



## Standards for Radiography of the Cervical Spine in Children and Adults

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### I. INTRODUCTION

Radiography of the cervical spine is a proven and useful initial procedure for evaluation of the cervical vertebra, disk spaces, bony neural foramina, and prevertebral soft tissues. This standard outlines the principles for the performance of high-quality cervical spine radiography.

All radiographic examinations should be performed in accordance with the Canadian Association of Radiologists Standard for General (Plain) Radiography.

### II. GOAL

The goal of radiographic examination of the cervical spine is to identify or exclude anatomic abnormalities or disease processes of the cervical spine.

### III. INDICATIONS

Indications for radiography of the cervical spine include, but are not limited to:

1. Trauma to, or potentially involving, the cervical spine.
2. Neck Pain.
3. Shoulder or arm pain suspected to result from radiculopathy.
4. Current or prior surgery of the cervical spine.
5. Evaluation of cervical spine abnormality seen on other imaging studies.
6. Spondyloarthropathy.
7. Populations at high risk of cervical spine abnormality (e.g. Down Syndrome, certain skeletal dysplasias) either for purposes of screening or for those patients with neurologic signs or symptoms potentially related to a cervical spine abnormality, for consideration of new physical activities that may involve excessive neck motion, or for those patients undergoing intubation for general anesthesia.
8. Suspected congenital abnormality of the cervical spine.
9. Evaluation of primary and secondary malignancy.
10. Follow-up of previous cervical spine abnormality.
11. Arthritis.

### IV. SPECIFICATIONS OF EXAMINATION

A. Cervical Spine Examinations in Adults should include the entire cervical spine from the craniocervical junction to the superior end plate of T1.

1. A standard examination includes anteroposterior (AP) and lateral views.
2. When assessment of neural foramina is necessary, oblique views should be obtained.
3. Ideally, the lateral view should include the entire cervical spine from the craniovertebral junction to the superior end plate of T1. This is mandatory in the assessment of trauma patients and the "Swimmers" lateral view should be performed if necessary to assess C7-T1 alignment. It may be omitted for certain clinical indications such as the assessment of degenerative disc disease.
4. The "open mouth odontoid view" is mandatory in trauma patients and the assessment of C1-2 instability. It may be omitted for certain clinical indications such as the assessment of degenerative disc disease.
5. In cases of trauma with significant clinical suspicion of cervical fracture (patient immobilized), cross-table lateral, AP, and odontoid (if cooperative patient) views should be taken and reviewed prior to moving the patient for further examination.
6. Current evidence suggest that appropriately selected trauma patients should undergo screening by helical CT of the C-spine rather than routine radiography.

#### B. Cervical Spine Examination in Infants and Children

1. In the pediatric population, AP, odontoid, and lateral radiographs are usually sufficient for most clinical indications of cervical spine imaging.
2. For infants and very young children, only AP and lateral radiographs without a specific odontoid projection may be adequate depending on the clinical indication for the examination. In the event that open mouth odontoid or oblique views in younger children cannot be obtained due to lack of cooperation, the decision to obtain additional imaging such as a computed tomography (CT) scan should be based on clinical suspicion for fracture or malalignment.

#### C. Examination of Pediatric Patients at High Risk for Cervical Spine Instability (e.g. Down Syndrome)

1. Lateral radiographs of the cervical spine centered at the craniocervical junction are taken in two positions: active flexion and active extension. No passive or forceful efforts at positioning should be attempted though some restraint of the uncooperative pediatric patient may be necessary. The radiographs should include the clivus and the cervical spine to the superior end plate of T1.
2. Analysis of the radiographs for atlanto-occipital and atlantoaxial instability should be performed.

#### D. Limited Cervical Spine Examination

For some clinical indications (e.g. intraoperative, follow-up cervical fusion), a limited examination will provide sufficient information, while limiting patient radiation exposure.

#### E. Additional Evaluation

1. Flexion-extension lateral view: When assessment of cervical instability is necessary, lateral views in flexion and extension can be obtained. When the patient is capable, he/she should be solely responsible for head movement while these views are obtained. In the unconscious or uncooperative patient, physician supervised assisted movement or videofluoroscopy may be helpful.
2. Articular pillar (facet) views: These angled oblique views should be considered if a facet fracture is suspected on the initial examination.
3. Based on the clinical assessment and/or evaluation of the radiographs, further examination of the cervical spine with CT or magnetic resonance imaging (MRI) scanning may be indicated.

#### F. Quality Control

1. The examination should completely demonstrate the entire cervical spine, or the levels of clinical interest in a limited exam.
2. If prior cervical spine films are available, they should be compared.

### V. RADIOLOGIST QUALIFICATIONS

Physicians involved in the performance, supervision and interpretation of radiography of the cervical spine should be Diagnostic Radiologists and must have a Fellowship or Certification in Diagnostic Radiology with the Royal College of Physicians and Surgeons of Canada and/or the Collège des médecins du Québec. Also acceptable are equivalent foreign Radiologist qualifications if the Radiologist is certified by a recognized certifying body and holds a valid provincial license.

## REFERENCES

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