

# Evaluation of PTCA versus Stenting and Bare-Metal Stenting versus Drug-Eluting Stenting in the Treatment of Coronary Artery Disease

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**Abstract:** Introduction: The risk of developing coronary artery disease (CAD) for both men and women is increasing in society today. Over the past twenty-five years, the concepts of percutaneous transluminal coronary angioplasty (PTCA) and stenting have become dominant modalities in the treatment of CAD. In the late 1970's and early 1980's, PTCA was seen as the best possible alternative to bypass surgery until repetitive treatments were required to reopen occluded arteries. Following the failure of PTCA, stenting and derivatives of stenting with drug-eluting compounds have been developed to examine the most effective revascularization technique to reduce the rate of coronary re-stenosis. Methodology: The purpose of this study was to perform a systematic examination of the literature to evaluate these techniques. Articles used included randomized controlled clinical trials of adults ranging from 50 to 75 years of age who had undergone either PTCA or stenting from the years 1979 to 2006. Key variables evaluated in the study were PTCA, stenting, and drug-eluting stents. Results: Thirty articles met the inclusion criteria and were reviewed using evidence based methods. Following analysis, the overwhelming consensus exists that the use of PTCA with stenting is more effective than angioplasty alone, and drug-eluting stenting is more effective than bare-metal stenting in the prevention of re-stenosis in patients with CAD. Conclusion: The most effective treatment for patients with CAD is PTCA with drug-eluting stenting.

## 1. Introduction:

Recent statistics illustrate that heart disease is considered the leading cause of death in the United States with approximately one death occurring every thirty-three seconds.[1] Current research also indicates that the development of heart disease is increased with factors including: older age, male gender, family history, smoking, hypertension, diabetes mellitus, hyperlipidemia, obesity, and living a sedentary lifestyle.[1] While previous cardiovascular research mostly emphasized the treatment of risk factors such as hypertension and high cholesterol, the importance of inflammation and its resultant damage to endothelial cells leading to CAD is now becoming understood as a

major risk factor as well.[2] As the role of inflammation is researched, its effect upon interventional treatment (angioplasty and/or stenting) of CAD is uncertain. Over the past 20 to 25 years, the revascularization techniques of percutaneous transluminal coronary angioplasty (PTCA) and transluminal stenting have been examined with inconclusive results.

## 2. Methodology:

An evidenced based systematic review of the literature was completed pertaining to studies regarding angioplasty and stenting. Articles included in the study pertained to subjects evaluated for angioplasty and stenting ranging from 50 to 75 years of age. Medline was searched for articles meeting the defined inclusion criteria from 1979 to 2006. Peer reviewed articles were used for background purposes including epidemiology data and information on clinical presentation, along with foreground articles, including systematic reviews of data and randomized control studies. The following key terms were used: coronary artery disease, balloon angioplasty, stenting, atherosclerosis, drug-eluting stents, and re-stenosis. From the selected articles, data was examined, extracted, and compared with one another regarding the selected treatments and their efficacy in treating CAD, including their relationships to bare metal and drug eluting stents.

## 3. Results:

From 1979 to 2006, thirty articles met the inclusion criteria as described previously in the methodology. Of these, eight studies supported the efficacy of angioplasty combined with stenting instead of angioplasty alone. [3-10] One other study which addressed the issue found no significant reduction in the rate or prevention of re-stenosis over time. [5]

Ten studies supported the efficacy of drug-eluting stenting instead of the use of bare-metal stenting to treat atherosclerosis. [3, 11-19] While in contrast two studies found no significant difference in the reduction in rate or the prevention of re-stenosis, and often times more side effects, when using drug-eluting stents instead of bare-metal stents for patients with coronary artery disease. [11, 15] Levels of evidence for the articles included in the review may be seen in Figure 1.

### Conclusion:

As a health care provider in society today, the ability to make the best possible decisions for patients is highly dependent upon the understanding of new technologies. For patients with coronary artery disease, the importance for cardiologists and primary care providers to know the best techniques from the literature is of utmost significance. As was illustrated in this review, the most effective treatment for patients with coronary artery disease is percutaneous transluminal coronary angioplasty combined with drug-eluting stenting of atherosclerotic lesions. While the evidence in this review shows significance clinically for the treatment of patients with coronary artery disease, the reality is that the mortality rate of these patients is not decreasing.<sup>22</sup> And with this being said, the importance for future research to evaluate the cause and determine a way to decrease the mortality rate. Until a perfect technique with no side effects is developed, health care practitioners will have to rely on the training they receive in school and the current literature available to provide the best possible care for their patients.

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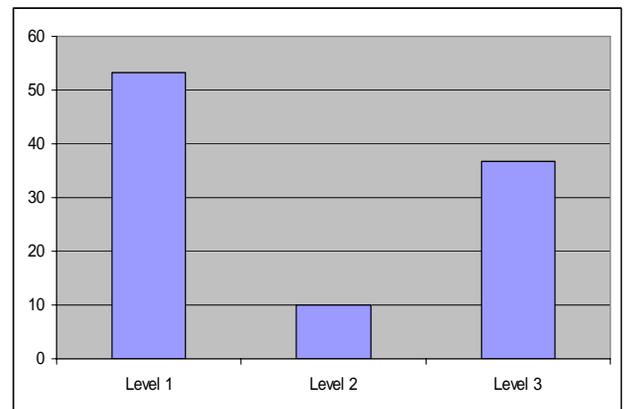


Figure 1. Levels of Evidence by Percentage