Perioperative X-Rays in Arthroplasty Surgery

Outcome and Cost

C. J. Lavernia, MD, R. A. Hernandez, MD, and J. A. Rodriguez, MSME

Abstract: Numerous legislative proposals to cut reimbursement to surgeons and hospitals are presently included in U.S. congressional and senate agendas. Perioperative x-ray films in arthroplasty surgery are standard operating procedure. Our objective was to assess the effects of the radiologist reading on the clinical and economic outcome of arthroplasty procedures. One hundred consecutive cases were prospectively studied. The radiologist reading, clinical management, and outcome of each case were carefully reviewed. The amount billed for the radiologist interpretation was noted for each examination. A total of 398 studies in 100 patients were done. Ninety-six preoperative, 110 intraoperative, and 192 postoperative radiographic studies were reviewed. These reports took an average of 1.71 days to be recorded on the chart (SD ± 2.45). The total radiologic professional fees billed to Medicare in these cases was $11,054. (The radiologist's interpretation was not useful in the clinical management and did not affect the outcome in any case.) Assuming that each surgeon takes 1 x-ray film on every arthroplasty case, the total actual savings to Medicare of not having a radiologist reading these studies could reach $536,000 per year; if 2 intrahospital x-ray studies are performed per procedure (preoperative, intraoperative, or postoperative), the savings are $1.1 million per year. These cost reductions are achieved at no sacrifice to quality of care or outcome. Numerous areas of excessive spending with no improvement in outcome exist in the treatment of Medicare patients. There areas should be identified and eliminated before surgical fees are lowered even further. Key words: arthroplasty, x-rays, cost, radiologists, economics.
Methods

One hundred consecutive cases done by the senior author (C. J. L.) were prospectively studied. All patients reported to the hospital’s preadmission area a week before the procedure as part of a clinical pathway. Physical examination, laboratory studies, and a prosthetic series were done on all patients for templating and surgical planning. Intraoperative and postoperative x-rays were done on all arthroplasty cases.

The medical charts were carefully reviewed, and the number and type of x-ray performed were noted. A paper chart review was accomplished by careful analysis of the intrahospital documentation. In addition, our hospital’s automated computerized radiology dictation system allows documentation of the exact time that the x-ray was done, the time the report was dictated, and the exact time that the record was transcribed. The posting of the report within the hospital’s information system was recorded on the time to chart. The radiologist reading was carefully reviewed. The clinical management in each case was carefully analyzed. Length of stay, charges, and diagnostic studies were noted.

Short-term outcome was defined as any increase in length of stay, charges, diagnostic studies, or consultations that were the direct result of findings noted in the radiologist reading not present in the progress notes or the dictated summaries before the dictation being available for the clinician in the hospital’s information system. Potential examples of outcome variability as the result of radiologist reading include incidental findings of periprosthetic fractures, foreign bodies left in the patient, or any type of lesion that required further diagnostic studies or consultations.

X-ray readings were classified as descriptive, nondescriptive, or containing technical errors (Table 1). Descriptive x-ray films were those in which the device as well as location of the device was carefully noted. Nondescriptive x-ray films were general descriptions such as “total hip replacement in place.” Technical errors included calling a total hip arthroplasty a hemiarthroplasty or using incorrect nomenclature for the implants. The current Medicare reimbursement rate as well as the amount of dollars billed and the average collected by the radiologist interpretations was noted for each examination.

Results

A total of 398 studies in 100 patients were done. Ninety-six preoperative, 110 intraoperative, and 192 postoperative radiographic studies were reviewed. The total actual reimbursement by Medicare for the professional reading of these studies was $4,044.00. The average time it took the report to get to the chart was 1.71 (SD 2.4) days. The radiologist interpretation did not affect the clinical management or outcome of any of the cases. Careful review of the radiologist’s wording in each of the cases demonstrated no additional findings that required subsequent diagnostic studies or an additional clinical consultation.

Discussion

In this era of cost containment, healthcare interventions that have no effect on the final outcome should be the target of budget cuts. Radiologist interpretations of perioperative x-ray films have been the subject of numerous investigations [1,3,5,6,10]. Hillman et al. [7,8] reported on the utilization and charges for outpatient diagnostic imaging in a Medicare population. They concluded that physicians that own the x-ray equipment perform more and charge more for the imaging modalities than the radiologists [8]. Their study suggested that third-party payors restrict or eliminate payments to nonradiologists who provide radiographic services. Most of their findings, however, are applicable only to the outpatient setting.

Several studies have addressed the issues of in-hospital interpretation of x-ray films. Clark et al. [5] studied all hospital radiographs in a local community hospital in St George, Utah, from 1992 to 1993. In their report, description of fracture alignment displacement and type of implant were noted to be poorly described [5]. The radiologist’s written report did not change the clinical outcome or the management of the patient in any of the cases. DeAraujo et al. [6] studied 300 fracture follow-ups in which the radiologists’ as well as the orthopedists’ reports were compared. They concluded that there was no evidence to support the need of a radiologist’s interpretation on fracture follow-up. Bosse et al. [1] in a retrospective study reviewed 50 patients admitted to a trauma unit. They found that the orthopedist was able to review and interpret the radiographs

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immediately with 100% accuracy. The radiologist interpretation included only 67% of the radiographs with a 95% accuracy rate. The radiologist interpretation in this study had no impact on patient care and was delayed in getting to the chart by 5.6 days.

Our data closely agree with the results reported previously. The average delay for the report to arrive in a chart was 1.71 days. In addition, for our patients, the radiologist interpretation was not useful in the clinical management, and it did not change the outcome of any case. The amount reimbursed for the reading of our patients' x-ray films was $4,044.00.

Verveli et al. [11] studied 222 consecutive arthroplasty patients. They concluded that 1 series of routine inpatient postoperative total joint arthroplasty x-ray films was all that was needed to assess the results of the procedure. Although they did not make any conclusions in terms of the radiologist interpretation, they stated that the patient management decisions were not affected by the radiologist report and that the reports were often received in the office after the patient had been discharged. In their particular institution, the radiologic consultation is a global one, and the reading charges are included in the total fee. In our institution, similar to most hospitals in the United States, the radiologists bill separately for interpretation of the x-ray films taken in the hospital.

The large number of x-ray films taken in our patient cohort could be the subject of criticism. The principal utility in most of these intrahospital x-ray films at our institution is purely instructional. After the operating room experience, our team carefully reviews the x-ray films. The position of the implants on the radiograph is correlated to the clinical intraoperative situation. In most community hospitals, the same number of x-ray films would probably be wasteful and are probably not warranted. In addition, preoperative films on patients that were seen 2 to 3 weeks before surgery probably do not need to be repeated. In our institution, because of the nature of some of our clinics, x-ray films taken before surgery are never at the hospital at the time of surgery.

In the United States, 500,000 arthroplasties are done yearly. Assuming that each surgeon takes only 1 x-ray film on every arthroplasty case, the savings to Medicare of not having a radiologist interpret these studies is $536,000 per year. If 2 x-ray studies are done per case (an admission, preoperative, intraoperative, or postoperative), the savings are $1.1 million. These cost reductions are achieved at no sacrifice to the quality of care or any type of potential adverse change and outcome. In this era of cost containment, eliminating the reading charges would not affect the outcome and would yield significant yearly savings.

**Conclusion**

Radiologist interpretations of in-hospital x-ray films in arthroplasty surgery had no effect on the outcome of the surgical intervention in the management of our patient cohort.

**References**