iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** VIII **Month of publication:** August 2020

DOI: https://doi.org/10.22214/ijraset.2020.31002

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue VIII Aug 2020- Available at www.ijraset.com

Evaluate the various Protocols and Techniques for Spinal Trauma in MRI

Rajendra Pandit[1], Ms. Geetashree Majumdar[2], Dr. Abhishek Gupta[3].
[2]*Assistant Professor, Department of Radiology and Imaging Technology RIMT University, Mandi-gobindgarh, Punjab.*
[3]*M.D. Radio-diagnosis Department of Radio-diagnosis and imaging NIMS University, Jaipur*

Abstract: ***Objectives:-To determine the sensitivity and specific of MRI in evaluation of spinal trauma. To determine the localization and the common age group exposed to spinal trauma, spinal cord, hemorrhage, ligamentous injury.***
Methods:-The present retrospective study was performed on 60 patients that had MRI Spine scan with history of trauma. A period of 6 months from October 2019 to March 2020 is taken to study this topic. The information obtained was recorded on a self-designed data capture sheet. Data was analyzed using Microsoft Excel 2010. Sample size is calculated by:
$n = (Z_{1-\alpha})^2 (P\ (1-P)/D^2)$
Results:-A total of sixty (60) patients of the age range of (0-80) were referred for MRI scan of the spine to the department of radio-diagnosis with a clinical suspicion of a spinal trauma. Thirty seven (37) of the patients were males while twenty three (23) were females. Majority of the patients that fall within the age group with the highest patients i.e. (30-40) years were males.
In this study, majority of the patients that fall within the age of (30-40) of the patients with the highest number of Grade I & Grade II anterolisthesis in lumbar spine and Wedge compression fracture. Regarding the types of study, normal cases are 6.67% and abnormal cases are 93.33%.
Conclusion:- MRI is commonly used in the evaluation of acute spine trauma after the MDCT has been acquired because of its high sensitivity for soft tissue injury and it is therefore modality for evaluation of the spinal cord, ligaments, intervertebral discs, and Para spinal soft tissues. Although spine X-ray is the initial modality is suspected cases of injury, their further evaluation needs MRI for their accurate localization, analyzing their Morphology, involvement of adjacent structure and associated findings hemorrhage, ligamentous injury, spinal cord, fractures.
In the present study, overall Grade I & II anterolisthesis is the most common comportment involved.
Keywords:-Spinal trauma, MRI, Spinal cord, Hemorrhage, Ligamentous injury, Fractures.

I. INTRODUCTION

Trauma is a common and devastating insult to the spine and spinal cord with important long term sequel for both the individual and the society. In adult, it's more commonly seen. Neurological deficits may be transient, incomplete or complete. Patients with an incomplete deficit are benefited from aggressive therapy aimed at limiting secondary deterioration due to spinal cord ischemia and compression that can occur due to treatable causes such as disc herniation or extradural hematoma. Diagnosis is important for patient, clinicians and radiologists.

A. Mechanisms of Spinal Injury

1) *Flexion Injury:* Leading to anterior wedging of vertebral body with posterior longitudinal ligament/ interspinous ligament disruption.
2) *Extension Injury:* More common in cervical spine leading to posterior element fracture, anterior longitudinal ligament rupture and subluxation.
3) *Axial Loading:* Diving & jumping injury leading to burst fracture and lateral element fracture.
4) *Rotation Injury:* Leads to lateral mass fracture and facet subluxation.[9]

The roles of imaging in the assessment of spinal trauma are:

a) Diagnosis of fractures/dislocation
b) Assessment of stability/instability
c) Diagnosis of damage to or impingement on neurological structures
d) Follow-up
e) Assessment of treatment

Diagnosis of long-term complications such as post- traumatic syrinx or cyst formation.

©IJRASET: All Rights are Reserved

The main indications of MRI in spinal trauma include:

- Radiographic and/or MRI scan findings suggestive of ligamentous injury, such as pre-vertebral hematoma, spondylolisthesis, asymmetric disc space widening, facet joint widening or dislocations, and inter- spinous space widening.
- To look for epidural hematoma or disc herniation before attempting a closed reduction of cervical facet dislocations.
- To identify spinal cord abnormalities in patients with impaired neurological status.[5]

B. AIM

The present study is aimed to evaluate various techniques used in spinal trauma with the help of (1.5T Philips).In this paper we have also discussed about various protocols of MRI to diagnose spine trauma. Separate spine coils will be employed for imaging the spine. Before starting the procedure, a satisfactory written consent form is taken from the patient, then patient is asked to remove all metal object including keys, coins, wallet, any cards, jewellary, hearing aid and hairpins. Contrast injection risks and benefits must be explained to the patient. Gadolinium should only be given to the patient if GFR is > 30. If possible provide a chaperone for claustrophobic patient. Various protocols are applied to complete the scan.

C. The Typical MRI Protocol For Spinal Injury Includes

1) Sagittal T1 weighted (T1W) andT2 weighted (T2W) spin echo sequences,
2) Axial T1weighted (T1W) and T2 weighted (T2W)
3) Gradient recalled echo (GRE) sequence axial T2*W and sagittal T2*W GRE sequences
4) Sagittal and coronal short tau inversion recovery (STIR) sequences
5) Fat suppressed T1W/T2W sagittal images

II. METHODOLOGY

A retrospective cross-sectional design is used. As a source of data, the radiology record book is used. Data is analyzed using descriptive statistical tools, frequencies, mean and percentage. All records requests with an indication of spinal trauma. Sample size is calculated by:

$$\mathbf{n = (Z_{1-\alpha})^2 (P\ (1-P)/D^2)}$$

Reference: Kish, L. (1965). Survey Sampling. New York: Wiley[13]

1) $Z_{1-\alpha} = Z_{0.95} = 1.96$ (from normal distribution table. This value of 1.96 is standard for Confidence interval of 95%)

2) P = I/d (P is prevalence, I is incidence, d is duration)

= 50/10

= 5 =0.05%

3) D = 5% = 0.05 (D is determination of absolute precession)

4) $n = 1.96^2 (0.05(1-0.05)/0.05^2)$ (n is number of samples)

= 3.84(0.04)/0.0025

= 0.153/0.0025

= 61.2

5) So the sample size required is **61**.

Reference article: - Preethi Ganesan,et al. Role of CT and MRI in Spinal Trauma. International Journal of Contemporary Medicine Surgery and Radiology [8]

©IJRASET: All Rights are Reserved

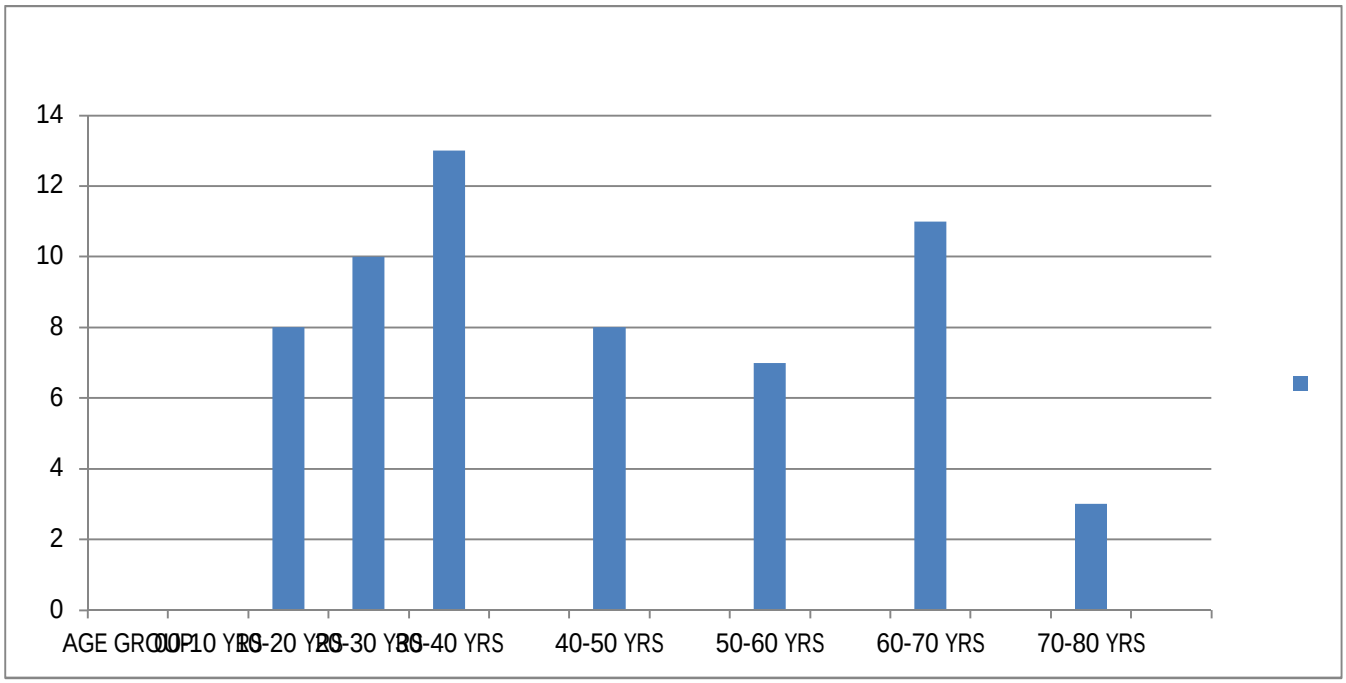
International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue VIII Aug 2020- Available at www.ijraset.com

III. RESULTS

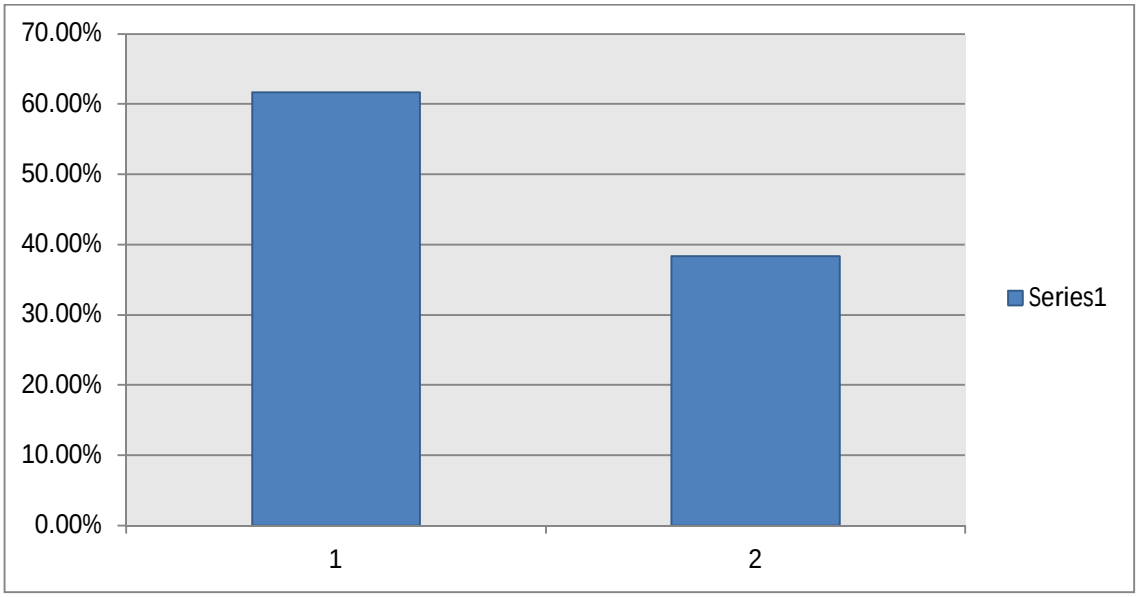
The sample studied consisted of 60 spinal traumas. Regarding age, 00 were 00–10 years old, 08 were 10-20 years old, 10were 20-30 years old, 13 were 30-40 years old 08 were 40-50 years old,07 were 50-60 years old, 11 were 60-70 years old,03 were 70-80 years old. The sample studied consisted of 60 patients of the age range of 10-80 were referred for MRI study to the department of Radio-diagnosis with a clinical suspicion of retrolisthesis , fracture , edema , hemorrhage , vertebral body height decreases ,Central spinal canal & B/L neural foramina, vertebral bodies ,alignment , IV discs appear, posterior elements (pedicle, lamina, spinous process and transverse process, spinal cord morphology, cord edema ,Facets joints, ALL, PLL, spinous ligaments and ligamentum flavum and pre and paravertebral soft tissues during the study period..

In my study, majority of the patients that fall within the age group with the highest patients i.e. 30-40 years old. Regarding the types of study, normal cases are 04 and abnormal cases are 56.

A. Age Wise Distribution of total Patients

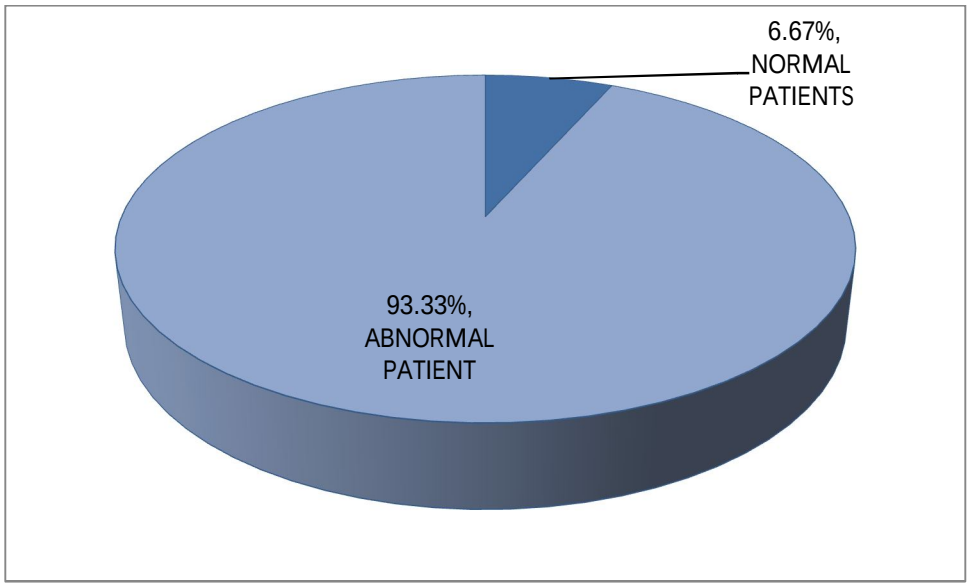


B. Sex Wise Distribution Of Patients



©IJRASET: All Rights are Reserved

C. Distribution Of Cases Abnormal And Normal



IV. DISCUSSION

This study consists of 60 patients that are scanned in magnetic resonance imaging machine. In this study, majority of the patients that fall within the age of (30-40) of the patients with the highest number of Grade I & Grade II anterolisthesis in lumbar spine and Wedge compression fracture. Regarding the types of study, normal cases are 6.67% and abnormal cases are 93.33%.

The common abnormality that I observed in my study is, Retrolisthesis, Grade I anterolisthesis , Grade II anterolisthesis , Anterior& Posterior wedge compression fracture , Vertebral body height decreases& alignment , mild edema , nerve root compression , hemorrhage collection, spinal cord and cord edema . Grade I & Grade II anterolisthesis of L5 over S1 with fracture of bilateral pars articularis and pseudo protrusion of L5-S1, Pre and Para vertebral spinal muscle and soft tissue neck injury. ALL, PLL,spinous ligaments and signal intensity, Old and multiple, wedge compression fracture of bilateral pars and edema in posterior paraspinal muscles which results indentation over ventralthecal as well as bilateral transversing nerve roots and vertebral body with retropultion or fracture fragment.

V. CONCLUSION

MRI is commonly used in the evaluation of acute spine trauma after the MDCT has been acquired because of its high sensitivity for soft tissue injury and it is therefore modality for evaluation of the spinal cord, ligaments, intervertebral discs, and Para spinal soft tissues. Although spine X-ray is the initial modality is suspected cases of injury, their further evaluation needs MRI for their accurate localization, analyzing their Morphology, involvement of adjacent structure and associated findings hemorrhage, ligamentous injury, spinal cord, fractures.

In the present study, overall Grade I & II anterolisthesis is the most common comportment involved.

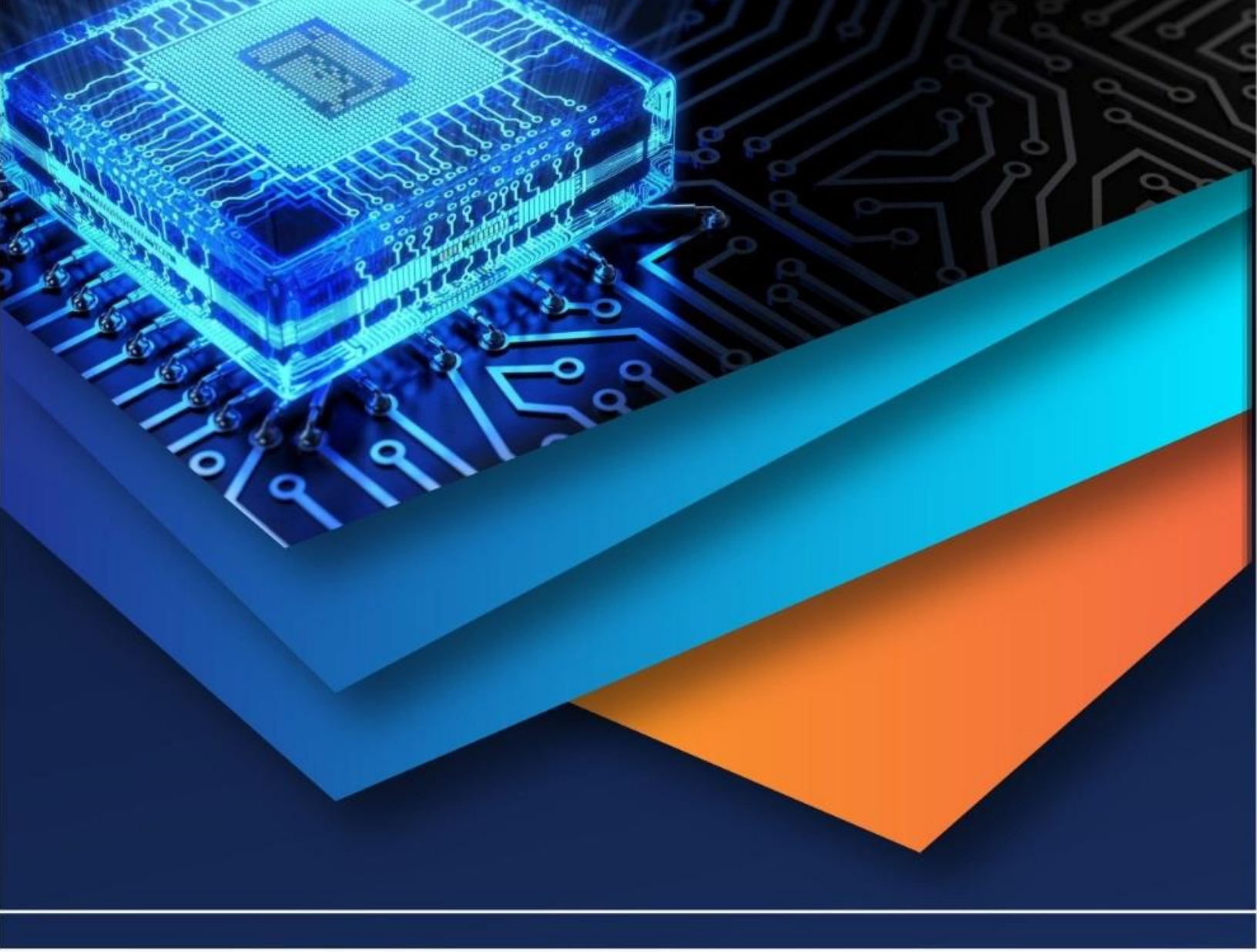
REFERENCES

[1] Bollipo JP, Rao PB. Evaluation of spinal injuries by MRI. IntSurg J 2019;6:542-6
[2] Guarnieri G, Izzo R, Muto M. The role of emergency radiology in spinal trauma. Br J Radiol 2016; 89: 20150833
[3] Johan W. M. Van Goethem Menno Maes.EurRadiol (2005) 15: 582–590
[4] Johan W. M. Van Goethem Menno Maes. Imaging in spinal trauma. EurRadiol (2005) 15: 582–590
[5] Kumar and Hayash BMC Musculoskeletal Disorders(2016).
[6] Naik BR, Sakalecha AK, Savagave SG. Evaluation of traumatic spine by magnetic resonance imaging and its correlation with cliniconeurological outcome. J Emerg Trauma Shock 2019;12:101-7
[7] Netter illustration from www.netterimages.com. c Elsevier Inc.
[8] PreethiGanesan, AbubackerSulaiman F, SooryaPrakash, E.A Parthasarathy, RajamaniAnand, RamyaKalaiarasan. Role of CT and MRI in Spinal Trauma. International Journal of Contemporary Medicine Surgery and Radiology. 2018;3(2):B11-B14
[9] S.Khurana.(2013), Magnetic resonance imaging in acute spinal trauma : European Society of Radiology
[10] Umesh .C. Parashari ,J Craniovertebra Junction Spine. 2011 Jan-Jun; 2(1): 17–26.
[11] Yenukoti, Rohit. (2015). Clinical anatomy of vertebral column.

©IJRASET: All Rights are Reserved

[12] Yogesh Kumar, DaichiHayash. BMC Musculoskeletal Disorders (2016) 17:310
[13] Kish, L. (1965). Survey Sampling. New York: Wiley
[14] Lubdha M. Shah, MD, Jeffrey S. Ross, MD, Imaging of Spine Trauma, *Neurosurgery*, Volume 79, Issue 5, November 2016, Pages 626–642.
[15] Lubdha M. Shah, MD* Jeffrey S. Ross, MD‡*Department of Radiology, University of Utah, Salt Lake City, Utah; ‡Department of Radiology, Mayo Clinic Arizona, Phoenix, Arizona Correspondence: Lubdha M. Shah, MD, Director of Spine Imaging, Associate Professor of Radiology and Neurosurgery, University of Utah,Published Online, July 12, 2016.
[16] MANIPAL MANNUAL SURGERY, 4TH EDITION.
[17] Physiopedia; registered charity in the U.k , no.1173185 “disc herniation”.
[18] Spectrum orthopaedics “ligaments disruption” November 03,2017.
[19] M A Kliewer, L Gray, J Paver, W D Richardson, J B Vogler, J H Mc Elhaney, B S Myers “acute spinal ligaments disruption: MR imaging with anatomic correlation”nov-dec,1993
[20] https://www.spineuniverse.com/anatomy
[21] Rihn JA, Anderson DT, Harris E, et al. A review of the TLICS system: a novel, user-friendly thoracolumbar trauma classification system. Acta Orthop 2008.
[22] Bono CM, Vaccaro AR, Hurlbert RJ, et al. Validating a newly proposed classification system for thoracolumbar spine trauma: looking to the future of the thoracolumbar injury classification and severity score. J Orthop Trauma 2006.
[23] Kerwin AJ, Bynoe RP, Murray J, et al. Liberalized screening for blunt carotid and vertebral artery injuries is justified. J Trauma. 2001

©IJRASET: All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)