

Percutaneous coronary intervention (PCI) is the most widely employed coronary revascularization procedure worldwide (Chap. 296e). It is now applied to patients with stable angina; patients with acute coronary syndromes, including unstable angina and non-ST-segment elevation myocardial infarction (NSTEMI); and as a primary treatment strategy in patients with ST-segment elevation myocardial infarction (STEMI). PCI is also applicable to patients with either single-vessel or multivessel disease.

In this chapter, the use of PCI will be illustrated in a variety of commonly encountered clinical and anatomic situations, such as chronic total occlusion of a coronary artery, bifurcation disease, acute STEMI, saphenous vein graft disease, left main coronary artery disease, multivessel disease, and stent thrombosis. In addition, the use of interventional techniques to treat structural heart disease will be shown, including closure of an atrial septal defect (ASD) and transcatheter aortic valve replacement (TAVR).

CASE 1: CHRONIC TOTAL OCCLUSION

(Videos 297e-1 to 297e-7)

- An 81-year-old male with angina, New York Heart Association (NYHA) class IV congestive heart failure and inferoapicoposterior ischemia on an exercise technetium-99m scan.
- Diagnostic cardiac catheterization revealed a left dominant system with a totally occluded left circumflex (LCx) artery. The distal LCx filled via collaterals from the left anterior descending (LAD) artery, indicating chronicity of the total occlusion.

VIDEO 297e-1 Baseline left coronary angiogram shows an occluded LCx with left-to-left collaterals originating from LAD septal vessels.

VIDEO 297e-2 Attempts to cross the total occlusion in the LCx using a hydrophilic wire and an antegrade approach were not successful with the wire tracking to the right of the trajectory.

VIDEO 297e-3 The LAD septal collateral is accessed with a guidewire that is directed toward the distal LCx to cross the total occlusion retrograde.

VIDEO 297e-4 The total occlusion is crossed retrograde. The wire is snared in the guide, exteriorized, and used to provide antegrade access to the LCx.

VIDEO 297e-5 Antegrade flow in the LCx is restored after balloon inflation.

VIDEO 297e-6 Following stenting of the total occlusion, blood flow in the distal vessel is improved and a second significant stenosis is seen.

VIDEO 297e-7 Final result after LCx stenting.

SUMMARY

- Approximately 15–30% of all patients referred for cardiac catheterization will have a chronic total occlusion (CTO) of a coronary artery.
- CTO often leads to a surgical referral for complete revascularization.
- Incomplete revascularization due to an untreated CTO is associated with an increased mortality rate (hazard ratio = 1.36; 95% confidence interval [CI], 1.12–1.66, $p < .05$).
- Successful PCI of a CTO leads to a 3.8–8.4% absolute reduction in mortality, symptom relief, and improved left ventricular function.
- Newer techniques, such as the retrograde approach to crossing total occlusions, are useful when the antegrade approach fails or is not feasible and there are well-developed collateral vessels.

(Case contributed with permission by Dr. Frederick G.P. Welt.)

CASE 2: BIFURCATION STENTING

(Fig. 297e-1; Videos 297e-8 to 297e-16)

- A 52-year-old male with an acute coronary syndrome and a troponin I = 0.18 (upper limit of normal, <0.04).
- Diagnostic cardiac catheterization showed single-vessel coronary artery disease with a significant stenosis in the mid-LAD and a bifurcation lesion involving a large diagonal branch.

VIDEO 297e-8 Baseline angiogram of the left coronary circulation shows the significant stenosis in the mid-LAD and the bifurcation lesion involving a large diagonal branch.

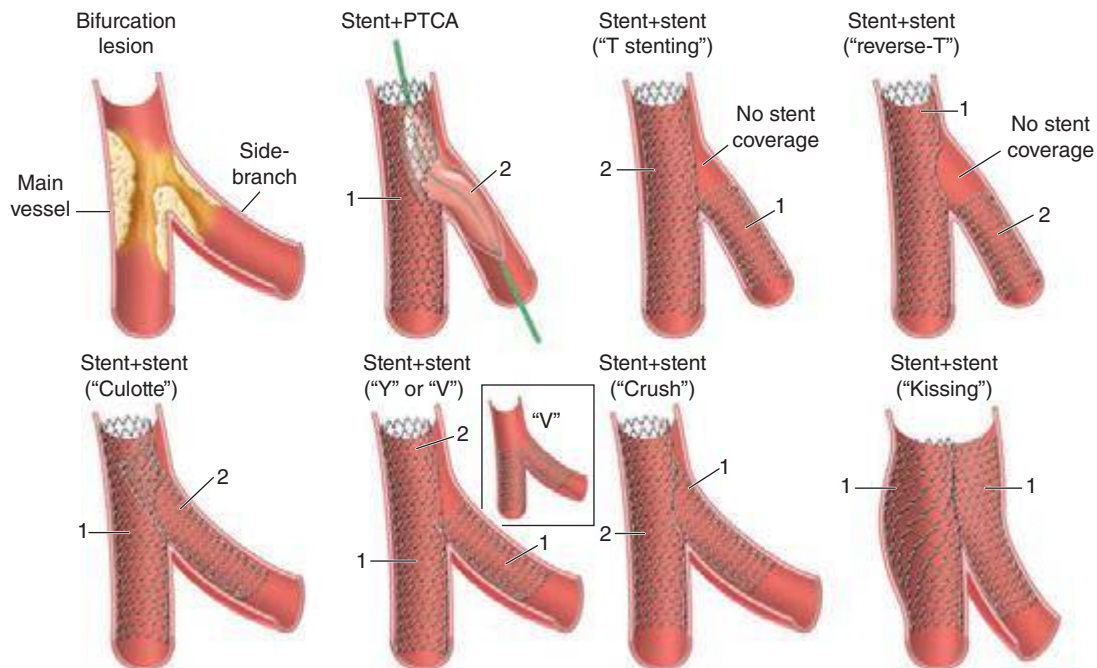


FIGURE 297e-1 Schematic representation of one-stent and two-stent techniques to treat bifurcation lesions. PTCA, percutaneous transluminal coronary angioplasty