In-patient transfer for coronary angiography: a substitute for clinical evaluation?

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Abstract

Waiting for in-patient transfer for the investigation of chest pain is a significant cause of 'bed-blocking'. We performed an audit of 58 consecutive in-patient transfers. The mean delay between referral and transfer was 10 days (range one to 28 days). At the time of transfer the mean number of pain-free days was five (range one to 21 days). Of the 37 patients with a working diagnosis of unstable angina, only 19 (51%) underwent some sort of non-invasive risk stratification prior to referral, nine patients (24%) were walking around the hospital or had taken weekend leave and 13 (35%) had normal anatomy or subcritical disease. Of 21 with post-infarct angina, seven (33%) underwent exercise stress testing, five (24%) were mobilising around the hospital and 18 (86%) underwent some sort of intervention.

In conclusion, waiting times for in-patient angiography were long and utilisation of non-invasive investigation was low.

Key words: chest pain, unstable angina, angiography, waiting time, non-invasive investigation.

Introduction

Waiting for in-patient transfer for the investigation of chest pain is a significant cause of 'bed-blocking'. Furthermore, a large proportion of such patients may have no evidence of coronary disease[1] and could reasonably be investigated non-invasively in the first instance. We performed an audit to see how frequently patients transferred for in-patient angiography had been investigated non-invasively and what residual symptoms they had.

Methods and results

We collected data on level of mobility, previous cardiac diag-

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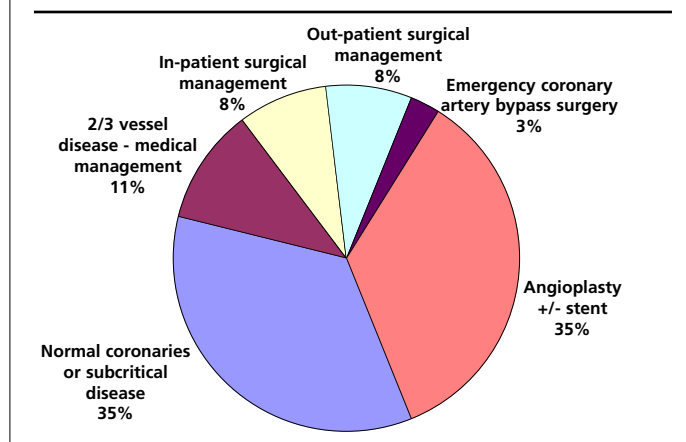**Emma Helm,** Senior House Officer in Cardiology
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noses, non-invasive investigations and length of stay in 58 consecutive patients transferred during August and September 2000 from 15 different district general hospitals in the South Thames region to St Thomas' Hospital. The mean delay between referral and transfer was 10 days (range one to 28 days). At the time of transfer the mean number of pain-free days was five (range one to 21 days). A prior diagnosis of coronary artery disease had been previously established in 35 (60%) patients – by angiography in 23 (40%). Of the 58 patients, 37 had a working diagnosis of unstable angina and 21 had post-infarct angina.

Unstable angina

There were 37 patients with a working diagnosis of unstable angina: 20 (54%) were thought to have had abnormal ST segment changes; 11 (29%) had had an exercise test of which 10 were positive; five (14%) had had troponin levels measured, all of which were positive; three (8%) had had myocardial perfusion scans, of which one was positive. Therefore 19 (51%) underwent some sort of non-invasive investigation prior to referral. One patient was bed-bound, 27 (73%) were mobilising around the ward, eight (22%) were walking around the hospital and one had taken weekend leave.

The results and outcomes of angiography were as follows: 13 (35%) had normal anatomy or subcritical disease; 13 (35%) had one- or two-vessel disease and underwent angioplasty +/- stenting; six (16%) had three-vessel disease and were referred for coronary artery bypass surgery; four (11%) had significant coronary artery disease and were recommended for medical treatment; one patient had three-vessel disease and attempted angioplasty of the circumflex artery was complicated by dissection and required immediate coronary artery bypass grafting (CABG). Thus 20 (54%) had or were recommended some form of intervention (figure 1).

Post-infarct

Of the 21 patients transferred after acute myocardial infarction, seven (33%) underwent exercise stress testing, all of which were positive. None had had myocardial perfusion scanning. The mobility of the post-infarct patients was as follows: seven (33%) were bed-bound, nine (43%) were mobilising around the ward, five (24%) were mobilising around the hospital; no patients had taken weekend leave.

The results and outcomes of angiography were: nine (43%) had one- or two-vessel disease and underwent angioplasty +/- stenting; three (14%) had three-vessel disease and were referred for out-patient CABG (i.e. discharged to the waiting list); six

Figure 1. Unstable angina - outcomes

- Out-patient surgical management 8%
- In-patient surgical management 8%
- Emergency coronary artery bypass surgery 3%
- 2/3 vessel disease - medical management 11%
- Angioplasty +/- stent 35%
- Normal coronaries or subcritical disease 35%

Figure 2. Post-MI outcomes

- Angioplasty +/- stent 43%
- 2/3 vessel disease - medical management 14%
- In-patient surgical management 29%
- Out-patient surgical management 14%

(29%) had three-vessel disease and were referred for in-patient CABG (during the acute admission); three (14%) were recommended for medical treatment alone. In total, 18 (86%) underwent some sort of intervention (figure 2).

Discussion

Clinical trials of angioplasty in unstable angina have selected patients using strict entry criteria, such as rest pain of a minimum duration coupled with objective evidence of ischaemic heart disease either on ECG, previous angiography or myocardial perfusion scanning.[2] For patients without previously established coronary artery disease and without ECG changes, the widely accepted American AHCPR guidelines[3] and European guidelines[4] stress the importance of non-invasive testing in risk stratification and deciding priorities in management. Thus, patients at low risk – defined by no persistent ST depression, no recurrent chest pain and normal troponin levels – should have non-invasive investigation in the first instance.

Our study shows, however, that non-invasive testing was used in only about 50% of patients with a working diagnosis of unstable angina and in only three of 13 (23%) patients subsequently found to have normal coronary arteries. A majority of our patients were fully mobile around the ward or hospital and could have reasonably been expected to perform an exercise test. There was also little use of myocardial perfusion imaging and troponin assays,[5] although access to these tests may have limited their use.

As many as a third of patients referred as unstable angina had normal coronary anatomy or non-significant coronary disease. Similar figures have been shown in other centres for patients with acute[1] and also chronic pain.[6] There may be many explanations for this including fear of litigation, the length of out-patient waiting lists for angiography, or expediency.[7] Furthermore, the availability of angiography may be a more powerful predictor of its use than a patient's urgency or risk of adverse clinical events.[8-10] This has important implications in view of increases in spending on coronary angiography discussed by
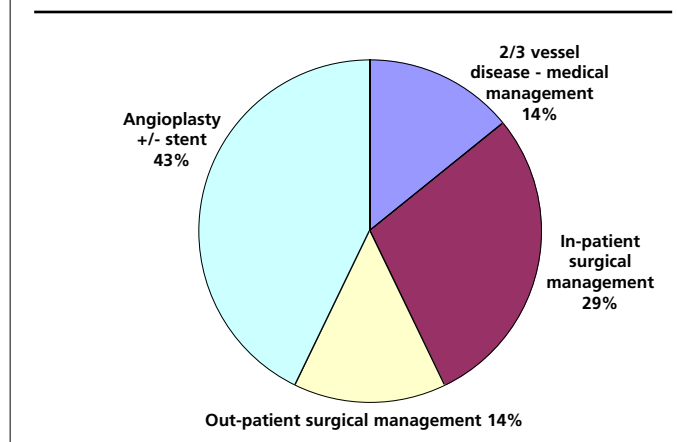
Key messages

- We found that up to a third of patients with a working diagnosis of unstable angina who were referred for urgent in-patient angiography had normal or near-normal coronary vasculature

- Patients in whom chest pain has settled and who are considered low risk (i.e. without persistent ST depression and normal troponin) should be considered for non-invasive investigation

- In low-risk patients the need for angiography should be determined by non-invasive investigation (usually exercise tolerance test or myocardial perfusion scan)

the National Service Framework.[11] Such increases must be coupled with better clinical and non-invasive stratification to avoid flooding angiography services with low-risk cases. Chest pain clinics[12,13] are being set up as a result of the National Service Framework and currently there are 160 nationwide (S Combes, personal communication). These are designed to see patients within two weeks although, in practice, patients are usually seen much sooner. This should prevent the admission of many cases with chest pain of uncertain aetiology and give general practitioners an alternative to direct accident and emergency admission.

Angioplasty was performed for 43% of patients post-infarction and 35% with unstable angina. Many had been pain free for several days prior to transfer despite good levels of activity; few had evidence of continuing ischaemia. It is possible that we were over-treating our patients, perhaps as a result of the convenience of performing angioplasty at the time of the diagnostic angiogram. This remains impossible to prove without the non-invasive tests having been performed.

In conclusion, this study gives evidence of lengthy waiting

times for in-patient angiography coupled with a low usage of non-invasive investigation. The fact that 35% of patients with a working diagnosis of unstable angina had normal or near-normal coronary anatomy suggests that many patients could have been discharged from their referring hospital either with reassurance, non-cardiac investigation or listing for elective coronary angiography.

References

1. Fruergaard P, Launbjerg J, Hesse B *et al*. The diagnosis of patients admitted with acute chest pain but without myocardial infarction. *Eur Heart J* 1996;**17**:1028-34.
2. The TIMI IIIB Investigators. Effects of tissue plasminogen activator and a comparison of early invasive and conservative strategies in unstable angina and non-Q-wave myocardial infarction: results of the TIMI IIIB trial. *Circulation* 1994;**89**:1545-56.
3. Braunwald E, Mark DB, Jones RH *et al. Unstable angina: diagnosis and management*. Clinical Practice Guideline Number 10. AHCPR Publication No. 94-0602. Rockville, MD: Agency for Health Care Policy and Research and the National Heart, Lung, and Blood Institute, Public Health Service, U.S.Department of Health and Human Services, May 1994 (amended).
4. Bertrand ME, Simoons ML, Fox KAA *et al.* Management of acute coronary syndromes: acute coronary syndromes without persistent ST segment elevation. *Eur Heart J* 2000;**21**:1406-32.
5. Heeschen C, van den Brand M, Bruemmer J, Simoons ML, for the CAP-TURE Investigators. Angiographic findings according to TnT. *Circulation* 1999;**100**:1509-14.
6. Chambers J, Bass C. Chest pain with normal coronary anatomy: a review of natural history and possible etiological factors. *Prog Cardiovasc Dis* 1990;**33**:161-84.
7. Clement DC, Cohn JN. Salvaging the history, physical examination and doctor-patient relationship in a technological cardiology environment. *J Am Coll Cardiol* 1999;**33**:892-3.
8. Every NR, Fihn SD, Maynard C, Martin JS, Weaver WD. Resource utilisation in the treatment of acute myocardial infarction: staff-model health maintenance organization vs fee-for-service hospitals. *J Am Coll Cardiol* 1995;**26**:401-6.
9. Pilote L, Miller DP, Califf RM, Rao JS, Weaver WD, Topol EJ. Determinants of the use of coronary angiography and revascularisation after thrombolysis for acute myocardial infarction. *N Engl J Med* 1996;**17**:1198-205.
10. van Miltenburg AJ, Simoons ML, Bossuyt PM, Taylor TR, Veerhoek MJ. Variation in the use of coronary angiography in patients with unstable angina is related to differences in patient population and availability of angiographic facilities, without affecting prognosis. *Eur Heart J* 1996;**17**:1828-35.
11. Department of Health. *National Service Framework for Coronary Heart Disease: modern standards and service models*. London: The Stationery Office, 2000.
12. McManus RJ, Mant J, Davies MK *et al*. A systematic review of the evidence for rapid-access chest pain clinics. *Int J Clin Practice* 2001;**56**:29-33.
13. Chambers J. Chest pain clinics: hope or hype? *Int J Clin Pract* 2002;**56**:4.