Heart 1996;75:8–10

VIEWPOINT

Combining coronary angiography and angioplasty

Bernhard Meier

The combination of diagnostic coronary angiography and coronary angioplasty (PTCA) has numerous names. It has been referred to as ad hoc, follow-on, one-time, one-stage, single-stage, single session, diagnostic session, stop and go, or dessert PTCA. "PTCA at first sight" is the term coined for PTCA performed after the first diagnostic coronary angiogram.[1] I propose to use the term "ad hoc PTCA" in this paper.

Ad hoc PTCA is second generation PTCA

Ad hoc PTCA was out of the question in the early days of coronary angioplasty when the procedure was considered highly investigational and it was mandatory not only to organise surgical stand-by in its true sense, but also to make absolutely sure that the indication was sound and the patient fully informed and consenting. Subsequently, several developments have favoured ad hoc PTCA. PTCA indications were quickly extended to truly urgent situations such as acute myocardial infarction where a two-stage intervention was not feasible and unstable angina pectoris where myocardial infarction might be expected in about 15% of patients within the next few days. Although intercurrent infarction in patients on the waiting list for PTCA has never been a frequent event, it may occur in up to 2% of patients, depending on the length of the waiting period. Every experienced angioplasty operator recalls with painful regret at least one patient who never made it back for the scheduled angioplasty. With an average waiting period of 4·5 months, as many as 1% of patients die on the waiting list.[2] Vessel occlusions during the waiting period are much more frequent, but they tend to occur in collateralised vessels and may be clinically unrecognised.

Indications for PTCA have widened to include patients in benign coronary situations that previously would have been managed conservatively.[3] The administrative cost of an additional procedure is controversial in such patients. Patients who require repeat PTCA for restenosis will recognise the advantages of avoiding a fourth catheterisation (counting the initial PTCA as a two stage intervention).

Since the initial reports by Myler *et al*[4] and Feldmann *et al*[5] there have been several reports of ad hoc PTCA. Invariably the results were undistinguishable from those of deferred angioplasty.[6–10] Nevertheless, American guidelines advised against the concept of ad hoc angioplasty.[11] However, the most recent version of the guidelines[12] explicitly allows ad hoc PTCA under certain circumstances, and even recommends it in patients with acute infarction, unstable angina, or restenosis. Ad hoc PTCA can be credited with reducing hospital stay by 30% and cost by 15% and also with reducing radiation exposure.[7 9]

The current volume of ad hoc PTCA at different centres and in different countries is unknown. A centre in Israel reported ad hoc PTCA in 83% of over 2000 patients.[10] Three quarters of the remaining patients had been referred with a diagnostic film from other hospitals. These figures accord with ours. However, throughout Switzerland in 1993 ad hoc PTCAs accounted for only 54% of angioplasty procedures (a range of 11–75%).[13] Automatic cine loops and digital image enhancement have facilitated ad hoc PTCA. Accordingly two-stage procedures at our hospital were performed in a room with traditional *x*-ray equipment.

Ad hoc PTCA offers something for everyone

Does ad hoc PTCA enhance the comfort of the patients and their families? Patients can be offered diagnosis and treatment within 24 hours. They may return home and even resume work the next day. The risks of a waiting period are avoided, and they will have only one arterial puncture. There is only one "night before", one fasting morning, one intravenous line to be inserted, etc. Exposure to radiation is reduced and the load of contrast medium is smaller. Also the prospect of a possible redo will look less bleak if the first intervention has been swift.

What does ad hoc PTCA offer physicians and their teams? They will enjoy an enhanced reputation among patients and referring physicians for their efficacious and speedy way of dealing with patients with coronary disease. They will use their time, equipment, and money more effectively and they will be able to treat more patients within a given budget (including personnel and laboratory space). Their minds will be less burdened with unfinished work. They will have to close just one arterial puncture per patient—and they too will benefit from reduced radiation exposure.

Who would argue against ad hoc PTCA? The first person who comes to mind is the

Division of Cardiology, University Hospital, Bern, Switzerland
B Meier

Correspondence to:
Professor B Meier, Professor and Head of Cardiology, University Hospital, CH-3010 Bern, Switzerland.

Accepted for publication 30 August 1995

catheterisation doctor limited to diagnostic procedures because of lack of skills, equipment, or surgical standby. Then there is the physician with little experience of PTCA who needs to consult with a peer before embarking on a procedure. In addition where physicians and facilities are underbooked the case load can be increased by splitting procedures into two. Lastly, the catheterisation laboratory staff who are unfamiliar with ad hoc PTCA may be apprehensive about the disruption of schedules caused by ad hoc PTCA and its potential complications. Once schedules are adjusted to take account of the fact that about every other procedure will result in an ad hoc PTCA, these concerns may abate quickly. Moreover, densely packed purely diagnostic programmes never run on time either.

Ad hoc PTCA is appropriate for all PTCA indications

Should ad hoc PTCA be reserved for simple procedures? Undoubtedly single vessel PTCA procedures are more easy to predict in terms of technical intricacy and risk. For such disease ad hoc PTCA could be the routine strategy. In patients with multivessel disease who need staged PTCA, ad hoc PTCA of the first lesion reduces the number of procedures from three to two. If adding PTCA to a diagnostic study, rather than pondering the case alone or with peers or sleeping on it, increased the risk, this should have become obvious with the thousands of ad hoc procedures performed worldwide.

The issues of surgical standby and informed consent have to be considered. Today, PTCA is done without surgical standby in many centres. Busy centres with surgical standby usually run their PTCA service independently of the surgical programme and deal with emergencies as they arise. Therefore an emergency operation as a consequence of ad hoc PTCA is no different from an emergency operation as a consequence of elective PTCA. Centres with classic surgical standby for every case, with a surgical team and room available during and after the procedure, are those with unexploited facilities and therefore standby can often be organised on the spot. When this is not possible it may be considered a reason to forego an ad hoc PTCA procedure.

Informed consent for a possible ad hoc PTCA will have to be obtained from all patients undergoing diagnostic coronary angiography. The committee responsible for the American guidelines expressed concern about putting worrying thoughts of possible PTCA and emergency surgery into the minds of many patients who are later found not to need PTCA.[12] I cannot see a real problem here. Most patients admitted for coronary angiography are aware that they have suspected or known coronary artery disease and that if the diagnostic procedure confirms this suspicion they will require medical treatment, angioplasty, or bypass surgery. The option that the problem might be resolved immediately after the diagnostic catheterisation should be seen as an advantage. All our patients sign a form that includes the possibility of ad hoc PTCA. At the end of the diagnostic coronary angiogram, the pictures are shown to the patient on the monitor and the therapeutic strategy is explained to him or her. Additional (oral) consent is obtained in the presence of two physicians and at least one other person. Patients seldom ask for time to think about the decision. Sometimes the two physicians involved in the case at our centre may seek an opinion from a more experienced colleague. If this is not immediately available treatment may be postponed.

Problems of self-referral are not restricted to ad hoc PTCA

Interventional cardiologists subscribing to a policy of ad hoc PTCA have repeatedly been accused of self-referral. But many of the deferred PTCA procedures must also be regarded as self-referrals, because between the diagnostic and the therapeutic sessions only the involved group of cardiologists will discuss the case. Moreover, ad hoc PTCA does not necessarily have to be a one-physician affair. In many centres, two physicians are involved in every case (a prerequisite in Germany[14] and France[15]) and immediate consultation with other cardiologists, clinicians, or cardiac surgeons can frequently be organised within minutes. Referral back to yourself is a common pattern not only in interventional cardiology but also in gastroenterology, ophthalmology, gynaecology, orthopaedic surgery, and so forth. Procedures for which there are clear indications are cheapest when diagnosed and treated by the same physicians. Procedures, such as angioplasty, where indications are less clear cut, theoretically are more subject to the abuses of self-referral but should get caught in the net of quality control, which is woven ever more tightly around medical care suppliers. Cross your heart, would you really want your physician to remove his colonoscope from your caecum after he found a polyp and give you an appointment in a week to have another colonoscopy after you had had time to think about it and sign the forms?

Ad hoc PTCA has been made possible by improved equipment and growing experience with an intervention that is, after all, the most common major therapeutic procedure in industrialised countries. It should be regarded as a benefit to patients and physicians rather than as suspect behaviour. Provided there is parallel development of quality control, ad hoc PTCA should become standard.

1 Moles VP, Meier B, Pande AK, Mehan VK, Urban P, Dorsaz P. PTCA at first sight: angioplasty based on video only. *J Invas Cardiol* 1992;4:3344–48.
2 Kober G, Reinemer H, Kaltenbach M. Incidence and detectability of the progression of high-grade coronary stenoses to occlusion. *Z Kardiol* 1984;73:674–8.
3 Pande AK, Meier B, Rutishauser W. Implications of coronary angiography in patients with suspected or known coronary artery disease. *Int J Cardiol* 1992;38:159–66.
4 Myler RK, Stertzer SH, Clark DA, Shaw RE, Fishman-Rosen J, Murphy MC. Coronary angioplasty at the time of the initial angioplasty: "ad hoc" angioplasty possibilities and challenges. *Cathet Cardiovasc Diagn* 1986;12:213–4.
5 Feldman RL, McDonald RG, Hill JA, Conti R, Pepine CJ,

Carmichael MJ, Knauff DG, Alexander JA. Coronary angioplasty at the time of the initial cardiac catheterization. *Cathet Cardiovasc Diagn* 1986;**12**:219–22.
6 Haraphongse M, Tymchack W, Rossal R. Coronary angioplasty at the time of the initial diagnostic angiography in patients with unstable angina. *Cathet Cardiovasc Diagn* 1988;**14**:73–5.
7 O'Keefe JH, Reeder JS, Miller GA, Bailey KR, Holmes DR. Safety and efficacy of percutaneous transluminal coronary angioplasty performed at time of diagnostic catheterization compared with that performed at other times. *Am J Cardiol* 1989;**63**:27–9.
8 Alfonso F, Macaya C, Iniguez A, Zarco P. Repeat coronary angioplasty during the same angiographic diagnosis of coronary restenosis. *Am Heart J* 1990;**119**:237–41.
9 O'Keefe JH, Gernon C, McCallister BD, Ligon RW, Hartzler GO. Safety and cost effectiveness of combined coronary angiography and angioplasty. *Am Heart J* 1990; **122**:50–4.
10 Rozenman Y, Gilon D, Zelingher J, Lotan Ch, Mosseri M, Geist M, Weiss T, Hasin Y, Gotsman MS. One-stage coronary angiography and angioplasty. *Am J Cardiol* 1995;**75**:30–3.
11 Ryan TJ, Faxon DP, Gunnar RM, Kennedy JW, King SB III, Loop FD, Peterson KL, Reeves TJ, Williams DO, Winters WL, Fisch C, DeSanctis RW, Dodge HT, Weinberg SL. Guidelines for percutaneous transluminal coronary angioplasty. A report of the American College of Cardiology/American Heart Association Task Force on Assessment of Diagnostic and Therapeutic Cardiovascular Procedures (Subcommittee on Percutaneous Transluminal Coronary Angioplasty). *Circulation* 1988; **78**:486–502.
12 Ryan TJ, Baumann WB, Kennedy JW, Kereiakes DJ, King SB III, McCallister BD, Smith SC Jr, Ullyot DJ. Guidelines for percutaneous transluminal coronary angioplasty. A report of the American College of Cardiology/American Heart Association Task Force on Assessment of Diagnostic and Therapeutic Cardiovascular Procedures (Committee on Percutaneous Transluminal Coronary Angioplasty). *JACC* 1993;**22**: 2033–54. *Circulation* 1993;**88**:2987–3007.
13 Röthlisberger B, Meier B, Urban P, im Namen der Arbeitsgruppe PTCA und Fibrinolyse der schweizerischen Gesellschaft für Kardiologie. Cardiac interventions in Switzerland 1993. *Schweiz Rundsch (Praxis)* 1995;**14**:402–11.
14 Deutsche Gesellschaft für Herz-und Kreislaufforschung, Kommission für Klinische Kardiologie (unter Mitwirkung der Arbeitsgruppe transluminale Angioplastie). Empfehlungen für die Durchführung der Perkutanen Transluminalen Koronarangioplastie (PTCA). *Z Kardiol* 1987;**76**:382–5.
15 Monassier JP, Bertrand M, Cherrier F, Didier B, Guermonprez JL, Marco JL, Morice MC, Valeix B. Recommandations concernant la formation des médecins coronarographistes et angioplasticiens, l'organisation et l'équipement des centres de coronarographies et d'angioplastie coronaire transluminale. *Arch Mal Coeur* 1991; **84**:1783–7.