



SIGNIFICANCE OF ULTRASONOGRAPHY IN EVALUATION OF VITREORETINAL PATHOLOGY

Ophthalmology

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ABSTRACT

INTRODUCTION:

Vitreoretinal pathologies include vitreal haemorrhage and vitreal detachment, retinal detachment, retinoblastoma, diabetic retinopathy, leukocoria, trauma over eye. The eye being an external sense organ lends itself to an easy and rapid examination of anterior segment but structure posterior to the papillary plane i.e lens, vitreous cavity and humor, retina, choroid in an opaque media could not be evaluated by just fundus examination.

OBJECTIVES OF RESEARCH: Demographic profile of patient with vitreoretinal pathologies. Diagnose the patient with vitreoretinal pathologies by ultrasonography. Detect and characterize the vitreoretinal pathologies by ultrasonography, clinical findings and post management confirmatory findings to establish the diagnostic accuracy of ultrasonography in vitreoretinal pathologies.

MATERIAL AND METHOD:

Study design: Institution based prospective, descriptive study

Study setting: USG section at Dept. of Radiodiagnosis, Medical College, Kolkata

Place of study: Dept. of Radiodiagnosis, Medical College, Kolkata

Period of study: January 2018 to august 2019

Study population: Referred patient from regional institute of ophthalmology

Sample size: 50 patients.

RESULT AND ANALYSIS: We showed that 29(48.3%) patients had vitreous haemorrhage. 19(31.7%) patients had retinal detachment. 10(16.7%) patients had posterior vitreous detachment. 7(11.7%) patients had endophthalmitis. 9(15.0%) patients had retinoblastoma. 1(1.7%) patients had PHPV. 1(1.7%) patients had asteroid hyalosis. 1(1.7%) patients had retinoschisis. 5(8.3%) patients had normal.

SUMMARY AND CONCLUSION: From, the present study it was noted that Ultrasonography is very efficient tool in diagnosing various ocular abnormalities. Ultrasonography can categorize the lesions in the posterior chamber well, depending on the echotexture and anatomy. Even the exact location of the lesion and surrounding structures can be well made out. Ultrasonography can detect structural changes that were missed or could not be detected by clinical examination especially with opaque media as well. Ultrasonography is proved to be very useful diagnostic tool in detection and evaluation of vitreo-retinal pathologies in patients with opacities in the vitreous cavity.

KEYWORDS

Ultrasonography And Vitreoretinal Pathology

INTRODUCTION

Vitreoretinal pathologies include vitreal haemorrhage and vitreal detachment, retinal detachment, retinoblastoma, diabetic retinopathy, leukocoria, trauma over eye. The eye being an external sense organ lends itself to an easy and rapid examination of anterior segment but structure posterior to the papillary plane i.e lens, vitreous cavity and humor, retina, choroid in an opaque media could not be evaluated by just fundus examination. It requires special examination technique to assess their functional and structural integrity. Ultrasonography is a noninvasive procedure, simple, cost effective and it is very useful in diagnosis of vitreoretinal pathology because of availability of unique information even in presence of opaque media. It also give topographic information of the pathologies and additional information about the condition of surrounding structure which sometimes required for surgical procedure. The application of ultrasound has steadily increased over the time in the field of ophthalmic diagnosis.

Ultrasound is an acoustic wave that consists of an oscillation of particles within a medium. Imaging of the eye and orbit is facilitated by the use of the high frequency sound (8-10 MHz, 20 MHz, and 50-100 MHz) ¹. First use of ultrasound in ophthalmology was in 1956 by Mundt and Hughes who used A-scan mode to evaluate an intraocular tumor ², while Baum and Greenwood were first to introduce B-scan into the ophthalmology ³. In 1979, standardized echography was introduced to ophthalmology as a term that refers to combined use of contact B scan (Brightness modulation) and standardized A-scan (Amplitude modulation) for evaluation of ocular and orbital pathology ⁴. Ultrasonography has developed significantly and is important diagnostic method if visualization of posterior eye segment is reduced and when pathology is clinically visible for monitoring of the disease progression. ⁵ Although not providing the resolution of Optical Coherence Tomography (OCT), high resolution ultrasound imaging can be used in the presence of optical opacities and allows evaluation

of deeper tissue structures ⁵. Ultrasonography can provide highly accurate (up to 96%) result in clinically suspected posterior eye segment pathology. ⁶ The frequency used in the diagnostic ophthalmic ultrasound for posterior segment is 8-10MHz

OBJECTIVES OF RESEARCH

General:

- To study the demographic profile of patient with vitreoretinal pathologies.
- To diagnose the patient with vitreoretinal pathologies by ultrasonography.

Specific:

- To detect and characterize the vitreoretinal pathologies by ultrasonography
- To compare the result with clinical findings and post management confirmatory findings to establish the diagnostic accuracy of ultrasonography in vitreoretinal pathologies.

MATERIAL AND METHOD

Study design: Institution based prospective, descriptive study

Study setting: USG section at Dept. of Radiodiagnosis, Medical College, Kolkata

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Period of study: January 2018 to August 2019

Study population: Referred patient from regional institute of ophthalmology

Sample size: 50 patients.

Control: Not required.

INCLUSION CRITERIA: Patient of all age group belongs to either sex with suspected vitreoretinal pathologies by clinical examination after receiving informed consent.

EXCLUSION CRITERIA:

- All cases suspected to have isolated anterior segmental and orbital lesion.
- Patient who did not give informed consent for examination

Study variable : Age, sex, findings in of ultrasonography.

Data collection and interpretation :

- Demographic data such as age, sex, address, occupation, religion, socioeconomic status
- Chief complains, history of present illness, history of systemic illness – dimness of vision, trauma to eye, diabetes.
- Findings of USG.
- Data about management of patient and post management confirmed diagnosis.

Laboratory findings: routine examination of blood, Sugar (fasting and post prandial)

Outcome definition and parameter: The result of USG findings and diagnosis will be confirmed with post management (confirmed) diagnosis to determine accuracy of USG to diagnose vitreoretinal pathology

RESULT AND ANALYSIS

Our study showed that 18(36.0%) patients had female and 32(64.0%) patients had male. 10(20.0%) patients had ≤ 30 years of age, 11(22.0%) patients had 31-40 years of age, 10(20.0%) patients had 41-50 years of age, 8(16.0%) patients had 51-60 years of age, 6(12.0%) patients had 61-70 years of age and 5(10.0%) patients had 71-80 years of age. 26(46.4%) patients had left eye affected and 30(53.6%) patients had right eye affected. 28(46.7%) patients had left eye examined and 32(53.3%) patients had right eye examined. 56(93.3%) patients had accuracy of USG. 56(93.3%) patients had diminution of vision. 9(15.0%) patients had inaccurate PL/PR. 6(10.0%) patients had high myopia. 15(25.0%) patients had congestion. 20(33.3%) patients had pain. 8(13.3%) patients had cat's eye reflex. 8(13.3%) patients had diabetes mellitus. 5(8.3%) patients had shallow AC. 6(10.0%) patients had deep AC.

We found in 24(40.0%) patients had vitreous haemorrhage. 19(31.7%) patients had retinal de-tachment. 9(15.0%) patients had posterior vitreous detachment. 8(13.3%) patients had endophthalmitis. 9(15.0%) patients had retinoblastoma. 2(3.3%) patients had PHPV. 1(1.7%) patient had asteroid hyalosis. 1(1.7%) patient had retinoschisis. 1(1.7%) patient had no definite clinical suspect. 28(46.7%) patients had vitreous haemorrhage. 18(30.0%) patients had retinal detachment. 11(18.3%) patients had posterior vitreous detachment. 6(10.0%) patients had endophthalmitis. 9(15%) patients had retinoblastoma. 1(1.7%) patients had PHPV. 1(1.7%) patients had asteroid hyalosis. 4(6.7%) patients had retinoschisis. 9(15.0%) patients had normal USG.

We showed that 29(48.3%) patients had vitreous haemorrhage. 19(31.7%) patients had retinal detachment. 10(16.7%) patients had posterior vitreous detachment. 7(11.7%) patients had endophthalmitis. 9(15.0%) patients had retinoblastoma. 1(1.7%) patients had PHPV. 1(1.7%) patients had asteroid hyalosis. 1(1.7%) patients had retinoschisis. 5(8.3%) patients had normal.

Table : Distribution of USG Diagnosis

		Frequency	Percent
Vitreous Haemorrhage	No	32	53.3%
	Yes	28	46.7%
Retinal Detachment	No	42	70.0%
	Yes	18	30.0%
Posterior Vitreous Detachment	No	49	81.7%
	Yes	11	18.3%
Endophthalmitis	No	54	90.0%
	Yes	6	10.0%
Retinoblastoma	No	51	85%
	Yes	9	15%
PHPV	No	59	98.3%
	Yes	1	1.7%
Asteroid Hyalosis	No	59	98.3%
	Yes	1	1.7%
Retinoschisis	No	56	93.3%
	Yes	4	6.7%

Normal USG	No	51	85.0%
	Yes	9	15.0%

DISCUSSION

We found that 18(36.0%) patients had female and 32(64.0%) patients had male. 10(20.0%) patients had ≤ 30 years of age, 11(22.0%) patients had 31-40 years of age, 10(20.0%) patients had 41-50 years of age, 8(16.0%) patients had 51-60 years of age, 6(12.0%) patients had 61-70 years of age and 5(10.0%) patients had 71-80 years of age. 6(46.4%) patients had left eye affected and 30(53.6%) patients had right eye affected. 28(46.7%) patients had left eye examined and 32(53.3%) patients had right eye examined. 56(93.3%) patients had accuracy of USG.

It was found that 56(93.3%) patients had diminution of vision. 9(15.0%) patients had inaccurate PL/PR. 6(10.0%) patients had high myopia. 15(25.0%) patients had congestion. 20(33.3%) patients had pain. 8(13.3%) patients had cat's eye reflex. 8(13.3%) patients had diabetes mellitus. 5(8.3%) patients had shallow AC. 6(10.0%) patients had deep AC.

Zvornicanin Jet al ⁷ (2012) found that (39.7%) eyes had poor posterior segment visualization, 21 (14.4%) eyes due to dense cataracts and 37 (25.3%) eyes due to different vitreous opacities. 88 (60.3%) eyes had good or partial posterior eye segment visualization, where 67 (45.9%) eyes had proliferative vitreo-retinopathy and 55 (37.7%) eyes had tractional retinal detachment. Most common causes for referral to vitreo-retinal surgeon were ocular complications of diabetes mellitus 94 (64.4%), ocular trauma 18 (12.3%), rhegmatogenous retinal detachment 16 (10.9%) and intraocular inflammation 9 (6.2%). Ultrasonography confirmed suspected diagnosis and operative management plan in 120 (82.2%) eyes, subclassified previously established diagnosis in 19 (13%) eyes and helped further operative planning and established completely new diagnosis and changed initial management plan in 7 (4.8%) eyes. The final clinical diagnosis confirmed the ultrasonography findings in 142 from 146 (97.3%) eyes. Dawood Z et al ⁸ (2008) found that the cases were divided according to age ranging from 0-80 years. Maximum no. of patients studied was in 5th decade (22%). Male predominance was seen with sex ratio 3.1:1 (M:F). Loss of vision and redness of eye were the leading symptoms. Maximum no. of ocular abnormalities studied were of Vitreous (40.2%) followed by Retina (25.77%). Also Among vitreous abnormalities, Vitreous hemorrhage was the most common accounting for 56.41% cases followed by vitreous detachment (33.33%), vitreous band was found in 10.25% cases. Retinal detachment was the common retinal abnormality detected (41.5%), while retinoblastoma was seen in 5.66% cases.

Elshafie MA et al ⁹ (2018) found that Overall, 68% of them were males, and 73.7% were younger than 40 years. The commonest findings in B-scan US were vitreous hemorrhage and retinal detachment (21.1% each).

Boroffka SA et al ¹⁰ (2007) found that the overall sensitivity, specificity and accuracy of ultrasonography for diagnosing ocular lesions was 93.1%, 97.14% and 94.62% (P value < 0.0001) compared to 50.0%, 97.14% and 67.74% for clinical examination respectively. The sensitivity, specificity and accuracy of ultrasonography for diagnosing orbital lesions was 82.60%, 97.14% and 93.55% (P value < 0.0001) respectively. B-scan ultrasonography was the initial imaging modality opted in most of the cases as it was readily available, simple, cost effective, non ionizing, non invasive and reliable modality. It has a higher spatial and temporal resolution compared to both CT and MRI for the diagnosis of ocular pathologies. It superseded the accuracy of ophthalmoscopy in the diagnosis of posterior segment ocular pathologies with significant difference (p-value < 0.0001).

Chaudhari HD et al ¹¹ (2013) found that Most of the patients presented with retinal detachment, n=45 (48.91%), vitreous haemorrhage, n=43 (46.73%) followed by vitreous degeneration, n=12 (16.30%). Choroid detachment was seen in 6 patients (6.52%) followed by Melanoma in 2 patients (2.17%) and Panophthalmitis in 1 patient (1.09%). The sensitivity of USG was 97.7% and specificity was 80% among patients with statistical significance (p<0.001). The present study shows that B-scan was useful for accurately diagnosing 92 patients, out of which 86 (93.47%) cases had some pathology while 6 (6.52%) patients were found normal. It also shows the utility of B-scan for evaluating the posterior segment in the presence of opaque ocular media.

Present study found that according to Clinical Diagnosis, 24(40.0%) patients had vitreous haemorrhage. 19(31.7%) patients had retinal detachment. 9(15.0%) patients had posterior vitreous detachment. 8(13.3%) patients had endophthalmitis. 9(15.0%) patients had retinoblastoma. 2(3.3%) patients had PHPV. 1(1.7%) patient had asteroid hyalosis. 1(1.7%) patient had retinoschisis. 1(1.7%) patient had no definite clinical suspect.

According to USG Diagnosis, 28(46.7%) patients had vitreous haemorrhage. 18(30.0%) patients had retinal detachment. 11(18.3%) patients had posterior vitreous detachment. 6(10.0%) patients had endophthalmitis. 7(11.7%) patients had retinoblastoma. 1(1.7%) patients had PHPV. 2(3.3%) patients had asteroid hyalosis. 4(6.7%) patients had retinoschisis. 9(15.0%) patients had normal USG.

SUMMARY AND CONCLUSION

Ultrasonography is a non-invasive, safe and cost-effective real time diagnostic tool to detect posterior segment pathologies in presence of media opacities. Ultrasonography is highly sensitive in finding the associated pathologies like retinal tear, retinal detachment and vitreo-retinal membranes in presence of vitreous haemorrhage obscuring retinal view which helps in deciding the correct treatment plan for the patient.

In our study accuracy of USG to evaluate vitreoretinal pathology was 93.3%. We found Sonological diagnosis correlated very well with the final diagnosis and formed a major basis for management decisions in significant number of cases. From the present study it was noted that Ultrasonography is very efficient tool in diagnosing various ocular abnormalities. Ultrasonography can categorize the lesions in the posterior chamber well, depending on the echotexture and anatomy. Even the exact location of the lesion and surrounding structures can be well made out. Ultrasonography can detect structural changes that were missed or could not be detected by clinical examination especially with opaque media as well.

Ultrasonography is proved to be very useful diagnostic tool in detection and evaluation of vitreo-retinal pathologies in patients with opacities in the vitreous cavity.

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