

Clinical Study

The utility of routine postoperative radiographs after cervical spine fusion

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Abstract

BACKGROUND CONTEXT: The senior author (JAG) recently published an article questioning the utility of routine postoperative radiographs after lumbar spine fusion. That study concluded that routine postoperative radiographs in the presence of a normal physical examination rarely change the clinician's management of these patients. Our aim was to repeat this protocol in patients after cervical spine fusion. We hypothesized that routine postoperative radiographs are unnecessary in most cases after cervical spine fusion.

PURPOSE: The purpose of this study was to determine the usefulness of routine postoperative cervical spine radiographs after cervical spine fusion as to whether they help to guide clinical decision making within the first postoperative year.

STUDY DESIGN: This is a retrospective chart review of 383 patients who underwent a cervical spine fusion over a 5-year period. Seven different surgeons performed the cervical spine fusions. Our review assessed a total of 1,155 postoperative clinic visits.

METHODS: Each clinical postoperative visit was reviewed. The history and exam were graded as either normal or abnormal, and any plain radiographs obtained were graded similarly as either normal or abnormal. Each patient's notes were followed up to 1 year postoperatively. Each patient had to have at least two postoperative visits with X-rays to be included in the study. We then noted any further action taken by the clinician based on the appearance of the radiograph in conjunction with the history and exam.

RESULTS: In patients with normal history and exam presentations, further action was taken only 5/879 (0.57%) of the time, sometimes even in the presence of abnormal radiographs. The actions included two surgical revisions, two prolongations of cervical collar immobilization, and one patient who underwent a flexion/extension radiographic evaluation and subsequent prolonged cervical collar immobilization. There were 276 visits with abnormal history and exam; of these, 34/276 (12.3%) had abnormal X-rays. Of the clinic visits with abnormal history and exam and abnormal X-rays, 15/34 (44%) went on to revision.

CONCLUSIONS: Routine postoperative radiographs after cervical spine fusion rarely appear to be of value when patients present with a normal history and exam and may expose patients to unnecessary diagnostic studies and expenses. Patients exhibiting a normal postoperative history and exam are likely to have no further additional action taken in the presence of either normal or abnormal radiographs. © 2013 Elsevier Inc. All rights reserved.

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Cervical spine; X-rays; Postoperative care

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Introduction

Cervical spine fusion via an anterior, posterior, or combined approach with concomitant decompression as indicated reliably alleviates symptoms from radiculopathy/myelopathy and can impart stability after trauma or destabilizing cervical spine lesions [1–8]. It is a standard protocol for many spine surgeons to obtain routine postoperative radiographs at distinct intervals (typically at 2 and 6 weeks, 3 months, 6 months, and 1 year

postoperatively) whether or not the patient is symptomatic. The rationale for obtaining routine postoperative X-rays is threefold: they give the surgeon and patient piece of mind that the patient is healing and the surgery was a success; so that asymptomatic/symptomatic hardware migration or failure may be identified; and routine surveillance radiographs may help to protect the physician from liability via documentation of the patient's clinical status in the medical record.

The senior author (JAG) concluded in a study that routine postoperative radiographs after lumbar spine fusion almost never altered the course of treatment [9]. There has not been, to our knowledge, an investigation into the necessity of obtaining routine postoperative radiographs after cervical spine fusion for one or more levels. By assessing the utility in decision making of such routine imaging in postoperative decision making, physicians may avoid exposing the patient to unnecessary charges and radiation.

Materials and methods

On approval by our institutional review board, we began a retrospective chart review of 686 patients who underwent cervical fusion for any reason between January 1, 2002, and December 31, 2007 (Table 1). For inclusion into this study, patients had to be a minimum 18 years of age and have at least two postoperative visits with radiographs within 12 months after the index procedure. This narrowed our cohort to 383 patients, totaling 401 procedures including 18 revision surgeries (2 on the same patient) with an average of 3 postoperative visits. We included patients who had undergone anterior cervical fusion, posterior fusion, or combined anterior/posterior fusion. Procedures were performed by a total of seven surgeons: six neurosurgeons and one spine fellowship-trained orthopedic surgeon. One hundred ninety-nine patients were men and 184 patients were women. Patient ages ranged from 18 to 84 years, and the numbers of fused levels were from 1 to 6. An anterior-only approach alone was used 350 times, 40 through a posterior approach only, and 10 via a staged anterior and posterior approach (Table 2).

A senior-level orthopedic resident with the assistance of a medical student reviewed each postoperative clinic visit note. A qualifying clinic visit was defined as having a history and exam as well as an anterior-posterior and lateral X-ray of the cervical spine. The history and exam were determined to be either normal or abnormal based on the clinician's interpretation of the patient's symptoms. A normal history and exam (H/E NL) included only findings that were deemed appropriate during the course of recovery. An abnormal history and exam (H/E NOT) was defined as pain greater than would be expected by the clinical situation or an unresolved or new onset neurologic deficit.

The radiographs were also reviewed and graded according to the clinician's note (or the radiologist's interpretation if the clinician did not comment on the X-ray) as normal

EVIDENCE & METHODS

Context

Postoperative radiographs are commonly obtained at follow-up visits after cervical fusion.

Contribution

Based on this retrospective review, the authors found that only 5 of 879 patients with normal history and physical exams at follow-up visits had abnormal X-ray findings (displacement of graft, plate, or pseudarthrosis) requiring action on the part of the treating surgeon (revision surgery, prolonged brace use).

Implication

The findings are interesting and suggest changes in current common practice. However, any change would have to consider gradual failure of graft and/or instrumentation that remains asymptomatic until catastrophic failure and catastrophic morbidities occur (a "threshold" phenomenon). What is the rate of these uncommon events? What rate is acceptable to miss? Are there particular clinical circumstances (eg, infection, tumor, deformity) with greater risk of progressive asymptomatic failure?

—The Editors

(X-ray NL) or abnormal (X-ray NOT). Abnormal radiographic findings included failure of fixation, increasing listhesis/kyphosis, motion between fused segments, or any change from the baseline postoperative X-ray. We then determined whether or not the clinician took action based solely on the appearance of the routine radiographs (meaning did the clinician change management of the patient if they had a normal exam but an abnormal routine X-ray), such as additional imaging or reoperation. Chi-square analysis was used to analyze the data.

Results

The clinic notes of 1,155 visits were reviewed and graded. A total of 879 visits were graded as H/E NL and 276 visits were graded as H/E NOT. Radiographs were graded as X-ray NL for 1,090 visits and as X-ray NOT in 65 cases.

These data were organized into four categories (Table 3). No action was taken 100% of the time, when clinic visits

Table 1
Pathologic condition leading to fusion

Pathology	No. of patients
Degenerative	302
Traumatic	70
Other	11

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