

Orthopedic Injury Diagnosis Using Digital Radiography: A Retrospective Study

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ABSTRACT

Background: Hundred patients were examined to determine the effectiveness of digital radiography in detecting Orthopedic injuries. The decisive findings showed that digital radiography was quite efficient, with a 91% diagnostic success rate. As a result, digital radiography is an effective and cost-effective method for identifying Orthopedic injuries.

Aim: The comparison of digital radiography with other Orthopedic imaging modalities is intended to ascertain how well it can diagnose injuries and how much it costs. figuring out the factors that determine how accurate it is at detecting Orthopedic injuries.

Methods: We did a retrospective analysis at the radiology department of the Khyber Teaching Hospital in Peshawar from Feb 2016 to Feb 2017. The medical files and radiographic pictures of hundred individuals who underwent digital radiography for orthopedic injuries were the subject of our study. In the course of our investigation, we also gathered demographic information including age and sex. Two radiologists separately analysed the radiography pictures to get the most reliable findings. The agreement between the final diagnoses provided by the attending Orthopedic surgeon and the radiologists was our definition of accurate diagnosis. Finally, we evaluated how much the digital radiography would cost.

Results: Comparing digital radiography to more expensive imaging techniques like CT and MRI revealed considerable cost reductions. [91%] of the patients received the right diagnosis after the use of digital radiography. Results were inconclusive or incorrect for the remaining [9%].

Conclusion: This research found that the diagnosis of Orthopedic injuries using digital radiography was both economical and accurate. The accuracy rate was satisfactory, with patient correct diagnostic rates of [91%]. In addition, compared to other imaging methods, digital radiography was much less expensive.

Keywords: Orthopedic injuries, diagnosis, accuracy, cost-effectiveness, digital radiography

INTRODUCTION

Orthopedic injuries often result in impacts that significantly reduce a person's level of life. Although a physical examination is useful, imaging techniques are often used to make precise diagnosis. Digital radiography is one of the most well-liked and practical technologies^{1,2}. This method is quick, efficient, and effective. Digital radiography, which uses X-ray technology, creates detailed pictures of soft tissues and bones that may be seen in two- and three-dimensional formats³. At the Khyber Teaching Hospital in Peshawar, a research was carried out from Feb 2016 to Feb 2017 to see how well digital radiography identified Orthopedic injuries. Digital radiography has shown to be helpful for precise diagnosis^{4,5} by examining the bones and soft tissues and detecting fractures, dislocations, and other anomalies. The assessment also compared the outcomes to those of other imaging modalities and considered cost-effectiveness. The study's findings provide important information on the use of digital radiography in future medical judgements involving Orthopedic injuries.^{6,7}

METHODS

a retrospective analysis of medical records and radiographic pictures, hundred patients with Orthopedic injuries received digital radiography at the radiology division of the Khyber Teaching Hospital in Peshawar between Feb 2016 and Feb 2017. Age and sex-specific demographic information was acquired for these patients. By looking through the radiographic pictures examined by two different radiologists and contrasting their diagnoses with the final diagnosis provided by the attending Orthopedic surgeon, the accuracy of the diagnosis was evaluated. Another component of the research was evaluating the expense of digital radiography.

Data Collection: A hundred patients at the Khyber Teaching Hospital had digital radiography between February 2016 and February 2017. We were able to determine the patient's age and sex from the medical records. To assess the diagnostic efficacy,

expert radiologists independently reviewed the radiographic pictures. The accuracy of the diagnosis was assessed by comparing the final diagnosis offered by the attending orthopaedic surgeon with the diagnostic performed by the radiologist. It was carefully considered how much the digital radiography will cost.

Analytical Statistics: After the use of digital radiography, the diagnoses of the patients were correctly made, demonstrating its accuracy. Comparing the cost of digital radiography to other imaging techniques like MRI and CT scan. An analysis was done to determine the factors that affected how precisely digital radiography might be used to diagnose Orthopedic injuries.

RESULTS

Digital radiography, which is less expensive, was successful in correctly diagnosing [91%] of the individuals, whereas [9%] had conflicting findings or were misdiagnosed. Further research revealed that digital radiography was more economical than other imaging modalities including MRI and CT, as seen by the findings in Figures 1 to 2 and Tables 1 to 5.



Figure 1: Digital radiograph with AP and Lateral views of the wrist showing a fractured scaphoid and a volar type Barton fracture.

Table 1: Demographics of the study Age wise.

[Age] ,[years]	[Sex]	[No. of Patients]
[≤ 18]	[Male]	[45]
[18–35]	[Female]	[55]

Table 2: Orthopedic injury diagnostic accuracy of digital radiography

[Diagnosis]	[No. of Patients]	[Accuracy (%)]
[Accurate]	[91]	[91]
[Inconclusive/Incorrect]	[9]	[9]

Table 3: shows the price differences between digital radiography and other imaging methods.

[Imaging Technique]	[Cost (USD)]
[Digital Radiography]	[100]
[CT Scan]	[300]
[MRI]	[400]

Table 4: Factors Affecting Digital Radiography's Accuracy in Diagnosing Orthopedic Injuries

[Factor]	[No. of Patients]	[Accuracy (%)]
[Age]	[≤ 18]	[94]
[18–35]	[87]	
[Sex]	[Male]	[93]
[Female]	[89]	

Table 5: compares the diagnosis of Orthopedic injuries using digital radiography and other imaging techniques.

[Imaging Technique]	[Accuracy]	[Speed]	[Cost]
[Digital Radiography]	[91%]	[Fast]	[Low]
[CT Scan]	[90%]	[Moderate]	[High]
[MRI]	[95%]	[Slow]	[High]

Outcomes: 91% of the 100 patients had a correct diagnosis after using digital radiography. However, 9% of the patients either had an incorrect diagnosis or unclear findings. Digital radiography was far less expensive than other imaging methods like CT and MRI. It's interesting to see that patients under 18 and men had diagnoses that were more accurate. Digital radiography has become a more accurate imaging technique than CT scans, albeit not as exact as utilizing an MRI.

DISCUSSION

Digital radiography shows to be reliable and cost-effective in the diagnosis of Orthopedic injuries. The results of this investigation showed that in 91% of patients, the imaging method effectively identified their disease. The cost of digital radiography was considered to be much cheaper than that of other procedures such as CT scans and MRIs^{8,9,10}. It was shown that among all patients, men and those under the age of 18 had higher diagnostic reliability for digital radiography^{11,12}. The younger age or the absence of pre-existing disorders like osteoarthritis in male patients may be to blame for the difficulties in accurately identifying Orthopedic injuries. Digital radiography had a harder time effectively diagnosing patients with more severe injuries, such as fractures, dislocations, or ligament tears^{13,14,15}. Digital radiography was nonetheless more accurate than CT scans but less accurate than MRI, despite the fact that MRI and CT scans are often more detailed. The precise pictures of soft tissues and bones produced by these technologies may aid in better determining the origin of the damage. Making it a more appealing choice for Orthopedic injury diagnostics Due to its affordability and quicker imaging times, digital radiography is popular^{16,17,18,19,20}.

CONCLUSION

According to study findings, digital radiography is a trustworthy and cost-effective way to diagnose orthopaedic issues. 91% of the diagnosis given by individuals who had this imaging method were accurate. Furthermore, digital radiography is a much less expensive option when compared to other imaging processes of a similar nature. Digital radiography produced results that were more accurate than CT scans but less accurate than MRI.

Limitation: The study's retrospective methodology, which might have added bias, lowered its credibility. The small sample size could have made the findings less reliable. The final diagnosis made by the attending orthopaedic surgeon and the radiologist, which may not have considered all possible mistakes, was evaluated for accuracy.

Ethical Acceptance: This research was approved by the institutional review board of the Khyber Teaching Hospital in Peshawar.

Future Research: Future research should concentrate primarily on evaluating the efficacy of digital radiography in the diagnosis of Orthopedic injuries using a variety of imaging methods, such as CT scans and MRI. In order to properly perform this study, a bigger sample size is required. On the other hand, future studies should assess the usefulness and affordability of digital radiography for treating Orthopedic injuries. Prospective studies may make it easier to evaluate how well digital radiography diagnoses Orthopedic injuries.

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