



MISSED DIAGNOSES AND DISCREPANCY IN DIAGNOSTIC RADIOLOGY —

PART 1

An 86-year-old male patient with a background of colorectal carcinoma had total colectomy performed four years ago. He completed chemotherapy and the disease has been in remission since 2013. The current CT scan reveals multiple liver metastases ranging from 3 cm to 7 cm in diameter scattered throughout the liver.

On review, the last CT scan performed six months earlier showed a solitary enhancing 1 cm nodule in segment 8, just adjacent to the confluence of the hepatic veins. This particular lesion now measures 5 cm and was not mentioned in the report, which was done at a sister institution by a very renowned senior radiologist who was your mentor.

The questions arising from this scenario are:

1. Did the patient suffer a delay of treatment from this missed diagnosis?

2. Did the delay have an impact on the prognosis? (there is effective treatment for recurrences)
3. How should the current radiologist handle the problem with the first radiologist's report?
4. What would be the best approach to inform the patient of this finding?

DEFINITION OF DISCREPANCY IN RADIOLOGY

A reporting discrepancy occurs when a retrospective review or subsequent information about patient outcome leads to an opinion different from what is expressed in the original report.^{1,2}

DEFINITION OF MEDICAL ERROR

The concept of error depends on "expert opinion". A radiological error occurs when an observer fails to reach the same conclusion that a group of expert observers would have reached. Errors can only arise in cases where the correct interpretation

is not in dispute. Renfrew et al³ adapted Smith's⁴ scheme for radiological errors and classified these into seven causes:

- i. Complacency — over-reading and misinterpretation in which the finding is appreciated but attributed to the wrong cause (false positive).
- ii. Faulty reasoning — over-reading and misinterpretation in which the finding is appreciated and interpreted as abnormal but is attributed to the wrong cause. Misleading information and a limited differential diagnosis are included in this category (true positive reading but misclassification).
- iii. Lack of knowledge — the finding is seen but is attributed to the wrong cause because of a lack of knowledge on the part of the viewer (true positive reading but misclassification).
- iv. Under-reading — the finding is missed. Possibly a result from

- failure to isolate important material or from satisfaction of search (false negative).
- v. Poor communication – the lesion is identified and interpreted correctly but the message fails to reach the clinician.
 - vi. Miscellaneous – the lesion was not present on the image obtained, even in retrospect. This may be secondary to limitations of the examination or to an inadequate examination (false negative).
 - vii. Complications – untoward events happen during the course of examination, most frequently encountered during invasive procedures.

INCIDENCE OF MEDICAL ERRORS IN RADIOLOGY

Similar to the rest of the medical practice, errors are inherent in radiology. Available evidence places error rates between 3%–5% for general radiological practices.

For certain specialised examinations where review by subspecialists has occurred, the quoted error rate exceeds 30%. It is estimated that close to one million radiological errors occur annually in the United Kingdom National Health Service.⁵

INCIDENCE OF WRONG DIAGNOSES IN RADIOLOGY

A retrospective review study in 1999 found that 19% of lung cancers presenting as a nodular lesion on chest radiographs were missed.⁶ Studies in the 1970s found that 71% of lung cancers detected on screening radiographs were visible in retrospect on previous films.^{7,8}

DEFINITION OF A NEAR MISS

A near miss is an event characterised by the detection and correction of an error before harm reaches the patient. A 2011 study over a two-year period reported that electronic order entry form errors accounted for 20% of reported near misses – 90% of these originated from outside the radiology department

– while 40% of near misses were serendipitously detected.⁹

DEFINITION OF ERROR OF JUDGEMENT

Judgemental errors occur due to faulty reasoning.⁸ The adage that “the eye sees what the mind thinks” extrapolates to “the eye misses what the mind does not think about”. Smith estimated that such errors accounted for 10% of all mistakes in radiology.⁴

DEFINITION OF A DIFFERING OPINION: INTER-OBSERVER DIFFERENCES

The issue of error and discrepancy in radiology is well recognised. Studies as early as in the 1940s found that chest radiographs of patients with suspected tuberculosis were read differently by different observers in 10%–20% of cases. A study also identified that in interpreting X-rays of patients in an emergency department, major disagreements between two observers occur in 5%–9% of cases, with an estimated incidence of errors per observer being 3%–6%.¹⁰

The poor validity and high inter-observer variation in scoring radiological discrepancies have been demonstrated in recent literature.^{11,12,13}

SOURCES OF A MISSED DIAGNOSIS IN RADIOLOGY

Missed diagnoses are a subset of medical errors where significant findings and events are missed during a radiological examination.

PERCEPTUAL ERRORS

70% of errors in radiology are perceptual in nature, ie, the radiologist does not “see” the abnormality on the imaging exam, perhaps due to poor conspicuity, satisfaction of search or simply the “inexplicable psycho-visual phenomena of human perception.”³ This could also result from a true lack of relevant information and time pressure where radiological interpretation and decision-making is

done under conditions of uncertainty and urgency.¹⁴ An example would be when a trauma patient undergoes a full body CT scan and the trauma team presses for an instantaneous provisional report before the patient makes it out of the scan room.

COGNITIVE ERRORS

Cognitive errors occur when the radiologist sees an abnormality but fails to render a correct diagnosis by attaching the wrong significance to what is seen, perhaps due to inadequate knowledge, or an alliterative or judgmental error, resulting in overcalls or undercalls.³

COMMUNICATION ERRORS INTRA-SPECIALTY COMMUNICATION

The wrong protocolling of scans due to lack of communication between radiographer and radiologist, and incomplete sonographer’s notes not mentioning real time findings can result in a missed diagnosis.

INTER-SPECIALTY COMMUNICATION

This occurs when the professional caregiver fails to appropriately communicate known information to the radiologist or mixes up patient details, resulting in a misdirected search.

When the radiologist attempts to contact the referring team about unexpected significant findings, the senior doctor may be unreachable, particularly after hours, and information over the phone may also be wrongly interpreted by a junior staff. Appropriate action may be delayed as well.

These are some common issues that are known to contribute to the pitfalls of missed diagnoses in diagnostic radiology. Understanding them can help us work out solutions to the issues faced. ♦

Some strategies to minimise missed diagnoses and discrepancy will be discussed in a subsequent instalment.

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PROFILE



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