COMPUTED TOMOGRAPHY AND MAGNETIC RESONANCE IMAGING OF PATIENTS WITH ORBITAL RETINOBLASTOMA HELPS IN PROMPT DIAGNOSIS AND MANAGEMENT PLAN

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ABSTRACT

Retinoblastoma is the commonest intraocular malignancy of the infants and children. It is unique central nervous system tumor as it is visible to the naked eye and can be diagnosed with confidence clinically and radiologically without taking biopsy by non-invasive modalities like CT scan and MRI. CT scan can easily pick calcification in the tumor, its extent with involvement of nose and sinuses. It can also demonstrate bony erosion if any. MRI on the other hand can easily demonstrate peri neural and trans scleral extension of the tumor. In this way treatment options can also be planned along with prediction of prognosis in cases of retinoblastoma by using non invasive techniques like CT and MR scans.

Objective: Objective of this study is to determine the role of computed tomography and magnetic resonance imaging in diagnosis and management of retinoblastoma.

Methods: This study was performed in Radiology Department of Hayatabad Medical Complex Peshawar from 1st of January 2019 to 1st December 2019. It is was an observational descriptive study.

Results: CT scan is highly sensitive in diagnosis of retinoblastoma while MRI is highly sensitive in detecting peri neural and trans scleral spread of tumor for management plans.

Conclusion: CT scan and MRI are non-invasive methods with CT having high sensitivity and moderate specificity for detecting Retinoblastoma. MRI scan being helpful in diagnosing perineural and trans scleral spread. Both of these imaging modalities can help in prompt diagnosis, management and prognosis of retinoblastoma.

Key words: Retinoblastoma, MRI, CT

INTRODUCTION

Retinoblastoma is the commonest eye cancer in children. It arises in the developing retina which is a part of the central nervous system (CNS). If it is diagnosed early, the chances of saving the eye from enucleation increases. Early diagnosis can increase the survival rate up to 95%.[1]

On the other hand, if it is diagnosed late with extraocular spread along sclera emissary vessels and retrolaminar invasion of the optic nerve ; it is then associated with a high mortality rate.[2,3]

As its name implies, retinoblastoma originates in the retina. Retinoblastoma can extend from retina either toward the inner aspect of the globe (endophytic growth) or toward the sclera (exophytic growth). Both endophytic and exophytic types of retinoblastoma have their own complications. Those having endophytic growth pattern have high chances of vitreous seeding. While retinoblastomas having exophytic growth pattern grows in the sub retinal space, leads to retinal and choroidal detachments and sub retinal seeding.[4] Now in general clinical practice we mostly can not have a separate type of growth pattern of retinoblastoma ; as most of the tumors have mixed growth pattern having clinical pictures of both the types.[5] Some of the presentations of orbital retinoblastomas include diffuse infiltrating retinoblastoma, necrotic retinoblastoma which is associated with orbital cellulitis, and an even rarer pattern that results in phthisis bulbi.

The conservative management of retinoblastoma has now proven successful in the early stages of retinoblastoma and some advanced stages, avoiding surgical enucleation. Combination of systemic chemotherapy, peri-ocular chemotherapy, cryotherapy, laser coagulation and radioactive plaque techniques are used to effectively treat retinoblastoma. Chemotherapy has proved very useful for treatment of retinoblastoma and protecting the eye from enucleation but it has adverse effect of myelosuppression and infections.[6] Other new techniques include intra arterial infusion of Mephalan through internal carotid artery and ophthalmic artery.[7-9]

As treatment lines of retinoblastoma have changed from enucleation to less invasive and eye saving techniques, the non invasive imaging techniques have coined there great importance in early diagnosis of disease and its extent. CT has a high sensitivity regarding detection of calcification in the tumor, with

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detection of bony destruction.

Diagnosis of retinoblastoma is usually made by the ophthalmologist. Intraocular extent of the retinoblastoma can be diagnosed with confidence with use of Ophthalmoscopy. But if the ocular media is unclear or there is massive vitreous seeding, or when the mass is large enough to block ophthalmologist view then CT and MRI are used to detect extent of tumour. Aim of our study is to determine the role of CT and MRI in early diagnosis of retinoblastoma and planning proper management of the tumour.

MATERIALS AND METHODS

This is a descriptive observational study that is done from 1st Jan 2019 to 31st December 2019 in Radiology Department of Hayatabad Medical Complex. CT and MRI sections covered the process of collecting data for the study. All those patients who had suspected intra ocular retinoblastoma on ophthalmological examination and subsequently underwent CT and MRI were enrolled in our study. Ethical committee approval was taken to carry out the study.

RESULTS

A total of 35 CT orbit were reported in our department in this time period of one year which were diagnosed as retinoblastoma on the basis of their appearance and presence of calcification. 22 of these diagnosed retinoblastoma cases had MRI for evaluation of tumour extension. 6 of the cases out of these 22 cases were biopsy proven cases. 3 more cases were biopsied after reporting and were positive. 7 cases were treated just on the basis of imaging and clinical diagnosis only. Out of 22 cases 11 cases showed perineural and trans scleral spread. 2 of the cases had extension in the frontal lobe of the brain. One of the case had an additional finding of syrinx and high signals in cervical spine. Also one of the case of 4 year old girl was the case of trilateral retinoblastoma having bilateral orbital retinoblastomas along with pineoblastoma.

DISCUSSION

Retinoblastoma being a common and potentially dangerous condition with regards of its morbidity and mortality needs to be diagnosed as early as possible. Retinoblastoma is also highly curable cancer if diagnosed on time. In the previous ten years advancement has been made in terms of conservative management of Retinoblastoma. Combined chemotherapy and focal therapies (laser photocoagulation, cryotherapy etc) have resulted in increased rate of local tumour control and eye preservation[10].

Crude incidence of retinoblastoma in Asian countries ranges between 4.4 and 3.3 million among males and females. Illiteracy and unawareness results in late presentation in under developed countries leading to poor prognosis of the disease[11].

Diagnosis and treatment of retinoblastoma involve a multidisciplinary approach, for which diagnostic Radiology plays a crucial role, both for non invasive diagnosis and also for staging and management plan. Imaging modalities are also very important tool for diagnosing orbital retinoblastoma as biopsy increases chances of tumor seeding.[12]

At MR imaging, retinoblastoma appear as heterogeneously hyperintense lesion on T1-weighted images and heterogenously hypointense to ocular fluid on T2-weighted images.

Calcification is seen in all patients with retinoblastoma and high sensitivity of the CT for detecting calcium makes it cost effective and reliable diagnostic modality. CT scanning also helps in differentiating Retinoblastoma from other similar calcific conditions in the orbit like Coat's disease etc. In addition simultaneous scanning of brain can be used to evaluate intracranial extension.[13]One advantage of CT over MRI is its high sensitivity to detect calcification. Also its limited imaging time reduces risk of motion blur which can lead to image degradation in MRI[14].

22 out of 35 cases reported in CT as orbital retinoblastomas were followed by MRI orbits in our department. 9 of the cases were histologically confirmed to be retinoblastoma while others were treated on the imaging findings alone. All these 22 cases in whom both CT and MRI was performed for diagnosis , staging and extensions were followed uptil their first treatment line. All these cases were treated according to imaging diagnosis and there staging done by MRI in Ophthalmology Departments in Hayatabad Medical Complex and some of the cases in Khyber Teaching Hospital. There management plans varied from chemotherapy, ablation to enucleation.

CONCLUSION

CT and MR imaging both plays an important role in diagnosis and management of orbital retinoblastoma cases. CT is highly sensitive and moderately specific and being readily available is becoming primary baseline investigation along with clinical and ophthalmoscopic examination in our setup. MRI with its high tissue contrast and improved spatial resolution, is also becoming mainstay in the diagnosis and specially local staging of retinoblastomas.

By understanding the various manifestations and there appearance on both CT and MRI predicts there management and prognosis.

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