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Writing radiology reports in chiropractic

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Radiology reports are an essential component of the patient's permanent chiropractic health record. The available literature contains very few full-length articles addressing this important topic. A discussion of the purpose, structure, and composition of a radiology report is provided. A systematic approach to the evaluation of radiographic studies is also discussed.
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KEY WORDS: Reporting, radiology, chiropractic, radiological interpretation, report structure, radiological diagnosis, manipulation.

Les rapports radiologiques représentent un élément essentiel du dossier chiropractique permanent d'un patient. La documentation disponible contient très peu d'articles de fond sur cet important sujet. Un exposé sur le but, la structure et la composition d'un rapport radiologique est joint. Une approche systématique de l'évaluation de études radiographiques est également traitée.
(JCCA 1990; 34(1): 30–34)

MOTS CLÈ: Rapport, radiologie, chiropractie, interprétation radiologique, structure de rapport, diagnostic radiologique, manipulation.

Reading maketh a full man,
conference a ready man,
and writing an exact man.
– Francis Bacon,
"On Studies"

Introduction

Radiography is a valuable diagnostic tool in chiropractic. When a radiographic study is undertaken, the chiropractor, as a primary contact health care professional, is responsible for everything visible on the radiographs. Although there is a trend in chiropractic to increase the utilization of the chiropractic radiological consultant (DACBR and FCCR), many general practice chiropractors continue to exclusively interpret the radiographs of their own patients.

Radiographic interpretation however, is often inaccurate. A recent study[1] revealed that the most common cause of inaccurate diagnoses in accident and emergency departments was failure to interpret x-ray findings correctly. Pringle's[2] review of the radiographs of 160 injured patients revealed that 7.5% had fractures which were missed initially and subsequently detected upon re-examination of the films at a later date. Other investigators have found that the diagnostic accuracy of x-ray interpretation is only 83% by emergency room physicians and 95% by radiologists.[3]

The health professions continue to debate whether the interpretation and reporting of radiographs should be performed exclusively by radiologists.[4–6] Regardless of this debate, a careful and systematic approach to interpretation and report writing increases diagnostic accuracy.

Purpose of the radiology report

The radiological report is a permanent record of the practitioner's essential radiological observations and impressions. It is an integral component of the patient's permanent health record. In addition, this report is almost always included in correspondence to insurance companies. Yochum and Rowe[8] identify five important reasons for recording radiographic findings in the radiological report:

1. Medico-legal circumstances
2. A standard of comparison with previous or later examination
3. A permanent record if radiographs are lost or not immediately available
4. Communication with other health professionals
5. Expediting the treatment regime by providing a résumé of important indications and contraindications for therapy

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When multiple studies of a single area were performed over a number of years, earlier films were not always available.[9] In these cases, a report on earlier studies is often helpful. A recent study revealed that previous radiology reports provided "significant help" in over 20% of cases and were found to be "useful" in 60% of hospital cases.[10]

Structure of the radiology report

Considering there are over 300 million x-ray examinations performed every year,[11] there is a conspicuous absence of information about how to write radiological reports in the medical literature. Most discussions are editorials[12,13] or letters to the editor.[5,7,9,10,14–16] The chiropractic literature includes at least two discussions on the topic.[8,17]

The standard radiology report (figure 1) is organized according to the following structure:

1 Preliminary information
2 Radiological findings
3 Impressions
4 Recommendations (optional)
5 Signature

1 Preliminary information

Preliminary information is usually provided in a fill-in-the-blank format pre-printed on the practitioner's letterhead. It is information that can be simply arranged in point form. This section should include: the patient's full name, date of study and date of report, and the specific projections taken.

It is also helpful to include the following optional information: technical factors (kV, mAs, FFD) (optional), the file number, the patient's age, the patient's sex, and a brief clinical history and indication for the examination.

2 Radiological findings

The radiological findings section is the "body" of the report. It is a *systematic, descriptive, paragraph-form narrative of the radiographic observations*. It should include a step-by-step sequential evaluation of the films being studied. In this section it is important to describe your observations objectively in descriptive terms.

Do not provide a diagnosis or impression in this section.

One effective approach for evaluating skeletal radiographs, and for arranging your radiological findings, is the ABC's approach.[18] The ABC's is an acronym representing the first letters of each category in a systematic search pattern of radiographs. The ABC's pattern is followed in order to minimize the possibility of overlooking an important finding on the radiographs.

- *A Alignment* – This category includes any measurements of skeletal structures that are applicable. Evidence of spine curvature, scoliosis, deformity, rotation, malposition, deviation, and apparent leg length inequality are identified.
- *B Bone* – The bone category should include a concise description of cortical, medullary and subchondral bone mineralization, trabecular patterns, and overall bone density. The size, shape, and configuration of all bony structures should be considered. Abnormalities such as osteophytes, sclerosis, and lesions are described in this category.
- *C Cartilage* – The cartilage category includes the joint spaces. Abnormalities of symmetry, congruity, joint space loss, widening, or obliteration of the articulations are described in the cartilage category.
- *S Soft tissues* – The soft tissue category is concerned with a wide variety of tissues shadows and structures including the skin, organs, blood vessels, fat pads, calculi, cysts, deposits, calcification, ossification, aneurysms, ligaments, tendons, and capsules. Normal physiological calcification such as in the costal or thyroid cartilage is usually not indicated in the report.

Alignment, bone, cartilage, and soft-tissues are each usually described in separate paragraphs.

3 Impressions

This section of the report represents a *concise, point-by-point summary of the most important radiological findings* based on the narrative descriptions in the radiological findings section of the report.

In establishing the diagnosis of your impression of a particular radiographic abnormality, the first essential step is to categorize pathological processes according to their primary radiological features. Howe[17] utilizes an innovative and functional category system based on the acronym of CATBITES, which allows classification of the full spectrum of skeletal radiological abnormalities. Each letter corresponds to a specific radiographic category:

- *C Congenital* – anomalies and normal variants.
- *A Arthritis* – degenerative, inflammatory, and metabolic.
- *T Tramua*
- *B Blood* – hematological and vascular.
- *I Infection* – suppurative and non-suppurative.
- *T Tumor* – benign, maligant, and tumor-like.
- *E Endocrine* – metabolic, nutritional and endocrine.
- *S Soft-tissues*

It is important to note that certain conditions will fit two or more categories and exact categorization can be difficult. However, include a radiological "diagnosis" if possible. If the diagnosis is equivocal, or if it depends on further clinical correlation, include a list of differential diagnostic possibilities – beginning with the most probable diagnosis.

The impressions are numbered in decreasing order of importance. For example:

Figure 1 Sample radiology report

ABC CHIROPRACTIC RADIOLOGY

123 Main Street, Alta, Alberta TB3 AN9

RADIOLOGICAL REPORT

Patient:	Mary A. Jones
File #:	89001
Age:	71 (Female)
Date of Study:	July 1, 1989
Date of Report:	July 3, 1989
Examination:	Lumbar Spine (A-P, Lateral, Oblique, P-A spot)
Clinical:	Acute thoracolumbar pain after fall in bathtub.

The lumbar spine is hyperlordotic.

Marked osteopenia is noted throughout the lumbar spine and pelvis. An anterior wedge deformity of T_{12} with a 50% loss of anterior vertebral body height is noted. There is no evidence of posterior vertebral body collapse or bony projection into the neutral canal.

All joint spaces appear well maintained.

The soft tissues are unremarkable.

IMPRESSIONS

1. T_{12} compression fracture with 50% decrease of anterior vertebral body height
2. Severe post-menopausal osteoporosis.
3. Lumbar hyperlordosis.

RECOMMENDATIONS

CT scan of the thoracolumbar region should be requested if neurological signs appear clinically.

(Signature)

J. Smith, D.C.

1 Abdominal aortic aneurysm at L4 level measuring nine centimentres in diameter.
2 Mild degenerative joint disease in the left sacroiliac joint.

4 Recommendations

This section is optional. It is an opportunity for the radiologist to recommend further study or to provide specific clinical or therapeutic advice to the treating practitioner. It is not the radiologist's duty to routinely tell the doctor how to treat the patient, however. *The recommendations should be reserved for unusual or complicated cases where something on the x-ray will have a dramatic effect on the patient's outcome*. For example:

1 Technetium bone scan and CT scans of the cervical spine should be ordered to rule-out osteolytic metastasis.
2 The osteolytic defect in the C5 vertebral body represents an absolute contraindication to manipulation.

The recommendation section of the report is also used to suggest methods of improving existing radiographic quality. It is the responsibility of the treating practitioner to follow-up on all recommendations.

5 Signature

Every report must be signed by the author.

General guidelines

The radiological findings represent a detailed, objective decription of the radiographic study. The impressions on the other hand, represent a precise summary of all the important radiological findings (table 1).

It is important for the practitioner writing the report to know the clinical indication for performing the radiographic study. For example, it is important to know if the patient has experienced trauma and that the radiographs were ordered to exclude fracture. However, the author must not include clinical information in the radiological report unless it is unequivocally relevant to something observed on the radiographs or specifically referred to in the radiology requisition.

It is acceptable to write, "There is no evidence of metastatic deposition of the bronchogenic carcinoma in any of the skeletal structures visualized", especially when the radiology requisition specifically requests that metastasis be excluded. Further recommendations can be added in the recommendation section. It is not acceptable to speculate about clinical correlation of radiographic findings such as "The 4 cm short left leg is a common cause of low back pain". Such clinical information belongs in a clinical report.

Revak[16] has compiled an outline for radiology resident teaching which provides several useful suggestions to be incorporated in report writing. Following are excerpts of the main suggestions in his outline:

1 Brevity is the soul of wit. The ideal report states all positive findings and a few pertinent negatives. An excessively long report runs the risk of not being read at all or being read such that the essential information is lost.
2 Use complete sentences in a narrative style. Long sentences with complicated internal structure are to be avoided.
3 Use as many paragraphs as necessary to cover successive thoughts. Paragraphs should be used to separate pathologic and normal findings, or discussion of different organ systems.
4 Use present tense for what is on the film. Use past tense for what was done at the time of examination.
5 Minimize the use of the phrase "There is" at the start of sentences. Rather than say "There is [generalized osteopenia of the lumbar spine]" simply say the "[lumbar spine is osteopenic]".
6 Demonstrate that you have read the requisition. If a request is made to exclude osteomyelitis, the report should state specifically whether or not osteomyelitis is present.

Table 1 Correlation of radiological findings and impressions in radiology reports

ABC's Category	Radiological findings	Impressions
Alignment	A right convex curve is present from T_1 to T_{12} with an apex at T_6 measuring 32 degrees by the Cobb method.	32 degree right thoracic idiopathic scoliosis.
Bone	A 4 cm, circular, geographic radiolucency encapsulated by a dense rim of sclerosis with a homogenous matrix appears in the right intertrochanteric region of the right femur.	Geographic radiolucent lesion in the proximal right femur characteristic of benign monostotic fibrous dysplasia. Other differential possibilities are unlikely but include lesions such as enchondroma, giant cell tumor, intraosseous lipoma, and non-ossifying fibroma.
Cartilage	Bilaterally symmetrical, uniform joint space loss involving the radiocarpal, metacarpophalangeal, and proximal interphalangeal joints.	Rheumatoid arthritis.
Soft-tissue	A homogenous, well-defined 3 mm × 8 mm calcific density is identified adjacent to the superior margin of the greater tubercle of the left humerus.	Hydroxyapatite deposition disease of the left rotator cuff tendon. (Calcific tendinitis).

7 Vary the wording of your reports.
8 State the most important findings first. They are less likely to be missed on the chart if this is done. Incidental observations should be made last.
9 Use inductive logic. State observations first and conclusions last.
10 In complicated cases, a discussion may be necessary. This is usually included in the body of the report, but also may be included in the impressions.
11 Some incidental observations are worth reporting and others are not. Experience will help to determine which is which.
12 State your degree of certainty. It should be clear whether the diagnosis or impression is definite, possible, suspected, or equivocal. The number of differential diagnostic possibilities will vary inversely with the degree of certainty.
13 Quantify those measurments that can be stated in centimetres or degrees. In cases where measurement is not appropriate, use modifiers such as slight, moderate, or severe.
14 Avoid using purely radiologic terms in a report. Substitute appropriate descriptive words where possible. [Rather than use increased Ferguson's angle, state that there is a 60 degree lumbosacral base angle.]
15 Avoid a tale of woe. If a study fails for any reason, state the fact in one sentence and go on to the next report.

Some authors[10] have recommended the use of standard forms that utilize a check-list system in order to save time in dictation and typing. The report form method is not widely utilized however. Many automated and computerized dictation devices are now available to save time in dictation and typing, but the same principles apply to automated report writing as to traditional report writing.

Before reports are signed, they should be thoroughly proof-read. Hunter[15] recently reported that 13.7% of a series of 504 dictated radiology reports contained errors ranging from minor typographical errors to major errors in dictation or transcription, which confused findings of one report with those of another. Not only does proof-reading eliminate many errors, it also encourages brevity.

Finally, all reports should be typewritten, clear, concise, coherant, and above all, precise.

Conclusion

Radiology reports in chiropractic are an essential component of the patient's permanent health record. They serve several purposes such as: medico-legal communication; a standard of comparison with other studies; a permanent record in the case of lost radiographs; communication with other health professionals; a means of expediting the treatment regime; and a method to assist in formulating an accurate and precise diagnosis. The standard report format includes: preliminary patient and radiographic information, radiological findings, impressions, recommendations (optional), and the author's signature. The report is based on an orderly, systematic evaluation of the skeletal radiographs including observation of alignment, bony structures, cartilage and joint spaces, and soft-tissue shadows. An impression or a differential diagnosis is provided based on the objective radiological findings. In most cases, it is essential to correlate history, clinical examination and laboratory findings to confirm the diagnosis.

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