Guidelines should bother us, not comfort us

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Disclosures: Author has nothing to disclose with regard to commercial support.
Received for publication Sept 9, 2016; accepted for publication Sept 9, 2016; available ahead of print Oct 7, 2016.
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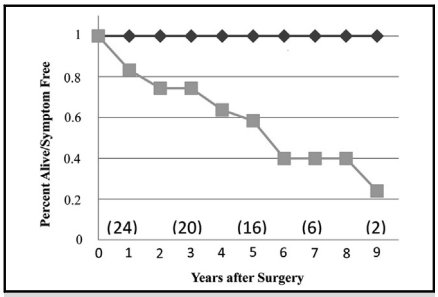
J Thorac Cardiovasc Surg 2017;153:1458-61
0022-5223/$36.00

http://dx.doi.org/10.1016/j.jtcvs.2016.09.008



Freedom from cardiac symptoms after anomalous aortic origin of a coronary artery repair. Reprinted with permission.[1]

Central Message

The new guidelines for management of anomalous aortic origin of a coronary artery may be the best we have, but the evidence base should still concern us.

See Article page 1440.

Anomalous aortic origin of a coronary artery (AAOCA)—specifically one that takes an interarterial course—is an infrequent anomaly (prevalence, 0.2%-0.8%) that is associated with a small incidence of sudden cardiac death, especially in athletes. The combination of high public visibility, low prevalence of the anomaly, and apparent low incidence of death caused by it, has been a cause célèbre for many publications promoting diagnostic algorithms and management schemes.

In this issue, Brothers and colleagues[2] report findings and recommendations of The American Association for Thoracic Surgery–sanctioned AAOCA Guidelines Writing Committee on the diagnosis and management of this disorder. This review was sorely needed, and the authors have done a laudable job executing it. Additionally, this cyclopean effort has the collateral advantage of stimulating more thought and debate on this challenging anomaly. For example, consider the following:

The authors make a Class I, Level B recommendation for surgical treatment for any operative patient with anomalous aortic origin of a left coronary artery (AAOLCA), with or without symptoms. Table 1 displays data extracted from 12 contemporary case studies and 50 case reports on operations for AAOLCA (representing most of the published articles from which data on AAOLCA could be extracted). None of these studies is a comparative study.

TABLE 1. Tabulated statistics from 11 recent case series publications and a review of 50 case reports (1-3 cases each report)

Publication	No. of cases operated for AAOLCA	Mean follow-up, y (range)	Postoperative deaths	Preoperative symptoms	Preoperative positive provocative test	Postoperative symptoms	Postoperative positive test
Romp 2003[3]	6	2.5 (0.3-7)	0/6	6/6	1/2	0/6	0-1/6
Erez 2006[4]	4	1 (0.3-2.5)	0/4	4/4	0/4	0/4	0/4
Osaki 2008[5]	7	2 (1.2-3)	0/7	6/7	4/5	1/6	NA
Levin 2010[6]	16	NA	0/16	16/16	NA	NA	NA
Turner 2011[7]	13	2.5 (NA)	0/13	6/13	NA	NA	NA
Mumtaz 2011[8]	7	1.5 (median) (0.1-5.2)	0/7	6/7	NA	0/7	NA
Frommelt 2011[9]	7	1.8 (0.1-8)	0/7	4/7	0/4	0/7	NA
Sharma 2014[10]	6	1.6 (1-7)	0/6	NA	NA	0/6	0/6
Wittlieb-Weber 2014[1] with Davis 2007[11]	8	4 (1-9)	0/8	6/8	2/NA	5/8	3/8 (1/8 ischemic)
Feins 2016[12]	6	3.8 (NA)	0/6	4-6/6	NA	3/6	1/4
Mainwaring 2016[13]	37	6 (0.2-16)	0/37	27/37	NA	0/27	NA
Case reports (from Nguyen 2012[14])	59	1.5 (0.01-9)	0/57	52/52	NA	3/46	NA

All data refer only to the subset of patients with anomalous aortic origin of the AAOLCA. Symptoms include all of those recorded as "cardiac" in origin by each study. Provocative tests include exercise echocardiogram testing and/or stress echocardiography. Deaths exclude those attributable to associated anomalies or to the extremity of the preoperative state. The denominators are the number of subjects evaluated for each column. *AAOLCA*, Anomalous aortic origin of the left coronary artery; *NA*, value could not be calculated using the data reported in the study.

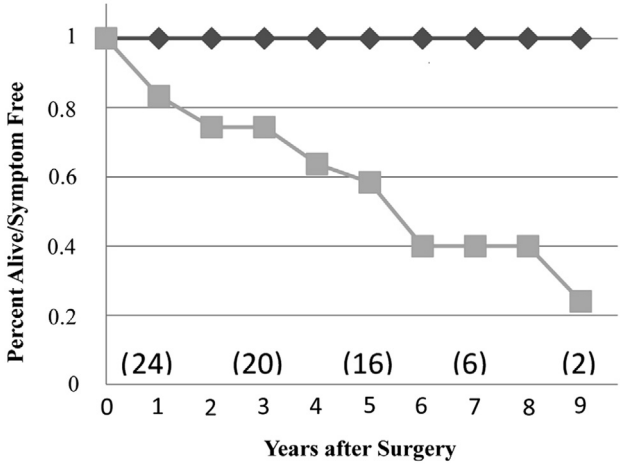


FIGURE 1. Freedom from cardiac symptoms after anomalous aortic origin of a coronary artery repair. Reprinted with permission.[1]

The total number of reported cases is 176. The average of the mean durations of follow-up is about 2.6 years. There were no deaths. Seems like perfect results, but how do they compare with the natural history of untreated AAOLCA? Brothers and colleagues[15] estimated that the cumulative risk of death over a 20-year period was about 6.3% for AAOLCA patients participating in competitive sports. Taking this percentage as an upper limit (because most patients do not participate in competitive sports), one would expect 1 to 2 deaths during the average 2.6-year follow-up among the 176 patients in this collection of studies. At least on the basis of this comparison, with such short-term average follow-up, there does not seem to be strong evidence for the superiority of surgical versus not-surgical treatment.

Now consider, in this same set of 176 patients, the evidence that surgical operation relieves cardiac ischemia in AAOCLA. To test this, one must know how many patients had evidence of preoperative ischemia. As shown in Table 1, the evidence of preoperative ischemia is scant—most studies did not quantitatively evaluate it. This leaves symptoms as the only evidence of ischemia—the reliability of which (except for sudden cardiac collapse) is among the most hotly debated questions in those studying this disorder. Furthermore, the quantitative evaluation of postoperative ischemia is also scant, with the largest single study (Mainwaring and colleagues[13]) not reporting postoperative testing at all. Thus, whether surgery on AAOLCA results in a lower incidence of persistent or new quantitative evidence of ischemia still awaits better evidence, notwithstanding the intriguing results shown in Figure 1.

Figure 2 reproduces an August 2015 refinement of the American College of Cardiology/American Heart Association Clinical Practice Guidelines grading system, more granular than that used in the present article.[16] Do we have objective evidence to strongly recommend surgery under all circumstances for AAOLCA (Class I), given that the margin in the above ad hoc comparative analysis of all of the Table 1 reports was only 1 or 2 deaths? Do we have 1 or more well-designed, well-executed studies with moderate quality evidence (Level B-NR), when we only have case reports or case studies subject to publication bias, when we average a few years' follow-up, and when we infrequently report quantitative ischemic tests for AAOLCA? We might consider being more humble so that we know we still have a problem here.

Perhaps it is time, as many have suggested, to focus on anatomic and clinical risk stratification of both AAOLCA and anomalous aortic origin of a right coronary artery, as well as accumulate greater length of follow-up. The Congenital Heart Surgeons' Society AAOCA registry, initiated in 2009, containing almost 600 patients and with 70 to 80 new enrollments per year, may provide the best opportunity to reach the next class of recommendation and level of evidence, because the cohort is to be followed for a lifetime. Studies based on the registry must be carefully crafted to provide prospective, serial, pre-, and postoperative quantitative evaluation of these patients by all Congenital Heart Surgeons' Society member institutions. How that is executed is still an organizational and regulatory challenge, but will be worth it. In the meantime, the current guidelines for surgical management of AAOCA, driven by the treatable anatomic nature of the anomaly and the Housmanian tragedy of sudden death in the young,[17] represent an important update of our knowledge base and expert opinion. The status of our evidence base should continue to bother us.

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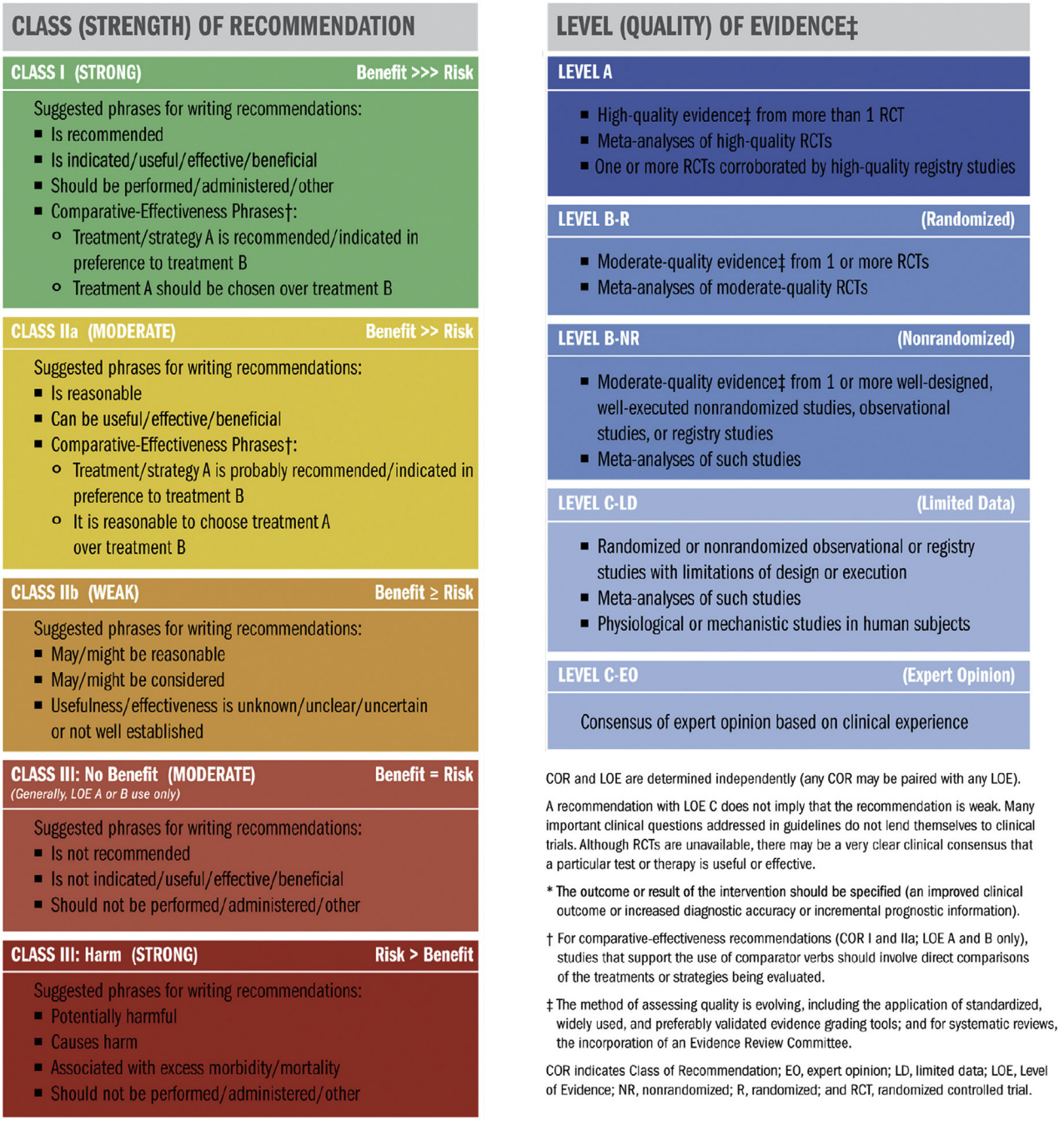

FIGURE 2. American College of Cardiology/American Heart Association revised 2016 recommendation scheme for clinical practice guidelines. Reprinted with permission.[16]

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