

its religious beliefs. This argument is spurious, as can easily be illustrated by potential cases involving recognized religious beliefs and medicine. It would clearly be unacceptable, for example, if an employer who was opposed to blood transfusions offered employees a health insurance policy that did not cover transfusions, thus putting them at high risk for avoidable complications or even death after severe trauma or major surgery. Similar arguments could be made if employers offered health insurance policies that did not cover vaccination, mental health services, or cancer chemotherapy; the employers' religious beliefs would present an unacceptable health risk to their employees. In neither case before the Court is there infringement of personal religious rights; should an employee for religious or other reasons not wish to receive covered services, she is free to make that choice for herself. Accepting the *Conestoga* arguments puts the religious beliefs of an inanimate corporation ahead of the primary health needs of its employees. We do not believe that a for-profit corporation should be able to decide what kinds of health care are available to its employees.

If the full panel of FDA-approved contraceptive services is made available to American

women, the public health of the country will benefit. If a woman's religious beliefs compel her to decline such services, she has the right to do so. But to deny coverage for these vital public health services to women who want them but cannot afford them outside their employer-sponsored insurance would be a personal and public health tragedy.

Disclosure forms provided by the authors are available with the full text of this article at NEJM.org.

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## Treatment of Atherosclerotic Renovascular Disease

John A. Bittl, M.D.

If the treatment of renal-artery stenoses can improve blood pressure and renal function,<sup>1</sup> why have clinical trials of renal-artery stenting failed to reduce the rates of renal and cardiovascular events?<sup>2-4</sup> The answer is found by examining the design and results of the Cardiovascular Outcomes in Renal Atherosclerotic Lesions (CORAL) trial, now reported in the *Journal*,<sup>4</sup> which concludes that implanting stents for moderately severe obstructive renovascular disease is no better than medical therapy alone in preventing the primary end point of death from cardiovascular or renal causes, myocardial infarction, stroke, hospitalization for heart failure, progression of renal failure, or the need for renal-replacement therapy.

The CORAL trial replicates the findings of the Angioplasty and Stenting for Renal Artery Lesions (ASTRAL) trial<sup>2</sup> and the Stent Placement

and Blood Pressure and Lipid-Lowering for the Prevention of Progression of Renal Dysfunction Caused by Atherosclerotic Ostial Stenosis of the Renal Artery (STAR) trial<sup>3</sup> and establishes beyond a reasonable doubt that renal-artery stenting is futile for the target population enrolled in the study. Patients who have atherosclerotic disease with a mean renal-artery stenosis of 73%, as assessed visually on angiography, in addition to hypertension while receiving two or more antihypertensive drugs or stage 3 chronic kidney disease, should not undergo renal-artery stenting, because the only tangible consequence is the procedure-related risk of bleeding or vascular complications.

The CORAL trial addresses the criticism leveled against earlier randomized trials that they enrolled patients with mild renal-artery stenoses. The current study required patients to have

a stenosis of at least 60% of the diameter of a renal artery, which is a more stringent criterion than the threshold of 40% used in the ASTRAL and STAR trials, and yet it failed to show a clinical benefit of renal-artery stenting. It should, perhaps, not be surprising that stenting of moderately severe renal-artery stenoses does not produce a clinical benefit, because the kidneys are perfused with blood and oxygen in marked excess of metabolic needs.<sup>5</sup> In a canine model, only stenoses of 75% or more of the diameter of a renal artery cause a rise in blood pressure and only stenoses of 80% or more of the diameter cause a reduction in renal function.<sup>6</sup> The degree of stenosis that causes a switch from aerobic to anaerobic metabolism in renal tubular cells and results in the commonly discussed but poorly defined condition of “ischemic nephropathy” has not been determined.

The CORAL protocol struck a balance between the practical constraints of patient recruitment and the most appropriate target population for renal-artery stenting. The trial was open to patients whose doctors were in a state of equipoise about the role of renal-artery stenting for stenoses of only 60%. If the CORAL protocol had been more restrictive, requiring more severe stenoses, enrollment would have been slower and the study could have folded. An even more restrictive trial confined to patients with critical bilateral disease or severe stenosis involving a single functioning kidney might never get off the ground. The challenge remains for future trials of renal-artery stenting to identify a suitable target population for enrollment. It is worth noting that in a subgroup analysis in the CORAL trial, there was no heterogeneity of the effect of renal-artery stenting in patients with stenoses of at least 80% as compared with patients with stenoses of less than 80%, a finding that suggests that a benefit of renal-artery stenting even for patients with fairly severe disease is difficult to predict.

The CORAL trial has several strengths. The trial investigators are commended for creating a protocol that maximized adherence to medical therapy, minimized crossovers, and allowed study personnel to give vouchers to patients for a thiazide diuretic, candesartan, amlodipine, and atorvastatin. An encouraging finding was that medical therapy alone was associated with a

20% rate of the primary end point at 2 years, which was half the expected rate of 40%.<sup>7</sup> The favorable results with medical therapy alone suggest, but do not prove, that the individual drugs used in the trial were beneficial. Although a specific recommendation for thiazide diuretics might rankle some practitioners, these agents have emerged as a cornerstone of contemporary antihypertensive therapy.<sup>8</sup>

In conclusion, the CORAL trial is a definitive test of the usefulness of renal-artery stents for moderately severe atherosclerotic disease. The trial results send a clear message to patients and referring physicians. Until new treatments are found to be safe and effective, patients in everyday practice who have moderately severe atherosclerotic renovascular disease and either hypertension or stage 3 chronic kidney disease should receive medical therapy to control blood pressure and prevent the progression of atherosclerosis but should not be corralled into getting a renal-artery stent.

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From the Munroe Regional Medical Center, Ocala, FL.

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