Recanalization of a Chronic Radial Artery Occlusion Allowing Subsequent Complex Coronary Intervention

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A 65-year-old man with previous coronary artery bypass grafting and recent recurrence of angina was referred for coronary angiography. His medical history included myelodysplasia with significant anemia (hemoglobin, 7.7 g/dL) and thrombocytopenia (platelets, $77 \times 10^9/L$). A percutaneous coronary intervention was performed 4 years previous to an occluded native right coronary artery via the left radial artery.

Given the increased risk of bleeding complications and a patent left internal mammary artery graft, coronary angiography was planned again via the left radial artery. The result of a modified Allen test was positive, demonstrating satisfactory ulnar arterial supply to the hand. Arterial puncture using a SURFLO micropuncture needle (Terumo Medical Corporation; Somerset, NJ) resulted in pulsatile blood flow back, but it proved impossible to advance the 0.021-inch introducer wire more than a few centimeters into the vessel. Therefore, the cannula on the introducer needle was advanced over the wire to secure arterial access and radial angiography was performed, which demonstrated radial artery occlusion (RAO; Figure 1; online-only Data Supplement Movie I). The occlusion was not believed to be due to spasm because it was proximal to the site of needle entry and did not relieve with administration of 200 g of glyceryl trinitrate.

Given the issues with alternative arterial access, an attempt was made to reopen the vessel. A Y-connector was connected (Figure 2A) to allow contrast injection, and a 0.014-inch Fielder XT coronary guide wire (Asahi Intecc; Japan) (Figure 2B) was successfully negotiated through the occlusion. The vessel was dilated using a 4F dilator, followed by insertion of a 4F sheath. Angiography via the sheath demonstrated that the proximal radial artery was free of disease (Figure 3). A standard 0.035-inch J-tip wire was passed up to the brachial artery, and further dilatation was performed with 5F and 6F dilators, followed by insertion of a 6F sheath.

Coronary angiography demonstrated that the previously stented ungrafted right coronary artery had recurred, but the left anterior descending coronary artery and intermediate grafts remained patent and the native circumflex was unobstructed (Figure 4A). A percutaneous coronary intervention was performed to the right coronary artery occlusion (Figure 4B). Radial angiography at the end of the procedure showed that the radial artery was widely patent at the site of original occlusion, with no residual stenosis (Figure 5; online-only Data Supplement Movie II).

At clinic follow-up at 3 months, the patient was angina free and no further intervention was planned. The left radial pulse was palpable, and ultrasonography of the wrist demonstrated moderate stenosis of the distal artery, with good anterograde flow.

Discussion

The RAO represents one of the few remaining limitations of the radial arterial approach for coronary procedures. With the
use of anticoagulation, limiting sheath diameter, and patent
hemostasis with a short duration of compression, the rate of
RAO is <5%. Acute RAO is thought to be primarily related
to thrombus formation and intervention in the acute and
subacute setting, as previously described.2,3

It is almost certain that the occlusion in this case was
secondary to the radial procedure performed 4 years previ-
ously. Chronic RAO (>30 days) has been considered a
contraindication to future attempts at vascular access from
this vessel1 and, to the best of our knowledge, successful
intervention to a chronic RAO has not been previously
described.

In many cases of RAO, the radial pulse remains palpable
because of collaterals from the palmer arch, and access to the
vessel distal to the occlusion point can be achieved. As this
case shows, an inability to advance the introducer wire does
not necessarily require the approach to be abandoned. If an
introducer needle with an integral plastic cannula is used, the
cannula can be advanced over the introducer wire to allow
radial angiography and identify the problem. This is a major
advantage over the open-needle approach to radial access
because contrast injection through an unsecured needle risks
losing position in the vessel lumen. A second advantage is
that the cannula can be connected to a Y-connector to
facilitate peripheral intervention using standard techniques.

Treatment of the occluded radial artery in this case was
achieved with sheath dilators acting as bougies and did not
require balloon dilatation. This resulted in an excellent
short-term result angiographically and intermediate-term pa-
tency on ultrasonography. Stent deployment in the radial
artery has been described as a treatment for vessel perfora-
tion,4 but there is a risk of stent compression from extrinsic
forces, given the peripheral location of this vessel; this should
be avoided if possible.

Disclosures
None.

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catheter

Figure 2. A Y-connector is attached to
the plastic cannula (A, arrowhead) and
advanced over the 0.021-inch introducer
wire. This facilitated the introduction of a
0.014-inch Fielder XT coronary guide wire
(B, arrowhead) to perform intervention to
the distal radial artery occlusion.

Figure 3. A radial angiogram after insertion of a 4F sheath
shows that the proximal vessel is free of disease. The arrow-
head is at the level of the sheath tip.
Figure 4. Coronary angiography in the left anterior oblique view. A chronic total occlusion of the right coronary artery (A) is successfully opened (B).

Figure 5. Radial angiogram performed at the end of the procedure showing no residual stenosis.
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