
COMMENTARY

The Cancer Patient: Too Many Scans and X-rays?

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ABSTRACT

The title of this article is the same as that of a paper by Brewin published in the Lancet more than 20 years ago. There have been substantial advances in diagnostic radiology and in oncological treatments during the past 20 years, but the question remains valid. Many radiological investigations requested for cancer patients stand little chance of being of overall benefit through altering clinical management or improving quality of life. There is considerable variation in the use of radiological investigations in cancer management. One area where this is seen in particular is in the 'restaging' of patients whose cancer has 'returned'. The reasons given to patients for such investigations are often not convincing. Investigations are sometimes arranged to 'rule out' or 'exclude' malignant involvement of other organs and tissues, but the sensitivity of even the best forms of radiological assessment means that such 'exclusion' is, in fact, impossible. Some investigations reveal that the disease is more widespread than originally supposed. While for some patients this may very usefully influence management, for others this news may make no significant difference to treatment but can have a profound negative and unnecessary psychological impact. Many radiological investigations are expensive and many patients have to wait longer than they should for the scans they need. Resources are limited and requesting unnecessary tests for some patients can adversely affect the management of others.

Key Words: Disease management, Investigations, Scans, Staging

INTRODUCTION

Brewin drew attention to the potential deficiencies and drawbacks of radiological investigations in certain circumstances for cancer patients more than 20 years ago.¹ While the sensitivity and specificity of scanning has improved considerably during the past 2 decades, many of the points that Brewin made are as relevant now as they were then. Brewin began his article with the following: "A man with proven lung cancer, progressive weakness, and weight loss has a focal fit for the first time in his life. A brain scan is ordered. Why? The odds in favour of a brain metastasis are overwhelming — and remain so even if the scan is normal. So why spend precious money? Why use valuable resources of staff and equipment, sometimes an unexpectedly wide variety of them, including, for example, an ambulance and its crew, who are thus made unavailable for other duties? And even if money

and resources are unlimited, why risk causing anxiety and discomfort?"

Brewin then developed his argument, as follows:

- normal scans do not prove that spread has not occurred
- systemic treatment may be considered appropriate or inappropriate whatever the result of a scan
- local treatment may be appropriate even if dissemination has occurred
- doing scans purely to help with prognosis should have a low priority
- scanning can cause physical and psychological harm — Asher had claimed that "over-investigation is a form of physical cruelty"²
- where investigations are unlikely to have any important effect on management they should be given a low priority
- scanning is sometimes done merely because it is fashionable, interesting, or for perceived medico-legal reasons
- if the demonstration of asymptomatic metastases is thought to be a logical reason for altering management, how good is the evidence that the altered management has a favourable effect?

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Submitted: 20 February 2004; Accepted: 20 February 2004.

Recently, Swensen provided a reminder of another undesirable consequence of scanning — false-positive results.³ In a study of screening for cancer with computed tomography (CT), this researcher described 700 ancillary findings, most of which were falsely positive and whose further investigation adversely affected quality of life and resulted in unnecessary diagnostic and interventional procedures. Subsequent correspondence in the *British Medical Journal* drew attention to the cost-ineffectiveness of such strategies of radiological investigation and to the potential knock on effects in the public sector from private sector extravagance by investigating common benign liver, renal, and adrenal ‘incidentalomas’.

This is not to say that there is no role for sophisticated radiological assessment in cancer screening. A recently reported Italian study of screening with spiral CT and positron emission tomography (PET) of more than 1000 patients who had smoked for 20 pack-years or more has shown that the combination effectively detects early lung cancer.⁴ However, it has not yet been demonstrated that lung cancer mortality is reduced by this strategy and it is very far from established that this is a cost-effective approach in comparison with other demands on health care resources. The author acknowledges that the evidence for the value of PET scanning patients with proven lung cancer in avoiding unnecessary surgery is convincing both medically and economically.⁵ The purpose of this article is not in any way to discourage scanning in general, but rather to encourage the more discriminate use of scanning, involving the weighing up of the arguments both for and against in any given clinical situation.

The results of a survey investigating doctors’ knowledge of radiation exposure have recently been reported.⁶ Very few doctors had any knowledge about the level of radiation that their patients were exposed to during radiological investigations. Their estimated doses were much lower than the correct doses. An abdominal spiral CT examination results in the patient receiving the equivalent of 300 chest X-rays, but only 6% of doctors knew this. The authors concluded that this lack of awareness becomes particularly pertinent when considering the number of patients who receive inappropriate or repeat examinations.

A consultant neurosurgeon, in expressing his personal view, has recently coined the acronym VOMIT for victims of modern imaging technology.⁷ He described

the profound anxiety caused by the discovery of abnormalities that eventually turned out to be innocent on scans done for very weak clinical indications. Scan requests were explained to patients using phrases such as “just to be on the safe side” or “I’m sure there’ll be nothing, but let’s be certain”. Although describing scenarios in his own specialty he expressed the view that “readers will have similar examples from their own disciplines. And I’m equally sure that, like me, you spend much of your time reassuring anxious patients and relatives that what some state-of-the-art, gleamingly expensive piece of equipment has shown is no more than a red herring.”

RESTAGING

The potential for requesting unnecessary radiological investigations is quite high when patients who have been treated in the past for cancer develop a recurrence.⁸ When a cancer is discovered to have recurred at one anatomical site it is common practice to request further investigations in an attempt to establish whether it has also spread to other sites. Radiological investigations constitute the major part of this investigative strategy, commonly known as restaging. Restaging is universally accepted as an important part of proper clinical management for many patients with recurrent cancer, but there is variation in philosophy concerning its appropriateness in particular clinical situations.

The sixth (2001) edition of what is arguably the most internationally authoritative oncology textbook states, without qualification, that “patients with local recurrence after mastectomy should have a *complete* restaging to *rule out* [my italics] distant metastases. In particular, a CT scan of the chest and abdomen and a bone scan is recommended because many patients have additional sites of involvement only discovered in this manner.”⁹ While several sets of authoritative guidelines have been published on the appropriate use of investigations for the surveillance of patients being followed up after treatment of various primary cancers, there has been relatively little documentation of consensus on what investigations are appropriate when relapse is discovered. Recommendations for the evaluation of patients with newly diagnosed metastatic breast cancer were included in guidelines published in the USA by the National Comprehensive Cancer Network.¹⁰ Routine haematology and biochemistry blood tests, chest radiographs, and bone scans were recommended but it was considered that decision making on whether or not to proceed with other radiological investigations

can depend mainly on the presence or absence of relevant symptoms.

Current Practice

There does not appear to be any good documentation of current clinical practice in relation to restaging. There is, however, strong anecdotal evidence that there is wide variation in practice and that restaging can, without critical evaluation, easily become a routine part of clinical management for certain categories of patients with recurrent cancer. During the past 5 years, the author has seen several examples of the latter in discussion with candidates in the Final Examination for the Fellowship of the Royal College of Radiologists in Clinical Oncology.

Liver, bone, and chest scans can be requested very easily, perhaps too easily, in busy clinics. It is sometimes easier to request a scan than to think in depth there and then about how useful it is likely to be. Some scans may be ordered as a substitute for the more difficult task of making sound management decisions quickly. Restaging may be arranged by a practitioner in one specialty when any further treatment would be the responsibility of a practitioner in another. In such situations it is frequently helpful to check that the proposed investigation(s) may be of value, but this is usually not done.

Two friends with cancer recounted their experiences. One underwent whole body scanning after the appearance of scattered small subcutaneous nodules of metastatic melanoma. She had previously undergone toxic adjuvant systemic treatment, which she would not be prepared to repeat. Even if she were to try another treatment she already has clinically detectable disease that can act as a marker for response. It is difficult to see how her management could usefully have been influenced by discovering asymptomatic distant metastases at other sites. The other friend, with a past history of oestrogen receptor-negative breast cancer and chest radiology overwhelmingly suggestive of lung metastases, told me of the mental anguish she experienced while waiting weeks for liver and bone scans and their results. The scans showed no evidence of other metastases. Chemotherapy would have been recommended whatever they had shown.

The author took the part of an Assessor in an 'Oncology Validation Day' in 2002, designed to develop United Kingdom General Medical Council performance procedure tests of competence in oncology. It was intended

that the information gathered would provide reference data that trained assessors could use to assess the performance of any doctors referred for assessment in the future. Consultants and senior specialist registrars in both clinical and medical oncology volunteered to take the part of referred doctors. During the course of the day, the volunteers were required to conduct a series of 'objective structured clinical examination' (OSCE) consultations. The author was on a 'station' where the role player took the part of a middle-aged patient who had just been diagnosed with multiple lung metastases from her previously treated oestrogen receptor-positive breast cancer. Of the 22 volunteers, 13 recommended further scanning. None of the volunteers offered any practical reason why this might help, other than one who said that further tests were recommended "so we know where to look to see if the treatment has worked". No attempt was made to quantify the additional benefit of this strategy over and above confining monitoring to clinical assessment and radiological assessment of the lungs. Other volunteers recommended further tests "so we know what we're dealing with", because it was "wise to exclude the disease everywhere else", "to see if it has spread to other organs", or "to find the full extent of the problem". When the patient role player told one of the volunteers of her fear of further investigations demonstrating spread to other organs she was told "in a way it doesn't really matter because the drugs will get everywhere".

Potential to Influence Management

Recommending restaging following the diagnosis of recurrent disease can, on occasions, be almost an automatic reaction, a substitute for thought about what is really in the best interests of that particular patient. It stems from a desire to have as much knowledge as possible about what is going on, in the belief that having the 'complete picture' will contribute usefully to decision making about treatment or to other aspects of clinical management in its widest sense, for example in helping to give a prognosis.

This will indeed often be the case and, for example, investigations which stand a reasonable chance of demonstrating otherwise inapparent metastatic disease will usually be indicated before proceeding with potentially curative treatment for locoregional recurrence. Knowledge of asymptomatic metastases will also influence the choice of treatment for some categories of patients. However, in many situations the value of restaging will be debatable and not uncommonly the

net effect will be disadvantageous — either for that patient or for others. It is of course inevitable that physicians will vary in their assessment of what is reasonable, but relevant patient and resource utilisation factors should both be taken into account in a rough and ready attempt to quantify the likely benefit overall. In each situation, the chance of physical or psychosocial benefit should be assessed and weighed against the disadvantages.

The arguments in favour of a more critical use of restaging investigations are equally relevant to the investigation of the patient newly diagnosed with cancer, but the potential for staging investigations to influence management usefully in that situation is generally rather greater. Some recommended restaging investigations stand no chance of influencing treatment. This may be because systemic treatment would be indicated for recurrence whatever the actual anatomical distribution of disease, either because local treatment would not be feasible or because there is a high chance of systemic disease whatever the reported results of scans. It might be because local treatment would similarly be uninfluenced by whether or not there is evidence of distant disease. Occasionally, it may be because there is no anti-cancer treatment of any value whatever the extent of the disease.

It might be argued that in the case of a patient with locally recurrent inoperable breast cancer the choice of systemic treatment could be influenced by whether or not there are detectable asymptomatic visceral metastases. While it is acknowledged that liver metastases from breast cancer tend not to respond well to hormonal treatment, the chance that a patient with hormone receptor-positive disease who is otherwise symptomatically well and who has normal biochemistry will be disadvantaged by an initial trial of hormonal treatment without scanning must be very low. The routine imaging investigation of women without clinical evidence of metastatic breast cancer was specifically stated to be not recommended in a report by a Working Party of the Royal College of Radiologists.¹¹

Sensitivity of Scans

The sensitivity of most staging investigations is poor. A clear scan 'rules out' or 'excludes' nothing. There are approximately a million cells in a cubic millimetre of tissue. Most lesions need to be at least a few millimetres in diameter to be detectable on scans. Scans therefore will usually demonstrate only those malignant

deposits that contain substantially more than 10 million cells. We know from the subsequent course of the disease that the majority of patients with node-positive breast cancer have micro-metastases at presentation, even though they usually have normal blood tests and scans. Many studies have shown that very few isotope bone scans demonstrate metastases in patients with no bone pain and normal biochemistry,¹² yet they continue to be requested in such circumstances. More illogical is the widespread belief that a negative bone scan in patients with node-positive breast cancer indicates that there are no metastases. Moreover, false-positive results from scans are quite common. Scans may be repeated or other investigations set in train when the initial findings demonstrate an abnormality of uncertain nature that turns out eventually to be benign, all this adding to delay and anxiety.¹³

Effect on Morale

Restaging can be harmful. It is not necessarily helpful for someone who has just received devastating news to be told just at this time that, in addition, the disease has spread to the liver, when there had been absolutely no clinical evidence of this. Such a view in 2003 may to some appear unacceptably paternalistic, but not everyone wants all the bad news to come at once. There will be patients who, for practical reasons, can make good use of knowing that the prognosis is now much worse than had been thought, but there will be others whose quality of life will be immeasurably worsened by such news. Patients with a poor prognosis have a right not to be told so unless requested, but arranging further investigations can effectively deprive them of this freedom. It can be argued that it is not appropriate for doctors to participate in the maintenance of false hope, but how many apparently healthy doctors undergo regular full health checks and how many would really wish to know the precise state of their coronary arteries? Many of us are to a greater or lesser extent living, and choose to live, in ignorant comfort.

The ethics of requesting investigations that may adversely influence quality of life is relevant here. Some patients given bad news will wish they hadn't undergone the investigation. To request investigations without fully informed consent after discussing the possible advantages and disadvantages, including the inability of scans to detect very small deposits, could itself be regarded as paternalistic. Yet even raising the possibility that a scan might show further spread will cause unnecessary further distress for some patients.

It is often forgotten or not fully realised by the doctor requesting a scan that he or she may be initiating a 3 to 4 week, or longer, period of very considerable psychological anguish. The anxiety caused by waiting for investigations and their results is often profound. Part of the worry may be due to justifiable concern about the consequent delay in treatment for what has been discovered. The scan may result in the patient being made aware of the seriousness of his or her predicament earlier than would have been the case otherwise. On the other hand, the result when it does come may result in very great relief. This good news may be genuine good news but, as already discussed, the result may well be false.

CONCLUSION

For many patients with recurrent cancer, restaging investigations are clearly appropriate because of the extent to which they will contribute usefully to good clinical management. However, in some situations these investigations stand not only to do more harm than good for the patients concerned, but they can adversely affect the service for other patients because demand on diagnostic radiology departments exceeds supply. In the UK, the median wait recently for all patients for a magnetic resonance imaging (MRI) scan was 20 weeks and 6 weeks for a CT scan, with 25% of radiology departments reporting waits longer than 34 and 10 weeks, respectively.¹⁴ Although cancer patients as a group will tend to have their investigations performed more quickly than average, it is clear that in the UK at least, many of them are currently experiencing serious and unacceptable delays in getting the tests they need, and waiting for CT and MRI scans is a particular problem.¹⁵ Unnecessary scanning incurs both financial and opportunity costs, including the consequences of distressing delays in necessary scans for other patients.

Perhaps radiology requests should include an indication of how the proposed investigation might usefully influence management. If requesting clinicians were asked also to estimate the chance of the investigation

being of benefit this might help further to focus thought on the justification of both the inevitable and potential costs. This could constitute the basis for a potentially useful and interesting prospective audit.

ACKNOWLEDGEMENTS

I thank Dr Corinne Rees and Dr Amit Bahl for their helpful comments.

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