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ORIGINAL ARTICLE

Evaluation of Lumbar Spine Injuries on Computed Tomography

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ABSTRACT

Objective: To use computed tomography to examine the findings of lumbar spine trauma.

Material and methodology: This cross-sectional study which was performed with a sample size of 50 patients in 6 months from October-2022 to march-2022 calculated via a convenient sampling technique by taking the mean from previously published studies. This study was carried out at 3 private hospitals in Sialkot, Pakistan after informed consent. Data were statistically analyzed using SPSS version 20. Frequency and percentages were mentioned.

Results: Mostly patients were male 27(54%) and the least number of patients were females 23(43%). The most frequent age group was 55-65 years15 (30%). The most frequent weight was 66-75kg 20(40%) and the lowest weight was 46-55kg 8(16%). There is a high risk of lumber spine trauma in overweight patients. The most frequent type was simple 30(60%) and the least type was comminuted 5(10%). the most frequent findings were mild 30(60%) Single vertebral fracture 36(72%) is most common. L1 12(24%) was most common affected.

Conclusion: Males have a higher incidence than females, with males. Vertebra number one is more influenced than the others in terms of the number of affected vertebrae. Simple fractures are the most common type of fracture. CT examination is best for evaluating lumbar spine injuries.

Keywords: Computed tomography, Lumbar, Spine, Trauma

INTRODUCTION

Ever since its introduction in 1972, computed tomography (CT) has grown in importance as a diagnostic tool in modern medicine.[1] CT use in Europe and Asia has increased significantly.[2,3] Both the technologic and clinical aspects of medical imaging have changed dramatically.[4] In the radiology department, innovation has become frequent, and there is the emergence of new concepts, approaches, and procedures, along with improvements to existing approaches.[5] The ultimate goal of these improvements is to obtain the most accurate diagnostic data while also enhancing the quality.[6] Radiography, fluoroscopy, and computed tomography are the three forms of x-ray exams.[7] Computed tomography is one such discovery that has become renowned as a revolutionary method in medicine.[8] A revolving x-ray source and detector array are used in computed tomography.[9,10] Fixed pictures can be reconstructed in any anatomical plane—coronal, sagittal, transverse, or oblique—by collecting a large amount of data.[11]

Trauma is the main cause of death, with lumbar spine injuries being one of the most common.[12] Because such patients frequently have an unusually extended stay in the hospital and seek discharge to a long-term care facility, the lumbar spine has a high psychosocial and economic burden.[13] Everyone of any age can be affected by lumbar spine problems.[14] Because of their high-risk lifestyles, people between the ages of 15 and 24 have been particularly vulnerable.[15] Lumbar stenosis affects both young children and people over the age of 70.[16,17] Falls in the home are the most common cause of harm in newborns and the elderly.[18] Another prominent consequence is the violent shaking of children or the elderly.[19] Automobiles accidents are the greatest causes of injury in teenagers and adults, although injuries sustained during violent crimes and road traffic accidents are also significant contributors.[20] For patients with a severe lumbar spine injury or unstabilized multiple organ injury, computed tomography scanning of the lumbar spine remains the most helpful imaging examination.[21]

In a variety of medical specialties, cross-sectional photographs are employed for diagnostic purposes.[22] Due to a CT system scarcity, there has been an increase in the number of lumbar spine injury patients.[23] The accessibility of CT scans in hospitals, particularly those near highways, aids in the assessment of lumbar spine injuries and reduces the amount of time spent transferring patients from distant locations.[24] Furthermore, conventional radiography is unable to accurately detect lumbar spine damage.[25]

The purpose of this study is to demonstrate the potential impacts of lumbar spine injury, as well as the necessity of computed tomography imaging in routine and emergency units. CT scanning is a type of imaging that employs computer-processed x-rays to create tomographic images of specific parts of a scanned item, allowing the user to view what's inside without having to cut it apart. From a large number of two-dimensional radiography images taken around a single axis of rotation, digital geometry processing is utilized to create a three-dimensional image of the inside of an item.

METHODOLOGY

This is a cross-sectional study that was performed with a sample size of 50 patients in 6 months from October 2021 to March 2022 calculated via a convenient sampling technique by taking the mean from previous related studies.[3,17,10] Patients who were selected presented to the ultrasound department of the private hospital in Gujrat, Pakistan This study included a random sample of 50 individuals with a clinical diagnosis of lumbar spine injury who was sent to CT and ranged in age from 10 to 70 years after verbal agreement from patients, were included. Pregnant females in the 2nd and 3rd trimesters were excluded. Toshiba dual spiral CT, Siemens, and GE high-speed dual CT were employed in this investigation. Data were statistically analyzed with SPSS version 28. Graphs and tables were used for data summarization.

RESULTS

In table 1 the frequency distribution of the sample's gender is shown. Mostly patients were male 27(54%) and the least number of patients were females 23(43%).

Table 1: Frequency distribution of gender of patients

		Frequency	Percent
Gender	female	23	46.0
	male	27	54.0
	Total	50	100.0

In table 2 frequency distribution age groups of the sample is shown, the most frequent age group was 16-25 years 13(26%) and 5-65 years15(30%) and the lowest frequency was 26-35 years 2(4%) & >65 years 2(4%).

Table 2: Frequency distribution of age groups of patients

		Frequency	Percent
Age Groups	16--25 years	13	26.0
	26-35 years	2	4.0
	36-45 years	9	18.0
	46-55 years	9	18.0
	56-65 years	15	30.0
	>66 years	2	4.0
	Total	50	100.0

In table 3 frequency distribution of weight of the sample is shown, the most frequent weight was 66-75kg 20(40%) and the lowest weight was 46-55kg 8(16%). There is a high risk of lumber spine trauma in overweight patients.

Table 3: Distribution of frequency weight of patients

		Frequency	Percent
Weight of patients	46-55	8	16.0
	56-65	12	24.0
	66-75	20	40.0
	76-85	10	20.0
	Total	50	100.0

In table 4 frequency distribution of type of fracture in the sample is shown, the most frequent type was simple 30(60%) and the least type was comminuted 5(10%). Simple fracture is more common among other lumbar spinal fractures.

Table 4: Distribution of frequency of the type of fracture

		Frequency	Percent
Type of Fracture	complex	15	30.0
	simple	30	60.0
	comminuted	5	10.0
	Total	50	100.0

In table 5 frequency distribution of severity of fracture in a sample is shown, the most frequent findings were mild 30(60%)

Table 5: Frequency distribution of severity of the fracture

		Frequency	Percent
Severity of fracture	mild	30	60.0
	moderate	10	20.0
	severe	10	20.0
	Total	50	100.0

Table 6 shows the site of fracture. Single vertebral fracture 36(72%) is most common.

Table 6: Frequency distribution of site of fracture

		Frequency	Percent
Site of fracture	one site	36	72.0
	more than one site	14	28.0
	Total	50	100.0

Table 7 shows the affected lumber vertebra. L1 12(24%) was most common affected.

Table 7: Distribution of frequency of affected lumbar vertebra

		Frequency	Percent
Affected lumbar vertebra	L1	12	24.0
	L1 & L2	3	6.0
	L2	2	4.0
	L2 & L3	3	6.0
	L3	5	10.0
	L3 & L4	6	12.0
	L4	5	10.0
	L4 & L5	7	14.0
	L5	7	14.0
	Total	50	100.0

Table 8 shows the difference between affected lumber vertebra and type of fracture which was found significant.

Table 8:

		Affected lumbar vertebra									Sig.
		L1	L1 & L2	L2	L2 & L3	L3	L3 & L4	L4	L4 & L5	L5	.000
Type of fracture	Compl-ex	12	3	0	0	0	0	0	0	0	
	simple	0	0	2	3	5	6	5	7	2	
	Comm-inuted	0	0	0	0	0	0	0	0	5	
Total		12	3	2	3	5	6	5	7	7	

Table 9 shows the association between severity of fracture and type of fracture which was found significant.

Table 9: Type of fracture * severity of fracture Cross tabulation

		Severity of fracture			Sig.
		mild	moderate	severe	
Type of fracture	complex	15	0	0	.000
	simple	15	10	5	
	comminuted	0	0	5	
Total		30	10	10	

DISCUSSION

Lumbar spine radiographs have been largely superseded by CT scans in the examination of lumbar spine injuries, and they are now only used in patients with closed lumbar spine injuries. Radiographs of the lumbar spine are occasionally used to assess trauma. A CT is also the diagnostic study of choice in the evaluation of lumbar spine injuries since it has a short acquisition time, is widely available, and is simple to interpret. CT scans of the lumbar spine, which have been around for over 25 years, take longer to complete.

In current study mostly patients were male 27(54%) and the least number of patients were females 23(43%). Lumbar spine injuries are more common in males. Another previously published observational study in 2015 by Manahel Mohamed Seed Ahmed et.al reported the similar results that incidence of male is greater than female about 56(70%) and female 43(30%). In current study the most frequent age group was 16-25 years 13(26%) and 5-65 years 15(30%) and the lowest frequency was 26-35 years 2(4%) & >65 years 2(4%). The number of spinal injuries is more common in elderly and younger patients. . In current study the most frequent weight was 66-75kg 20(40%) and the lowest weight was 46-55kg 8(16%). There is a high risk of lumber spine trauma in overweight patients. In current study the most frequent type was simple 30(60%) and the least type was comminuted 5(10%). Simple fracture is more common among other lumbar spinal fractures. In current study the most frequent findings were mild 30(60%). In current study the most common site of fracture is single vertebra 36(72%).in current study the most frequent affected lumber vertebra is L1 12(24%). Another previously published observational study in 2015 by Manahel Mohamed Seed Ahmed et.al reported the similar results that type of fracture are simple 16(53.3%), complex 11(36.7%), comminuted 3(10%), severity of fracture as mild 16(53.4%), moderate 7(23.3%) and severe 7(23.3%). Most common effected vertebrae L1 8(26.7%) and other vertebrae as L1 and L2 3(10%), L2 1(3.3%), L2 and L3 4(13.3%), L3 5(16.7%), L3 and L4 2(6.7%), L4 5(16.6%) and L5 2(6.7%).

To conclude, males have a higher incidence than females, with males. The vertebra number one is more influenced than the others in terms of the number of affected vertebrae. Simple fractures are the most common type of fracture.

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