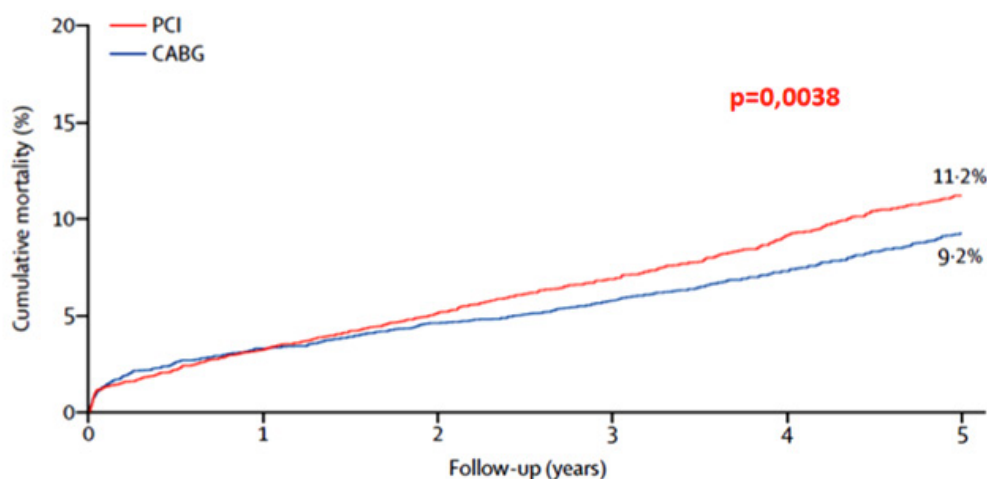
We did a systematic review up to July 19, 2017, to identify randomised clinical trials comparing CABG with PCI using stents. Eligible studies included patients with multivessel or left main coronary artery disease who did not present with acute myocardial infarction, did PCI with stents (bare-metal or drug-eluting), and had more than 1 year of follow-up for all-cause mortality. In a collaborative, pooled analysis of individual patient data from the identified trials, we estimated all-cause mortality up to 5 years using Kaplan-Meier analyses and compared PCI with CABG using a random-effects Cox proportional-hazards model stratified by trial. Consistency of treatment effect was explored in subgroup analyses, with subgroups defined according to baseline clinical and anatomical characteristics.

FINDINGS

We included 11 randomised trials involving 11 518 patients selected by heart teams who were assigned to PCI (n=5753) or to CABG (n=5765). 976 patients died over a mean follow-up of 3·8 years (SD 1·4). Mean Synergy between PCI with Taxus and Cardiac Surgery (SYNTAX) score was 26·0 (SD 9·5), with 1798 (22·1%) of 8138 patients having a SYNTAX score of 33 or higher. 5 year all-cause mortality was 11·2% after PCI and 9·2% after CABG (hazard ratio [HR] 1·20, 95% CI 1·06–1·37; p=0·0038). 5 year all-cause mortality was significantly different between the interventions in patients with multivessel disease (11·5% after PCI vs. 8·9% after CABG; HR 1·28, 95% CI 1·09–1·49; P=0·0019), including in those with diabetes (15·5% vs. 10·0%; 1·48, 1·19–1·84; P=0·0004), but not in those without diabetes (8·7% vs. 8·0%; 1·08, 0·86–1·36; P=0·49). SYNTAX score had a significant effect on the difference between the interventions in multivessel disease. 5 year all-cause mortality was similar between the interventions in patients with left main disease (10·7% after PCI vs. 10·5% after CABG; 1·07, 0·87–1·33; P=0·52), regardless of diabetes status and SYNTAX score.

INTERPRETATION

CABG had a mortality benefit over PCI in patients with multivessel disease, particularly those with diabetes and higher coronary complexity. No benefit for CABG over PCI was seen in patients with left main disease. Longer follow-up is needed to better define mortality differences between the revascularisation strategies.



Metanálise Avalia Resultados de Longo Prazo da Cirurgia de Revascularização Miocárdica Com e Sem CEC

Long-Term Outcomes of On- versus Off-Pump Coronary Artery Bypass Grafting

BACKGROUND

When comparing effects of on- versus off-pump coronary artery bypass grafting (CABG), it is important to assess the long-term clinical outcomes. However, most research conducted thus far has concentrated on short-term outcomes and ignored the long-term clinical outcomes, especially the 5-year outcomes of the largest randomized controlled trials.

OBJECTIVES

The aim of this systematic review and meta-analysis was to investigate the long-term clinical outcomes of on- versus off-pump CABG.

METHODS

To identify potential studies systematic searches were carried out using various databases. The search strategy included the key concepts of cardiopulmonary bypass AND off-pump AND long term OR 5-year outcomes. This was followed by a meta-analysis investigating mortality, incidence of myocardial infarction, incidence of angina, need for revascularization, and incidence of stroke.

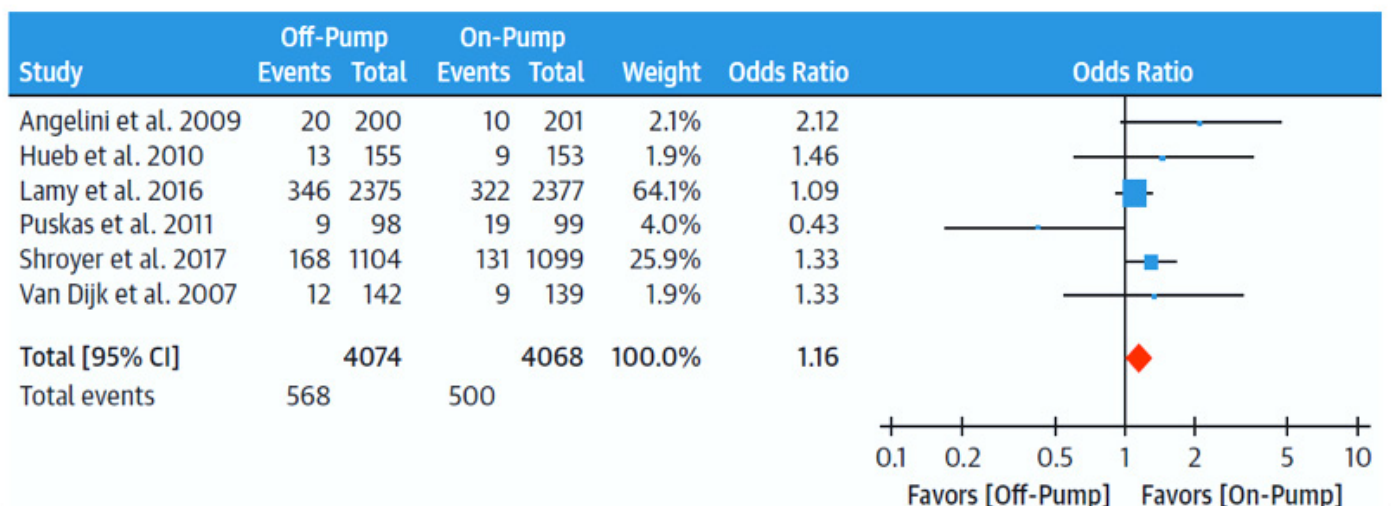
RESULTS

Six studies totaling 8,145 participants were analyzed. In the on-pump group mortality was 12.3%, compared with 13.9% in the off-pump group. The odds ratio (OR) for this comparison was 1.16 (95% confidence interval [CI]: 1.02 to 1.32; $P = 0.03$; 13.9% vs. 12.3%). In contrast, there were no differences in the incidence of myocardial infarction (OR: 1.06; 95% CI: 0.91 to 1.25; $P = 0.45$; 8.4% vs. 7.9%), incidence of angina (OR: 1.09; 95% CI: 0.75 to 1.57; $P = 0.65$; 2.3% vs. 2.1%), need for revascularization (OR: 1.15; 95% CI: 0.95 to 1.40; $P = 0.16$; 5.9% vs. 5.1%), and the incidence of stroke (OR: 0.78; 95% CI: 0.56 to 1.10; $P = 0.16$; 2.2% vs. 2.8%).

CONCLUSIONS

Statistically, on-pump CABG appeared to offer superior long-term survival, although the clinical significance of this may be more uncertain.

CENTRAL ILLUSTRATION Long-Term Outcomes After On- Versus Off-Pump CABG: Forest Plot of Mortality Incidence



Pacientes Diabéticos com Disfunção Ventricular tratados com Revascularização Miocárdica apresentam melhores Desfechos em todos os Cenários, comparados aos Submetidos a Angioplastia

Coronary Artery Bypass Surgery Improves Outcomes in Patients With Diabetes and Left Ventricular Dysfunction

BACKGROUND

The role of percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG) in patients with diabetes mellitus (DM) and multivessel coronary artery disease (CAD) has been established by large trials; however, these trials largely excluded patients with left ventricular dysfunction (LVD).

OBJECTIVES

The aim of this study was to determine whether treatment with PCI or CABG leads to improved outcomes in patients with DM, CAD, and LVD.

METHODS

In this propensity-matched study, outcomes were compared for patients with CAD, DM, and LVD treated with PCI or CABG between 2004 and 2016. The primary outcome was major adverse cardiac and cerebrovascular events, defined as the composite of death, stroke, myocardial infarction, and repeat revascularization. Secondary outcomes were the individual components of the primary outcome.

RESULTS

PCI compared with CABG was associated with a higher risk for major adverse cardiac and cerebrovascular events in cohorts with ejection fraction (EF) 35% to 49% ($P < 0.001$) and $< 35%$ ($P < 0.001$). Treatment with PCI was associated with an increased risk for death in both the EF 35% to 49% and the EF $< 35%$ cohorts. Stroke rate did not differ between PCI and CABG in either EF cohort. PCI was associated with an increased rate of MI in the EF $< 35%$ cohort, and repeat revascularization occurred more frequently in patients treated with PCI in both the EF 35% to 49% cohort and the EF $< 35%$ cohort.

CONCLUSIONS

At long-term follow-up, patients with CAD, DM, and LVD treated with CABG exhibited a significantly lower incidence of major adverse cardiac and cerebrovascular events and better long-term survival over PCI, without a higher risk for stroke.

TABLE 2 Risk of Primary and Secondary Outcomes in the Propensity-Matched Cohort

Outcome	Hazard Ratio, PCI:CABG	95% CI		p Value
		Lower	Upper	
EF 35%–49%				
MACCE	1.97	1.64	2.35	<0.001
Death	1.34	1.07	1.68	0.01
Stroke	1.01	0.57	1.78	0.98
Myocardial infarction	1.23	0.87	1.76	0.25
Repeat revascularization	5.46	3.80	7.78	<0.001
EF <35%				
MACCE	2.28	1.79	2.90	<0.001
Death	1.62	1.20	2.22	0.002
Stroke	0.87	0.39	1.91	0.72
Myocardial infarction	2.27	1.38	3.75	<0.001
Repeat revascularization	7.31	4.08	13.10	<0.001

ARCH International Aortic Database: Hipotermia Moderada com Perfusão Cerebral Anterógrada Recomendável como Método Preferencial na Reconstrução Total do Arco Aórtico

Safety of Moderate Hypothermia with Antegrade Cerebral Perfusion in Total Aortic Arch Replacement

BACKGROUND

Total aortic arch replacement (TOTAL) is a complicated operation and has traditionally required deep hypothermic circulatory arrest. In this study, the impact of moderate hypothermic circulatory arrest (MHCA) and antegrade cerebral perfusion (ACP) for TOTAL were examined.

METHODS

The ARCH International aortic database was queried and 3,265 patients undergoing TOTAL using ACP were identified. Patients were divided into groups based on lowest cooling temperature: MHCA (20° to 28°C) or deep hypothermia (DHCA) (12° to 20°C). Propensity-matched scoring using 15 variables was used in 669 matched pairs. Multivariable analyses were performed.

RESULTS

In the unmatched cohort, more patients underwent MHCA (2,586; 79.2%) who were also younger ($P<0.001$) and more frequently underwent emergent operations ($P<0.001$) than DHCA patients. For the propensity-matched patients, there were significant differences in cardiopulmonary bypass (CPB) time (MHCA 200 minutes versus DHCA 243 minutes, $P<0.001$), aortic crossclamp time (MHCA 120 minutes versus DHCA 142 minutes, $P<0.001$), and cerebral perfusion time (MHCA 63 minutes versus DHCA 58 minutes, $P<0.001$). Of note, there was no difference in neurologic outcomes nor in-hospital mortality for the two temperature groups. Multivariable analysis of risk factors for mortality included CPB time (odds ratio [OR] 1.006; $P<0.001$), concomitant mitral valve surgery (OR 3.070; $P=0.003$), emergent operation (OR 2.924; $P<0.001$), and poor ejection fraction (OR 3.133; $P=0.011$). Independent risk factors for stroke included coronary artery disease (OR 1.856; $P<0.001$), cerebral vascular disease (OR 2.172; $P<0.001$), emergent operation (OR 2.109; $P<0.001$), and CPB time (OR 1.004; $P<0.001$).

CONCLUSIONS

In this series, TOTAL with MHCA and ACP can be safely performed with acceptable operative risk. MHCA and ACP represent an effective strategy for TOTAL and may obviate the need for DHCA.

Canulação Direta da Aorta Ascendente (Samurai cannulation) como alternativa de Perfusão na Dissecção Aórtica Tipo A

Samurai Cannulation (Direct True-Lumen Cannulation) for Acute Stanford Type A Aortic Dissection

OBJECTIVES

In this study, we investigated early outcomes of patients who underwent surgical aortic repair for acute Stanford Type A aortic dissection at the Kitasato University Hospital and compared the results of Samurai cannulation (direct true-lumen cannulation) with other cannulation options.

METHODS

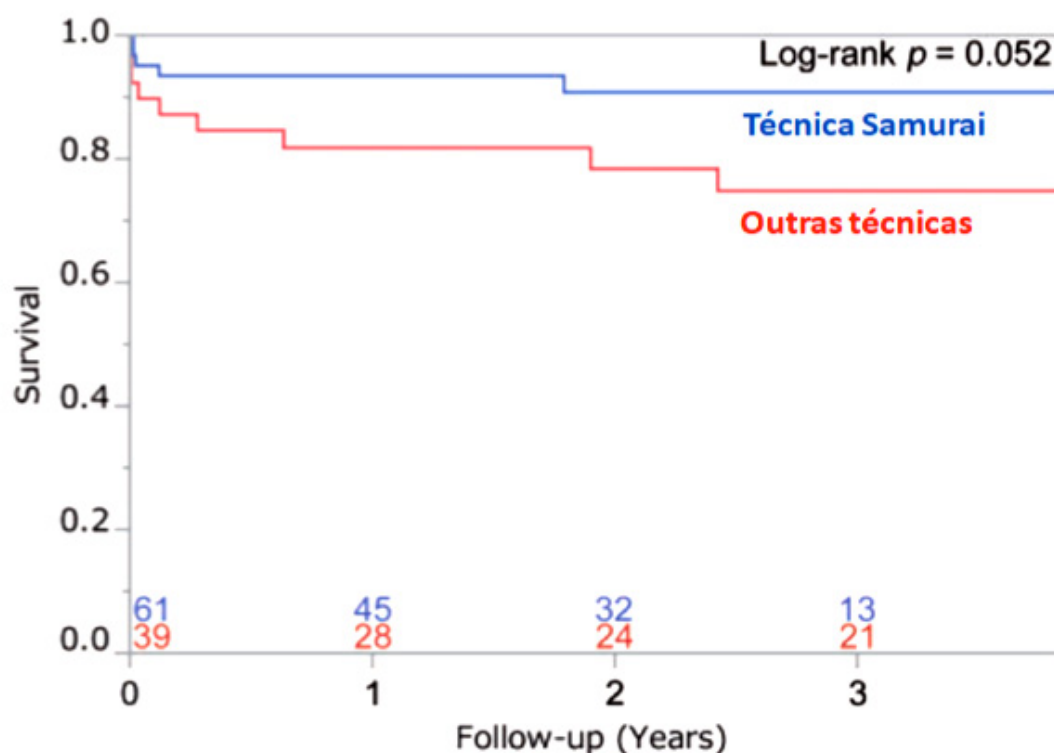
Inpatient and outpatient records were retrospectively reviewed.

RESULTS

Among the 100 patients who were operated on for acute Type A aortic dissection between April 2011 and April 2017, sole Samurai cannulation was used in 61 patients (Group S) and other cannulation options were used in the remaining 39 patients (Group O). No significant difference was observed in preoperative demographics between the groups. True-lumen cannulation was successful in all Group S patients, whereas 3 cannulation-related complications were observed in Group O patients. In Group S, the 30-day and in-hospital mortality occurred in 3 (5%) and 4 (7%) patients, respectively, and in Group O, these occurred in 3 (8%), and 6 (15%) patients, respectively. Four patients in each group (7% and 10%) experienced disabling or fatal strokes. Early mortality or stroke rate between the groups were not significantly different. During follow-up, there was no statistically significant difference between the groups in terms of survival, freedom from aorta-related death or freedom from aortic events.

CONCLUSIONS

Early outcomes of the initial series of surgery for Stanford Type A aortic dissection with Samurai cannulation was favourable with acceptable mortality and stroke rates without cannulation-related complications. Samurai cannulation represents an easy, safe and reasonable option for cardiopulmonary bypass in surgery for acute Stanford Type A aortic dissection.



A Cirurgia de Ross Revisada Passo a Passo

The Ross Procedure: How I Teach It

Replacement of the aortic valve with a pulmonary autograft and placement of a homograft in the pulmonary position was originally described by Donald Ross in 1967. After an initial wave of enthusiasm in the early 1990s, use of the Ross procedure has declined dramatically during the last two decades. Widespread adoption is hindered by the perceived complexity of this operation, which many believe increases surgical risk and leads to high rates of reintervention due to autograft failure.

Our group and others have demonstrated that in high volume centers, the Ross procedure can be accomplished with an operative risk that is equivalent to that of conventional aortic valve replacement. Long-term durability of the pulmonary autograft is highly dependent on a thorough understanding of aortic and pulmonary root anatomical details and their implications on surgical technique.

The risk of reintervention can thus be largely mitigated by minute technical refinements and careful attention to specific details. Interest in the Ross operation has recently been renewed as a result of the publication of several studies demonstrating suboptimal long-term outcomes of bioprosthetic and mechanical aortic valves in young and middle-aged adults, as well as a growing body of evidence demonstrating superior long-term outcomes of the Ross procedure compared with conventional aortic valve replacement in this patient population.

With this renewed interest comes the need to develop safe and effective strategies to teach the operation. Our group has performed more than 300 Ross procedures in adults, and we advocate a systematic approach that makes the operation safe and reproducible.

During the course of this period, several fellows have learned and performed the operation in part or fully, confirming the notion that this is a teachable operation. Here we describe our approach to teaching the Ross procedure using the full root replacement technique.



The Videos can be viewed in the online version of this article

<https://doi.org/10.1016/j.athoracsur.2018.01.048> on <http://www.annalsthoracicsurgery.org>.

Falência da Operação de Fontan e Mortalidade: Análise dos Resultados Contemporâneos e das Últimas Duas Décadas

Fontan Failure and Death in Contemporary Fontan Circulation: Analysis From the Last Two Decades

BACKGROUND

We sought to evaluate the incidence of Fontan failure or complication and its relation to death in patients having contemporary Fontan strategies over 2 decades.

METHODS

Five hundred patients underwent Fontan completion (extracardiac n=326; lateral tunnel, n=174) from 1985 to 2012 were reviewed. Patient characteristics, modes of Fontan failure/complication and death, and predictors for Fontan failure/complication and death were analyzed.

RESULTS

There were 23 early deaths (4.6%) and 17 late deaths (3.4%), with no early death since 2000. Survival has improved over time ($P<0.001$). Twenty-three of 40 patients who died were identified as Fontan failure before death, including ventricular dysfunction (n=14), pulmonary vascular dysfunction (n=4), thromboembolism (n=2), and arrhythmia (n=4). Mode of death was circulatory failure (n=18), multiorgan failure (n=6), pulmonary failure (n=3), cerebral/renal (n=5), and sudden death (n=4). Modes of failure/complication were directly (65%) or conceivably (10%) related to death in 30 of 40 patients (75%). Forty-eight percent of survivors had late Fontan complication(s). Five-year freedom from late Fontan complication was lower among patients who died compared with patients who survived (29.4% versus 53.3%, $P<0.001$). Ventricular dysfunction ($P=0.001$) and higher pulmonary artery pressures ($P<0.001$) after Fontan were predictors for death. Longer cardiopulmonary bypass time ($P=0.032$) and reinterventions ($P<0.001$) were predictors for late Fontan complication.

CONCLUSIONS

Early death in the early era has been overcome. Yet the incidence and causes of late death remain unchanged. There was a strong causative relationship between the mode of Fontan failure/complication and death, indicating the importance of early recognition and treatment of Fontan failure/complication.

