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If directional coronary atherectomy is useful then why is it not used more often?

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Directional coronary atherectomy (DCA) was developed to overcome the limitations of balloon angioplasty. However, three well controlled randomised trials have questioned the use of directional atherectomy.¹⁻³ The Coronary Angioplasty Versus Atherectomy Trial (CAVEAT) and the Canadian Coronary Atherectomy Trial (CCAT) were the first published trials comparing the two techniques. The design of the trials was such that post-procedural dilatation was strongly discouraged in the atherectomy arm. Intravascular ultrasound has shown that 60-75% of the final lumen is created by atheroma removal and the remainder by stretching the external wall of the artery.⁴ In view of the benefit of a large post-procedure lumen in reducing restenosis, the use of balloon angioplasty following successful yet suboptimal (> 15% residual stenosis) atherectomy is common practice when additional cuts may be unsafe.^{5,6} The high residual stenosis in CAVEAT and CCAT (30% and 26%, respectively) resulted mainly from avoidance of adjunctive balloon angioplasty. The full potential of atherectomy was therefore not realised. It is not the device itself but its ability to provide a larger lumen that may reduce the risk of restenosis.⁷

Is directional atherectomy useful?

DCA is useful for lesions unfavourable to angioplasty—for example, ostial, bifurcation, eccentric, and shelf-like lesions.⁸ CAVEAT I and CCAT trials, however, did not confirm that DCA was superior for such lesions.⁹ Although larger luminal gain with reduced residual stenosis was achieved despite the use of first generation devices, the long term outcome was similar. The initial gains were at the expense of complications, mainly non-Q wave infarction.

Newer GTO and short window catheters with flexible nosecones are clearly superior to the first generation devices for bifurcation and ostial lesions. The mechanism of luminal enlargement includes sequential excision of tissue that might otherwise be displaced into the branch ostium during balloon angioplasty, while stent placement may cause adjacent vessel compromise or "stent jail". The new ultrasound guided atherectomy catheter is another advance and will allow safe and aggressive debulking with greater precision. Debulking before stenting is an interesting concept in device synergy. It may lead to safer and easier stent deployment. It may result in a larger acute lumen without the need for high pressure inflation.¹⁰

Why is atherectomy not done more often?

The results of three randomised trials showed no long term clinical benefit with atherectomy.¹⁻³ The higher incidence of composite end points including myocardial infarction and acute abrupt closure has made DCA an unfavourable tool. It is of limited value for calcified lesions. The large, rigid guide catheter and the cutting device carry a substantial risk in an inexperienced hand. Inappropriate placement of the guiding catheter may result in ostial dissection. Serious femoral vascular complications may occur because of the larger groin puncture. DCA is a difficult, time consuming, and demanding procedure; it requires a long learning curve and regular use is necessary to maintain skill. DCA has become less attractive with the increasing availability of stents, the majority of which can be deployed using 6F catheters. Ticlopidine instead of warfarin has allowed stenting to be carried out with fewer complications thus reducing length of hospital stay and overall costs. Stenting has thus largely replaced DCA for many complex lesions. DCA should be reserved for the treatment of lesions such as proximal bulky, eccentric, ostial, and bifurcation lesions. It will continue to remain a unique research tool for obtaining specimens of human coronary atheroma.

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