ORIGINAL ARTICLE

Diagnotic Accuracy of Computed Tomography in Detection of Retinoblastoma

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ABSTRACT
Objective: to find out the accuracy of CT scan in diagnosing retinoblastoma with the gold standard of diagnosis being histopathology.
Study design: It is a cross sectional study
Done in the department of diagnostic radiology, Lahore general hospital, Lahore from 02-05-2013 to 01 -11 -2013.
Patients and Methodology: This study comprised of 240 patients with clinical suspicion of retinoblastoma. Computed tomography on Toshiba Asteion VF Model TXS 021B/1N, Single Slice Helical, images in the axial, sagittal and coronal projections was obtained without I/V contrast. The cases were operated and histopathological results were recorded. The results of computed tomography and histopathology were compared taking histopathology as gold standard.
Results: Out of 240 patients, 135 patients (56.25%) had retinoblastoma computed tomography. After comparison of results of computed tomography with histopathology, the sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of computed tomography were 87.14%, 90.48%, 92.19%, 84.82% and 88.75% respectively.
Conclusion: CT scanning with a sensitivity of 87.14% and a specificity of 90.48% in the diagnosis of retinoblastoma should be considered a worthwhile modality. It provides an edge in diagnosis with its accurate depiction of even the smallest calcifications. The earlier the detection, the earlier will be the treatment and its effectiveness.

Keywords: Retinoblastoma, Computed Tomography

INTRODUCTION
With an incidence of 1:14,000 - 1:20,000 live births retinoblastoma is considered the most common inherited malignancy of childhood

About 62% of patients have unilateral Retinoblastoma, 36% have bilateral Retinoblastoma and 1.3% of patients having unknown laterality. Mutations in RB1 gene (chromosomal location 13q14) has a greater than 90% risk of developing Retinoblastoma. Most patients are diagnosed in early childhood, before the age of 5 years. Recurrence rates are high; most patients present within one year of initial diagnosis and treatment with recurrent enlarging intraorbital mass.

Common presentation of Retinoblastoma children is with leukocoria and strabismus. Less common presentations are hyphaema, glaucoma, endophthalmitis and proptosis, it is detected in 56%of patients presenting with leukocoria or white reflex.

To see the extraocular extension of the retinoblastoma CT scan and MRI are both considered to be good modalities. However, CT has the upper hand as MRI is relatively insensitive for detecting calcifications.(7)

CT is the diagnostic procedure of choice due to dense calcification almost invariably observed in Retinoblastoma[4]. CT has a sensitivity up to 96% and a specificity of 96.42% in diagnosing retinoblastoma.

The rationale of this study was to establish CT scanning as an easily available, non invasive modality in the accurate early diagnosis of retinoblastoma obviating the need for a biopsy.

METHODOLOGY
This cross-sectional study was performed in Department of Diagnostic Radiology, Lahore General Hospital, Lahore from 02- 05-2013 to 01-11-2013 on a patient sample, sample of 240 with 95% confidence level, 3% margin of error with an expected sensitivity of 81- 96% and specificity

96.4% taking prevalence of Retinoblastoma as 56% in patients with Leukocoria.

All patients presenting with clinical suspicion of retinoblastoma referred from outdoor of Lahore General Hospital, Lahore meeting the inclusion criteria were taken. Patients with residual or recurrent retinoblastoma were excluded to avoid confounding variables. Informed consent was taken. Using Toshiba Asteion VF Model TXS 021B/1N, Single Slice Helical, images in the axial projections were obtained without I/V contrast. All the cases even with negative Computed tomography findings for retinoblastoma were operated and histopathological results were recorded. The results of Computed Tomography and histopathology were compared taking histopathology as gold standard

RESULTS

This study was conducted on 240 patients with clinical suspicion of retinoblastoma amongst which 109 patients (45.4%) were males and 131 patients (54.6%) were.

		CT-Sean Diagnosis		Total
		Positive		Negative
Histopathology	Positive	118	10	128
	Negative	17	95	112
Total		135	105	240

DISCUSSION

Retinoblastoma is easily diagnosed by eye examination if the optical media is clear and large calcified areas can also be documented by ophthalmoscopy.[10]

CT is important in the assessment of patients with clinically diagnosed retinoblastoma. CT allows accurate, rapid delineation of tumor size and location and whether or not there is retroorbital or intracranial extension. This information is important in planning treatment and determining prognosis.

MRI has been established as the method of choice in showing eye lesions but both CT and MRI are used as primary modalities to investigate the visual pathway in children. Both modalities prove invaluable in helping to differentiate between retinoblastoma and similar simulating lesion while also outlining in detail the intra and extra ocular structures and the brain.[11,12,13]

CT, however remains the modality of choice for detection of intraocular calcification and to investigate other orbital pathologies[1415] despite the disadvantages of decreased soft-tissue contrast and spatial resolution as compared with MR imaging; Use of iodinated contrast and radiation exposure is also an added disadvantage.

The method of choice for follow up imaging in established cases is MRI as it also provides information on intracranial involvement by the disease.[16] however, currently, MR imaging is not considered as specific as in detecting intraocular calcification.[17]

Although CT is superior in calcium detection.[18] the use of newer magnets (even if with the same magnetic field strength) allowing thinner sections may increase the specificity calcium detection. The development of a smaller diameter dedicated surface coil may allow the detection of very small intraocular lesions, even with a thickness of 1 mm. Results of a Turkish study established the median age to be 2 years in patients suffering from retinoblastoma and also suggested that an intrabulbar calcified mass in children younger than 3 years was most likely to be a retinoblastoma[20]. The study also concluded that retinoblastoma was rare in older age group.[21]

In this study all patients were in the age range 5- months to 60 months.

In this study, sensitivity and specificity of CT was 87.14% and 90.48%. Overall diagnostic accuracy was 88.75%. Results of this study is in accordance with the previous studies in which sensitivity of CT scan for the diagnosis of retinoblastoma was reported in between 81-96%.[13] [22] [23]Another study utilizing PET CT and done by Radhakrishan V et al showed the sensitivity to be 40.0% and the specificity to be 100%.[24]

Results of a local study from Karachi, Pakistan quoted the sensitivity of CT to be 91.4% and specificity to be 71.3% in diagnosing retinoblastoma on CT. The positive predictive value was 97.7 % while the negative predictive value came to only 20.0%. CT findings were based on the visualization of an intraocular mass which has a higher density value compared with the

vitreous body in addition to the presence of calcification in 90% of the cases.[26]

As per the findings of P. Galluzzi, intralesional calcifications seen as hyperattenuating areas were seen on CT in 27 of 28 eyes (96.42%).[25]CT shows an intraocular mass with higher density then the vitreous body and calcification in 90% of cases. The sensitivity and specificity of CT in retinoblas0na is 96% and 91% respectively.[26-27] (is this from another study. I didn't change it because I couldn't understand the sequence. Will do so when I understand)

It is also noted that MRI may benefit in estimating the degree of differentiation of tumor but is not as specific as CT as it lacks sensitivity in detecting calcium.

CONCLUSION

Conclusion: based on the sensitivity and specificity results which were 87.14% and 90.48% respectively we can safely assume CT to be a reliable diagnostic modality for the diagnosis of retinoblastoma. Calcification in the tumor is a reliable indicator of disease and CT is the best modality for its detection. In the end earlier detection results in earlier treatment which positively affects patient survival and quality of vision.

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